ANALYTIC APPROACH TO RISK ASSESSMENT IN THAILAND'S REAL ESTATE DEVELOPMENT INDUSTRY

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UNIVERSITY HAVE REQUESTED THE FOLLOWING FIGURES AND TABLE TO BE REDACTED

FIG 1 P4

FIG 1.1 P9

TABLE 1 P11

TABLE 1.1 P12

TABLE 2 P29

FIG 2.1 P30

FIG 3 P43

FIG 3.1 P45

FIG 3.2 P46

TABLE 3 P55

TABLE 4 P59

TABLE 4.1 P61

TABLE 4.4 P68

TABLE 5 P81

ABSTRACT

This research aims to introduce an innovative risk assessment model to Thailand real estate's industry as well as to investigate the risk perception of Thai practitioners. A theoretical framework that was developed from a review of the extant literature was used in the subsequent stages of research design, data collection and analysis. The extensive literature review revealed that the systematic risk assessment methods were too remote from the existing industry practices and these shall be considered as valid approaches by industry.

The theoretical frameworks were established based on the requirements of Social, Technological, Environmental, Economic, and Political (STEEP) factors. These were well rooted in practice and that individual perception toward risk was a key experiential aspect of risk assessment. The research strategy was designed as a two-phase approach. The first phase was a quantitative approach using the questionnaires survey techniques to gather 210 Thai developers' opinions towards risk assessment practices and the perception towards STEEP factors. The resultant data set was analysed with the statistic tests such as Component Analysis (CA), Explorative Factor Analysis (EFA), etc. The EFA test was applied to 66 risk assessment criteria in order to form the risk assessment model.

The phase 1 resulted in a tentative model which was explored in the qualitative phase (phase 2) of the study. This phase adopted the interviews with 13 Thai real estate practitioners, the interview transcripts were analysed using the content analysis and manual coding. The details of risk in this industry, and the requirements/features for the ideal risk assessment model were revealed in this phase. These were expanded and synchronised with the model developed from the EFA theorem in the first phase. In order to validate the tentative risk assessment model, a case study approach was implemented with 4 real estate experts, the results insisted that this model was acceptably developed and this could be used in the real business case because of it covered on the major existing risks in this real estate industry.

The final outcome of this research is a validated risk assessment model which forms the basis for assessing risks in the real estate projects which is closely aligned to an industry practice and can lead to an incremental improvement of risk assessment in the property industry.

ACKNOWLEDGEMENT

ABBREVIATIONS

ACT	-	Australian Capital Territory Insurance Authority
AHP	-	Analytical Hierarchical Process
ANOVA	-	Analysis of Variance
APTU	-	Faculty of Architecture and Planning, Thammasat University
ASA	-	Association of Siamese Architects Under Royal Patronage
ASEAN	-	The Association of Southeast Asian Nations
BMA	-	Bangkok Metropolitan Area
BOT	-	Bank of Thailand
CISDM	-	Centre for International Securities and Derivatives Markets
CPI	-	Corruption Perception Index
EBITDA	-	Earnings before interest, taxes, depreciation and amortisation.
EFA	-	Explorative Factor Analysis
EGAT	-	Electricity Generation Authority of Thailand
ETA	-	Event Tree Analysis (Fault Tree)
EXIM	-	Export and Import Bank
FAR	-	Floor Area Ratio
FI	-	Financial Institutions
GDP	-	Gross Domestic Product
GHB	-	Government Housing Bank
LDO	-	Local District Office
MCDM	-	Multi- Criteria Decision Making
MCS	-	Monte Carlo Simulations
OSR	-	Open Space Ratio
PMBOK	-	Project Management Body of Knowledge
PRS	-	Political Risk Services
PWD	-	Public Work Department
RAM	-	Risk Assessment Method
ROI	-	Return on Investment
SEC	-	Stock Exchange Committee
SET	-	Stock Exchange of Thailand
SME	-	Small and Medium size organisations/developers

GLOSSARY AND TERMS

ANP — *"Analytic Network Process"* is the decision-making supporting system, implemented by Professor Thomas L. Saaty. The Analytic Network Process (ANP) is a general form of the Analytic Hierarchy Process (AHP) used in multi-criteria decision analysis. The AHP structure a decision problem into levels forming a hierarchy, while the ANP is using a network approach. Then use a system of pair-wise comparisons to measure the weights of the items in the hierarchy, and finally to rank the alternatives in the decision.

AREA — Agency for Real Estate Affairs, this is Thailand's independent property consultants specialising in international standard valuation, survey, and research and information services. Further information of this agency were included in www.area.co.th

Discount rate — The interest rate used in determining the present value of future cash flows (Farlex, 2010)

GHB — Government Housing Bank, this is the special-purpose financial institution under the Finance Ministry's supervision opened for business on September 24, 1953, with its mission being to help secure appropriate housing finance for the general public. Further information in regard to this bank could be found in http//www.ghb.co.th

ONESDB — Office of the National Economic and Social Development Board of Thailand, this organisation is established by government of Thailand, with the missions to be a Central planning agency as well as to develop the strategy formulation towards balanced and sustainable development while upholding national interests and keeping up with unexpected changes with high efficiency. This office entered by the following website: http:// www.nesdb.go.th

REIC — Real Estate Information Centre, the information centre formed by Thai Government in order to provide the necessary information of the real estate industry such as numbers of projects, registered projects in particular area. In this research, the information of number of housing in studied area was obtained by REIC database. This centre could be accessed by website: http://www.reic.or.th

STEEP — "STEEP" is an abbreviation of Social, Technical, Environmental, Economic, and Political Factors analysis. Those factors are strongly involved in each project development stage (Morrison, 2007). STEEP describes a framework of macro-environmental factors used in project or investment environmental scanning. It is a part of the external analysis, when doing marketing research which gives an overview of the different macro- environmental factors that the company has to consider while investing in any project. It is a useful strategic tool for understanding market growth or decline, business position, potential and direction for operations.

TABLE OF CONTENTS

Abstract
Acknowledgement
Abbreviation
Glossary and terms

LIST OF TABLES

LIST OF FIGURES

LIST OF EQUATIONS

APPENDICES

CHAPTER 1: THE THAILAND REAL ESTATE BUSINESS

1.1. RESEARCH BACKGROUND

The real estate development sector is vulnerable to the consequences of risks, which are associated with the uncertainty of controlled factors that could be categorised as Social, Technological, Economic, Environmental and Political (STEEP) factors (Morrison, 2007; Chapman 2009; Nezhad and Kathawala, 1990), those regularly relevant to decision-making on the project development. It could be then concluded that risk occurring in real estate development projects must be considered and should not be underestimated, as those affecting to project management processes at all stages of the entire projects lifecycle, in terms of scheduled delay, cost overrun and inappropriate quality of products (PMBOK, 2002; Flyvbjerg, et al, 2003). However, Gehner et al., (2006) indicated that most of Dutch real estate developers considered that the project risks are caused by several subjective or external issues such as policy change, the resistance/opposition of administrative processes, the objection against building plans by citizens and changes in environmental legislation. These then affect to the progress of the project by several indirect causes, such as increase of interests, change in design and postponement of construction start dates, which lead to delay of the completion date as well as affecting the real estate marketing process, and the project revenue in the following way: *"decrease in rental/sale price, decrease in velocity of sales, cause a higher vacancy rate and lower investment value"*. (Gehner et al., 2006, pp.547)

Blundell, (2007) and Booth et al., (2002) stated that the practitioners currently do not have proper systematic risk assessment methods to assess these risks. An innovative risk assessment technique to assess the consequences of project management risks under the changing business environment shall be implemented. The ideal models shall apply a variety of complimentary approaches, which are grounded in a rigorous and preferably quantitative framework; therefore, risk management processes shall include an assorted mix of *"quantitative statistical framework"* as well as several techniques to test risks caused by the subjective issues (Booth et al., 2002).

This research comprehensively studies on risks, and risk assessment, the perceptions towards risk of the practitioners will be investigated and analysed in order to support the aforesaid statements that the real estate practitioners need a proper risk assessment technique. Therefore, the alternative risk assessment technique for this industry will be introduced in this study.

This study then emphasises on the risk perceptions and a proper risk assessment technique that provide more precise data based on the systematic structure. Booth et al., (2002) suggested that the practical tools, which could analyse risks, their impacts and computed the results in a numerical or statistical format shall be implemented. Frodsham (2007) supported that the ideal method for this business should allow the synthesising of the risk assessment criterion, comparisons of each factors and help the practitioners to structure the decision-making process. These processes shall be supported by the modern methods of mathematical statistics (Booth, et. al, 2002). For example, Analytic Network Process (ANP), or Analytical Hierarchy Process (AHP), however, these models are not developed specifically to deal with this real estate business' risk assessment, despite the fact that ANP was proven in its effectiveness assessing risks in the commercial real estate development sector(Chen & Khumpaisal, 2009).

The introductory chapter provides the fundamental information of this study and its structure. It commences with the research background and a brief description of the studied area's real estate business context, research questions, research assumptions, aims and objectives and contributions to knowledge, while the structure of overall thesis is attached at the end of this chapter.

1.2. THAILAND'S REAL ESTATE BUSINESS CONTEXT

Thailand situates in the middle of the South East Asia region, it is the world's 51st largest country in terms of total area, with a surface area of approximately 513,000 km^2, and a population of approximately 63 million people (ONEDSB, 2007).

In the macroeconomic level, the Economist Intelligent Units (2009) announced the growth of Thailand's real gross domestic product (GDP) was revised as -4.4%, affected from the slow growth of 2.6% in 2008. The Thai economy had been forecasted to fall down sharply by 4.3% (Year on year) in the fourth quarter of 2008, much deeper than expectation, as it was 5% growth was achieved in the first 3 quarters (ONEDSB, 2009). The contraction was attributed mainly to the deterioration in global economic conditions as the deterioration was rapidly exacerbated by political uncertainty and frequent changes of government. This domestic uncertainty has also delayed the disbursement of government budgets and the implementation of public projects and caused the economic momentum to be weakened. However, economic stability remains in check and manageable, as it is reflected in low inflation and low unemployment rates. ONESDB, (2009) gives the inflation rate of 2009 as (-0.5%)-(0.5%), while indicating that the unemployment rate could have surged to 2.5%-3.5%. The current account was estimated to be in a surplus of about 0.0%-1.0% of

GDP. Moreover, Exim Bank, (2009), predicted that in 2009, GDP amounted to an estimated US$ 278 billion in 2008, while the GDP per capita was US$ 4,149. The consumer price inflation increased to 5.5% in 2008, as compared to 2.2% in 2007, mainly on account of higher food and oil prices prevailing during the first half of 2008. CIA, (2009), indicated the services sector usually dominates Thailand's economy, contributing 46% of GDP in 2007.

Thailand is geographically divided into 6 regions: Bangkok and vicinities "BMA" (Bangkok, and 5 satellite provinces), the North: 17 provinces, the Central: 16 provinces, the East: 4 provinces, the North-East: 9 provinces and the South: 14 provinces (REIC, 2009). However, this research will be conducted in Bangkok and vicinities, due to the significant numbers of population and housing projects in this area, which rapidly increase year on year. In addition, BMA is the heart of Thailand economic and political administrative activities (ONEDSB, 2009).

1.2.1. Thailand's real estate business context and the major sources of risks.

Liow et al, (2005) indicated that real estate is the world's biggest business accounting for 15 % of global GDP with assets of US$50 trillion, it was also found that more than a half of the world's total assets are invested in direct real estate and securitised real estate investment vehicles such as property investment trusts or real estate stocks.

Thailand's real estate industry contributed approximately 6.8% to total gross domestic product in 2008 (ONESDB, 2009). This real estate development is normally accounted as the real sector, which drive other related industries, whether it booms or bursts, as well as it becoming an indicator to measure the vigour of the economic system (Brown and Matysiak, 2000). For example, there were 155 companies registered as public company's in Thailand stock exchange market, including the related industries and services such as construction materials, and these shown the amounts of total assets of £21.60 billion, which reflects 8% of overall total asset of public companies registered in 2008 (SET, 2009).

Narrowing down the studying area, the research was only conducted in Bangkok Metropolitan Area (BMA) and its vicinity. It is in accordance with the survey' s results of REIC (2009) that residential projects are mostly developed, around BMA area, covered on the nearby provinces which, are Pathumtani, Nontaburi, Samutsakom, and Samutprakam provinces (Figure 1).

3

Figure 1: Bangkok Metropolitan Area (BMA)- the studied area

Armitage and Keogh (1997) summarised the characteristics of Bangkok metropolitan area as the pre-eminent urban centre, performing key economic and capital city functions. It is located in the central Thailand region and became the node of the nation's transportation and the linkage to neighbouring countries such as China, and the Indo-China region. Bangkok was affected by the Asian investment boom in 1980s and 1990s and the city became a regional force (a global city) in finance and business as well as an influence on global politics, culture, fashion, and entertainment.

Bangkok city contains a population of approximately 6.3 million residents while the greater Bangkok area has a population of 11,971,000 (January 2008). The capital is part of the heavily urbanised region of Thailand. Bangkok and the border four provinces are co-urbanised as the Bangkok Metropolitan Area (BMA). This area is a centre of the nation's transportation systems, as it is served by two major international airports, and the mass rapid transit systems (i.e. BTS, MRT, and the SRT), and these system will be doubly expanded by 2020 (ONESDB, 2009). This area is the heartland of Thailand, dominating the country's economy and the development continues to pour in to Bangkok rather than the rest of the nation, as indicated by its' GDP, it combined economic output is roughly 89 billion dollars in purchasing power parity terms, which accounts for roughly 16 percent of Thailand's real GDP. With the given GDP of the city, the per capita income was estimated at 14,000 dollars, fairly low for a megacity (Trading Economics, 2010).

4

1.2.2. Thailand housing industry

The number of registered houses in BMA was approximately 4.2 million units or 20.1% of the overall Thailand housing units (REIC, 2009). The number of new registered housing units in this area was approximately 1.2 hundred thousand units, and the total registered housing in the BMA area in 2008 was 4,188,353 units, grown up from 4,050,735 units in 2007, or equivalently 3.4% (REIC, 2009). It reflects the growth of real estate business in this particular region. APTU (2006) surveys that the numbers of developer clustered in this region were approximately 240 firms in any firm size, (i.e. employees number, capital registered).

Apart from low-rise housing real estate projects as mentioned above, Duffy (2008) categorised the high-rise property type in Thailand into 4 categories which are:

1. Offices Building;
2. Residential, including condominiums, apartments and services apartments. This type had been divided into 2 sub-categories as the low-rise resident condominium (up to 8 storeys) and high-rise (higher than 8 storeys)
3. Retail, including shopping malls, arcades, and retails space
4. Industrial, including factories, manufacturing units, and warehouses

However, this research assumed that the residential developers will be the major sources of respondents for the data collection processes, due to this housing sector reflecting the largest portion in Thailand's real estate market as earlier mentioned in this section.

1.2.3. Risks and the impacts to Thailand's real estate industry

This section explains the major source of risks in this industry, Howell, (2001) and Moran, (2001) found that risks caused by political factors or the regulations affect Thailand's real overall real estate sector. These political risks are associated with political stability, sovereign risks and breach by the principal of specific undertakings provided in the concession agreements including policies towards a new project development. Thailand is currently falling under politically unstable circumstance, the political disruptions and the global economic recession has paused the economic growth to 2.6% in 2008 (Attapich, 2009). Chanlett-Avery (2009) supported that a contraction of public expenditure stemmed from political tensions and associated policy uncertainties. As well as the change of government cabinets (4 cabinets in 2008), delays were caused in budget disbursement and the implementation of government projects, particularly the mass rapid transit projects, as these mega-projects will have positively boosted Thailand's real economic system as a whole.

Additionally, Lee (2001) portrayed the level of political risks in Thailand by applying the PRS 1982-1998 index, this index was established based on the criteria of the restrictions on repatriation of profits or capital and exchange controls, the delays of payments facing exporters to the country, the policy related to fiscal and monetary expansion, the financial transferred risk and governmental foreign borrowing (PRS, 2009). Thailand was classified at level B- to B, which was converted as the modest or sporadic delays in financial transfer and the obstructions to the monetary transferring are high. He also interpreted that Thailand economic system and investment atmosphere consisted of some riskiness, which was caused by several factors such as political factors, investment transparency level or economic factors.

Thailand was moderately associated with this financial transferred risk, it meant that there would be a pitfall in the transferring of finance streams. This problem was probably caused by the institutional risks and these also influenced the transparency level of the overall Thailand property market (Chin et al., 2006). JLL (2004) ranked Thailand at 36th in the global and Asian real estate market transparency index, which portrayed that the Thai real estate market lacked transparency. Chin et al., (2006) addressed that the western investor also perceived that Thailand's real estate had the different market contextual and culture, it also having legal barriers to obstruct foreigners' investments.

However, the major risk that influenced Thailand's real economic and internal investors' perceptions is "*corruption*", its consequences obstructed the implementation of the investment. The

CPI index of 2009 indicated that Thailand scored 3.4 from 10, amongst the other ASEAN countries. This construed that Thailand failed to handle the corruptions, and these led to the decrement of the foreigner or local investors confidence to invest in Thailand (CPI) (Edutube, 2009).

Khumpaisal et al., (2010) supported that Thai practitioners perceived the political issues as the critical factor that affect to their confidences in developing the real estate projects. The political turmoil and the delay in approving of project's constructions causing the severe damages to this industry as the developers hesitated to invest and the customers postponed their purchasing plans. This finding extends this thesis investigating Thai practitioners' perceptions towards political risks and other high influence risks in Thailand's real estate development sector.

1.2.4. Global economic Crisis and impacts to Thailand's real estate sector

The downfall of Thailand's real economic system caused the vastly global economic crisis in 1997, this crisis caused by the regression of the real estate development sector in Thailand (Lauridsen, 1998; Warr, 2000). Quigley (2001) indicated this crisis was led by the negligence of risks in the real estate business sector. Role players such as financial institutions and developers lacked monetary disciplines, as well as neglecting risks in real estate business. They also described financial institutions (lender) injecting huge loans to the real estate developers without any considerations on risk as well as the performance of the loans and the capabilities of the developers to repay loans. These parties also lacked knowledge or practical tool to assess the risks in this particular business (Pornchokchai, 2007).

Lauridsen (1998) investigated the possibility that Thailand's real economic crisis started with the fluctuation in real estate loan as follows:

> *"An investment bubble of careless lending was created. A substantial part of the money was channelled into already inflated assets in the real estate sector. During 1992-96, a total of 755,000 housing units were built in Bangkok, which was double the estimate in the national plan. Loans from financial institutions to property developers increased, too. In 1993, the loans totalled 264 billion baht but by March 1996 they had gone up to 767 billion baht, of which 45% stemmed from finance companies and 54% from commercial banks."* (Lauridsen, 1998, pp. 1576)

Kritayanavaj (2007) supported that most of Thai developers, particularly in small or medium enterprises underestimated the consequences of risks as they lack an appropriate knowledge to assess, identify or understand the potential risks and their consequences, and that they require a maximum return from their investment without considering on any risks. Therefore, they did not

7

prepare any assessment or mitigation methods that the measurable risk assessment criterion did not systematically establish. Pornchokchai, (2007) also stated that if the housing policy changed, the ill-prepared developers were not able to identify and assess the risks. Therefore, they transferred the risks to their customers by increasing house prices or rental prices, deducting quality materials, or changing the instalment's conditions. Those might affect the pricing structure of the real estate market as a whole, burden the customers' affordability and investors could suspend their investment. Furthermore, the property's speculation also caused severe risks as the ordinary speculators have less knowledge in the markets and economic situation. They ignored the obvious warning signals and lessened their desire to understand the risk and consequences involved in this business (Pornchokchai, 2007).

Vanichvatana (2007) and Kritayanavaj (2007) predicted that the future trend of Thailand's real estate business would be similar to the incidents before the 1997 crisis, because of the methods to response to this industrial risk were not yet established. The cycle of economic crisis would be repeated by the reason of ignoring risks and other politic and economic factors also impacting on the real estate developers. This prediction was reflected by the global financial crisis in 2008-2009, which caused a significant impact due to the shortage of property purchasing demand and the amount of funds in Thailand's real estate market.

Several impacts such as the increase of fuel price, the fluctuation of loan interest and the currency exchange rate, including the government's policy towards this industry and international crisis also significantly affected Thailand's real estate industry wholly. Despite the fact that Thai developers suffered from the 1997 crisis, they are still do not take the consequences of risks into their accounts. Since they lacked of risk identification and assessment methods, as well as they only require a maximum return without considering on any factors affect to the project development processes.

1.2.5. Thailand's real estate cycle

Thailand's real estate cycle is fluctuated in accordance with the economic trend, of "Peak" and "Bottom", "Bust and Boom" period, and "Contraction and Expansion", the nature of the real estate cycle is described in figure 1.1 (Vanichvatana, 2007).

The diagram below indicates that the typical real estate cycle starts its movements from ascending to the peak point (growth), moving to the maturity and declining to bust (or contraction).

Figure 1.1: The typical real estate cycle

In this regard, Vanichvatana (2007) forecasted that Thailand's real estate markets cycle is tending to a contraction phase, this is a buyer's markets because of the buyers have more bargaining power than sellers. As the overall economy continues slowing, developers and buyers become more cautious particularly in their spending on the properties. During this recession phase, real estate transactions are decreasing and the consumers delay their purchasing decisions. At the cycle's lowest point, real estate inventories are low and few new projects are being launched. The property market situations are uncertain as a result of the fluctuating economic situation, construction materials and labour prices. When the economic situation starts recovering, the consumers' confidence returns and their affordability to buy new property increases, there is an accumulation of demand for real estate products. Since the real estate projects need longer to develop, the demand of new projects is higher than supply in the market.

The 2007-2009 global economic situation was affected directly by the global financial crisis, it also had a significant influence on Thailand's real estate in terms of the shortage of properties purchasing demand as well as the scarcity of funds injected into the real estate market. For example, the sub-prime crisis started from the US property sector in 2007, crucially affect the global real estate business, particularly the housing and residential sub-sector, since the purchasers of the houses had to mortgage with the banks and financial institutions. Several problems were also addresses in regard to price and the depreciation of properties, fluctuation of interest and mortgage rate, credit rating, and especially the purchase power of the purchasers. The main reasons for this recent recession were firstly, that the real estate developers lacked proper risks assessment tools. Secondly, they were over-confident or over-optimistic in their forecasting of the economic situation, thirdly due to a large number of non-performing loans, and finally high speculation in the purchasing of

9

those properties. In addition, the regulators who were responsible for the real estate sector lacked, transparency increasing the severity of the recession (Kritayanavaj, 2008). (see Appendix I).

Duffy (2008) also stated that Thailand's real estate sector is currently falling into a risky era, developers and construction contractors are suffering the impact of rapidly escalating material prices, particularly for the contractors who are bonded by the typical fixed-price contracts, as they are limited by a fixed price and budgets, but they have to take responsibility for any risks incurred by fluctuation of construction material prices. The less astute contractors will ultimately suffer losses and cash-flow deficits, and will lead to defaults, and leaving developers with partly or non completed buildings. He also estimated that Thailand's real estate construction costs have increased by 10–40% year on year, depending on the type of development and quality. Whilst construction costs threaten to rise further in light of the ongoing fuel price crisis, property developers are seeking alternative strategies to reduce risks.

ONESDB, (2009) supported that the deterioration of global economic and financial system are the key risk factors to the Thai economy. It was predicted to contract quite sharply in the first half of 2009 when the world economy hit bottom and severely affect to the investors' confidence in Thailand's property, export, tourism industries. However, the economy was expected to recover in the latter half, supported by the implementations of the government recovering packages.

The real estate sector contracted slightly by 0.3% due to the reduction of purchasing power and deteriorating consumer confidence (REIC, 2009). Moreover, financial institutions strengthened their lending standards for credits extended to home buyers and real estate developers, especially medium and small size developers, this caused a delay in buying decisions. Stocks of new houses in Bangkok and its vicinities at the end of 2008 were 110,812 units, increasing by 2.0 % from 2007 (AREA, 2008). The majority of remaining supplies were single houses, which accounted for 32 % of total stocks. The proportions of townhouse and condominium were 27 and 29 %, respectively.

To recap, Thailand's real estate sector is currently in the contraction period due to the global economic crisis, the increment of construction materials prices and the government's policies towards this industry. These affect the decision-making process towards risks and the project management activities. The practitioners' opinions towards the current real estate sector' situation will be also shown in the data analysis chapter within this thesis.

1.2.6. Risk assessment practices in Thailand's real estate industry

Although Thai real estate practitioners experienced the 1997 global economic crisis, and also acknowledged the cause of the economic downfall, the systematic risk assessment techniques including proper assessment criteria, which suit Thailand business context, are yet to be developed. The developers still lacking awareness in the project risks and they may also still be suffering from the 2008-2009 economic recession (Pornchokchai, 2007; Kritayanavaj, 2008).

Khumpaisal et al., (2010) indicated that Thailand's real estate business domain is complicated and has a different context from Europe in terms of the perception of project risks and the risk assessment techniques. The results indicated that Thai practitioners perceived the consequences of STEEP risks differently from the Westerners point of views (See Table 1).

Table 1: The comparisons of the real estate practitioners perception toward risks in European, UK and Thailand

British practitioners prioritised the technological factors as the second rank whilst Thai practitioners paid the least attention to these. British developers stated that risks caused by political issues were less concerning, while Thai indicated this as the second issue. These observations also reflect the context of political situation and the construction technologies in each country.

In term of preferred risk assessment methods, Gehner et al., (2006) indicated that 42% of the Dutch practitioners employed the systematic risk assessment methods such as sensitivity analysis, assessment checklists, or risk premiums. Meanwhile 79% of Thai practitioners used the non-systematic assessment methods such as the panel discussion techniques or intuition (see Table 1.1).

The results revealed that Thai developers lack practical risk assessment techniques, it is thus necessary to implement the appropriate models that are equipped with a proper assessment criteria to enable the decision making process towards risk in real estate projects.

Table 1.1: The comparisons of the risk assessment techniques used by the practitioners in Western and Thailand context.

According to the details of the studied area, Thailand's real estate business context, and the explanation of major risks affecting this industry, BMA area is the emerging real estate development region. However, Thailand's real estate sector is in the contraction period, there is an oversupply of properties in the market whilst the customers have less potential to buy a new property/house. Thailand's real economic system is currently suffering from the global economic crises, the increment of construction materials prices, the government's policies towards the real estate sector and the unstable political situation. These all affect the decision-making process towards risks and the real estate project management activities.

However, Thai developers do not have systematic risk assessment techniques, because they neglect the consequences of risks and the formal risk assessment techniques have not yet been developed. The popular risk assessment technique of using panel discussion, could not provide the quantitative data to support the decision making towards risks (Chen and Khumpaisal, 2009).

The specific problems of the studied area inspire the implementation of a proper and systematic risk assessment technique that suits the requirements of Thai practitioners and the real business contexts. This contributes to the original attribution of Thailand's real estate industry that the academic research that emphasises the risks or the risk assessment techniques, are yet to be implemented in Thailand's real estate business.

1.3. CENTRAL RESEARCH QUESTIONS

The research questions are established in order to pursue this thesis' objectives, the literature review processed had been conducted to respond to the research questions that examined and defined the existing problems in Thailand's real estate sector, the research questions are summarised herein:

- How can we develop the proper risk assessment model that suit with the Thailand's real estate industry and the practitioners' requirements?
- What kind of risk had the most impact to Thailand's real overall real estate development business and how do Thai practitioners perceive STEEP factor risks?
- Are Thai practitioners satisfied with the risk assessment techniques that they currently use?
- What are the ideal risk assessment techniques/methods suitable to Thailand's real estate business context?

In order to respond to the mentioned research questions, the solid assumptions were made based on literature review and the trial study. It is assumed that risks in Thailand's real estate projects are mostly associated with the STEEP factors' consequences, and it is necessary to implement systematic risk assessment/management techniques for Thai developers to deal with risks in their projects.

1.4. AIM AND OBJECTIVES

This thesis aims to introduce an innovative risk assessment method to deal with the consequences of risks, within the higher competitiveness of the changing natural and social environment. This also inspires a development of the generic risk assessment criteria that suit with the developers requirements. This research therefore deals with the risks related to the STEEP factors that occurred in the Thailand's real estate sector. In order to achieve the aim of this study, the following objectives were raised to respond to the thesis aim, which are:
- To develop the comprehensive risk assessment framework for Thai real estate developers to deal with potential risks in their projects.
- To implement an alternative risk assessment model, which constructed to suit with the quantitative and qualitative characteristic of risks?
- To investigate possible causes of risks based on generic risk assessment criteria and their consequences embedded in Thailand's real estate industry.

- To address any particular risks that occurred in this industry and explore the perceptions of Thai practitioners towards risks including the risk assessment practices and the required risk assessment techniques for Thailand real estate business' context.

1.5. THESIS CONTRIBUTIONS

The current problems in regard to assess the consequences of risks in Thailand's real estate projects influenced the researcher to develop the practical risk assessment model that enables to evaluate the consequence of risks. Therefore, the following contributions will be delivered:

- An innovative risk assessment model that enables the users to estimate both subjective and quantifiable risks in real estate projects.
- The comprehensive risk assessment criteria, which established based on the developers' requirements and the updated real estate business contexts.
- The thesis claims the original value as the academic research regarded to this area have never been conducted in Thailand's real estate industry.
- The examination of risks in Thailand's real estate industry.

The expected outcome of this research is the framework (the model) for assessing Thailand's real estate projects' risks. The thesis outcomes will be useful for the further risk mitigation processes and also assist the real estate practitioners in handling risks in a competitive and fluctuated environment. Moreover, the details of the research contributions will be extended in chapter 8 enclosed in this document.

1.6. SCOPES

The scopes of this thesis are associated with the studied area, definition of risks in this business and the selection of research's samples, these are described as:

- All data collection processes will be specifically conducted in Bangkok Metropolitan Area (BMA) and its satellite provinces (see Figure 1).
- This study covers on the risks assessment process during the feasibility analysis, design, bidding, construction included the handover stages of the properties.
- This study covers on the risks associated with the STEEP factors' contents, but also includes the internal factors such as managerial risk, miscommunication amongst project participants or disintegration of the developers' organisations.

- The research samples are the practitioners who developed their projects in the mentioned studied area, but also included the selected experts from academic institutions, or professional firms. However, the real estate speculators will be excluded from the research.

- Risks are classified as subjective matters, which related to the perception of the decision maker toward risks in the project development stage.

1.7. OUTLINE OF THE THESIS

The central research propositions of this thesis are the focus on how to develop the practical risk assessment model that established based on the assessment criteria that suit with the real estate practitioners' requirements. This thesis also concerns on how the practitioners perceive risks in terms of their consequences, the satisfaction towards the current risk assessment practices and the details of risks in this industry.

This thesis is limited by the research scopes (see Chapter 1.6) that risks are subjectively classified, hence the data collected from the practitioners need to be interpreted and analysed in text or numerical format. As the researcher is an insider of Thailand's property industry thus the appropriate research methodology will facilitate in investigating Thailand's real estate business context deeply and gather more reliable data. The mixed-method approach will be adopted as the major data collection process, in order to identify the problems in regard to the lack of practical risk assessment techniques and the perceptions of risks caused by STEEP factors.

Overall the thesis is divided into 2 stages according to the time, constraints, the practical consideration and informant accessibility. However, due to the amounts of the data gained by the practitioner, the data analysis part is separated into two chapters. A diagrammatic representation of the approach taken of this study is shown in figure 1.2.

Stage 1: Literary and theoretical works

Chapter 1 : Thailand real estate business

Description of study area, contexts and problems

Chapter 2 : Theoretical Framework : Real estate projects and investment decision making

Chapter 3 : Theoretical Framework : Risk considerations and assessment practices

Chapter 4 : Research Methodology

Stage 2: Field study and data analysis works

Chapter 8 : Conclusions and recommendations

Chapter 7 : Model exploration and explication (Phase 2 Qualitative approach)

Model explication (Case study approach)

Chapter 6 : Model development (Phase 1 Quantitative approach)

Chapter 5 : Data Theories, collection and analyses

Figure 1.2 : Structure of thesis

The theoretical foundations of this thesis are presented in chapter one to three, these are drawn upon the research in real estate development, but focus especially on risks and the risk assessment, it starts with Thailand's real estate business context, the definition of real estate projects, risk classification and their impact on this business, the current risks assessment methods includes the review of these techniques.

Chapter four consists of the philosophical justification for the research stances, including research ontological, epistemological, research reasoning and the practical considerations of research strategy. These stances are drawn from an extensive literature review in relation to the proper social science researches. The research strategy is developed based on the clarifications of the philosophical considerations, which lead to an application of mixed methodological approach.

Chapter five explains the design of data collection and analysis instruments including their administration procedures. This chapter describes both quantitative and qualitative data collection processes, the designed questionnaire used in large-scale survey, and the interview questions recorded, as well as discussing the research variables, and the statistical techniques used for data analysis. In addition, it also describes the risk assessment criteria that established based on STEEP factors and used in the data collection processes.

Chapter Six aims to develop the risk assessment model based on the statistical devices, this reports the descriptive statistical analysis of the data such as the respondents' profiles, and their satisfaction towards risk assessment models. An SPSS package is employed to analyse the mass quantitative data and then interpret into the narrative statements. The statistical devices use in this data analysis processes were inclusive of the descriptive statistics, advance statistical tests, associative of variables, correlation and explorative factor analysis. The outcome of this chapter is the established risk assessment model that needs to be strengthening by the additional findings from the qualitative research phases.

Chapter Seven, focuses extensively on the exploration and explication of the established risk assessment model. It uses the qualitative approach to yield richer data from interview with the practitioners. The data gained by these interviews are expected to inform the details of risks in Thailand's real estate business, the features of ideal risk assessment techniques in order to develop the purposed risk assessment model (in Chapter 6) to be responded to the requirements and the contexts of this particular industry. The explication of the risk assessment model included the validation procedure will be enclosed in the specific section in this chapter.

In Chapter Eight, all findings from both data collection approaches are summarised, which include the theoretical contributions to the body of knowledge and the limitations of the work as an agenda for the further studies.

17

CHAPTER 2 REAL ESTATE PROJECTS AND INVESTMENT DECISION

2.1. DEFINITION OF REAL ESTATE PROJECTS

The real estate is simply mean the immovable property, or a legal term that encompasses land along with anything permanently affixed to the land, such as buildings or other fixtures (Webster dictionary, 2005). It also defined as the rights or ownership in real property as well as the property itself and this ownership or rights are transferrable, which a person would retain title to (Harper, 2001).

However, for technical purposes, some scholars distinguish real estate, referring to the land and fixtures themselves as Graaskamp, (1980) given the general meaning of real estate as "*the space delineated by man, relative to a fixed geography, intended to contain an activity for a specific period of time. To the three dimensions of space (length, width and height) then, real estate has a fourth dimension – time for possession and benefit.*" By this definition, real estate is referred to a space – time characteristic, time and the possession of property are also affecting to the holding or developing process of the real estate projects.

Friedman (2000) defined that real estate are also include the activities concerned with ownership and use transfer of the physical properties, he also identified the key participants (stakeholders) who engaged in the business activities and context; which involve from the project initiate until hand-over stages. They are the developers, customers, contractors and financial institutions who play as the loan lenders or financiers.

Hilbers et al.,(2001) given that real estate projects and their market are characterised by heterogeneity, they are consisting of a series of geographical and sector submarkets that lack a central trading market, no any properties are identical in terms of these physical attribution. The real estate information on market transaction is often limited and not generally available, and its market is typically determined by infrequent trades, a negotiated pricing process, large transaction costs and rigid supply.

In relation to a real estate development project, Graaskamp (1981) defined that real estate project is the creation and management of space and time, this project type is similar to ordinal manufactured project in regard to they are also part of a larger physical system programmed to achieve long-term

objectives. However, this real estate project has its characteristic in which it is a small business enterprise standing of its own. Therefore, its process is a continuum and integration of construction technology, financing, marketing skills, administrative controls and rehabilitation required to operate the real estate enterprise.

Byrne (1996) supported that the development process of real estate project is comprised with the following activities:

- The perception and estimation of demand for new buildings of different types;
- The identification and securing of sites on which buildings might be constructed to meet that demand;
- The design of accommodation to meet the demand on the sites identified;
- The arrangement of short and long term finance to fund site acquisition and construction;
- The management of design and construction; and
- The letting and management of the completed building

Thus, real estate development process is a process that the developers and other agencies seek to secure their social and economic objectives by the improvement of land the construction or refurbishment of building for occupation by themselves or others such as customers or users (Byrne, 1996, pp.3).

The Bryne's definition of real estate development process will be applied in this thesis, and the development stage and the related activities are further extended in the Chapter 2.1.1.

2.1.1. The real estate development stages

As earlier discussed in Chapter 2.1, Graaskamp (1981) generalised the characteristics of real estate projects to other manufactured projects, then Matson (2000) defined the general concept of development project as the project are continued in lifecycle form, it starts with project identification to create the preliminary idea, planning, and pre-feasibility studies to refine ideas. The next step is deliberation or project organising, conducting feasibility studies, and making decision to precede, follows by project implementation such as securing capital, construction, obtaining permits, and hiring management. The project execution (construction work) then commenced, which is related to the mobilisation of manpower, equipment, and materials to carry out the plan. Finally, the project evaluation is to determine what did and did not work in order to plan for the other projects.

PMI (2004) additionally summarised that each project has its own objectives, but they share the common characteristics in which each project has the similar project lifecycle. Project Management Institution: PMI (2004), Smith (1999) and FTA (2007) indicated the typical stages within the real estate projects as;

- *Feasibility,* or formulating and establishing the project's concept, feasibility analysis and study, and strategy design and approval. The decision makers (project managers) are consider whether the project will proceed or stop at the end of this feasibility stage (Go / no-go decision).
- *Planning and design* this stage combines with the conceptual design, project programming and scheduling, project cost and budget, project detailed design and planning, including some contractual agreements and terms.
- *Production* this stage is associated with construction materials manufacturing, materials delivery, site operation, civil works, finishing works, installation, testing. The property is substantially complete at the end of this phase.
- *Turn over and start up* this includes the commissioning and testing, defect inspection, maintenance. The property is fully operated at the end of this stage.

RIBA's plan of work additionally given the details of real estate project stages as overall processes are divided into 13 phases (from A to M). In shorter term, the typical real estate projects consist with the following stages:

- *Preparation stage*, this stage combines with the briefing preparation in order to identify client (developer)'s requirements and any possible constraints on development. Sufficient information enables the client or developer to decide whether to proceed and to select the probable delivery method. It requires particularly important decision, as this will determine the way in which project resources, responsibilities and risks are apportioned between the client and its consultants and contractors (RIBA, 2009). This stage also requires strategic brief preparation to establish the general outline of the client's requirements and planning of future action, as well as to identify the related procedures, organisational structure and range of consultants and others to be engaged for the project.
- *Design stage* all designs and planning activities are undertaken in this stage. It has an important purpose to ensure that the general project concepts are feasible in terms of

technically, financially, functionally. Then, these concepts are interpreted and illustrated, which enable the related authorities to approve before delivering the completed works.

- *Construction stage* it is the property produce and execution stage, it needs the supportive information, cost and resources from the project stakeholders in order to complete this stage. (RIBA,2009; Smith, 2002).

- *Use stage* this stage begins when all construction works are completed and prompt for the users, this also included the hand-over activity, marketing and sell of the properties (Millington, 2000; English Heritage, 2005)

The stages of real estate development project and its definition as given by RIBA, PMI and Millington are illustrated in figure 2.
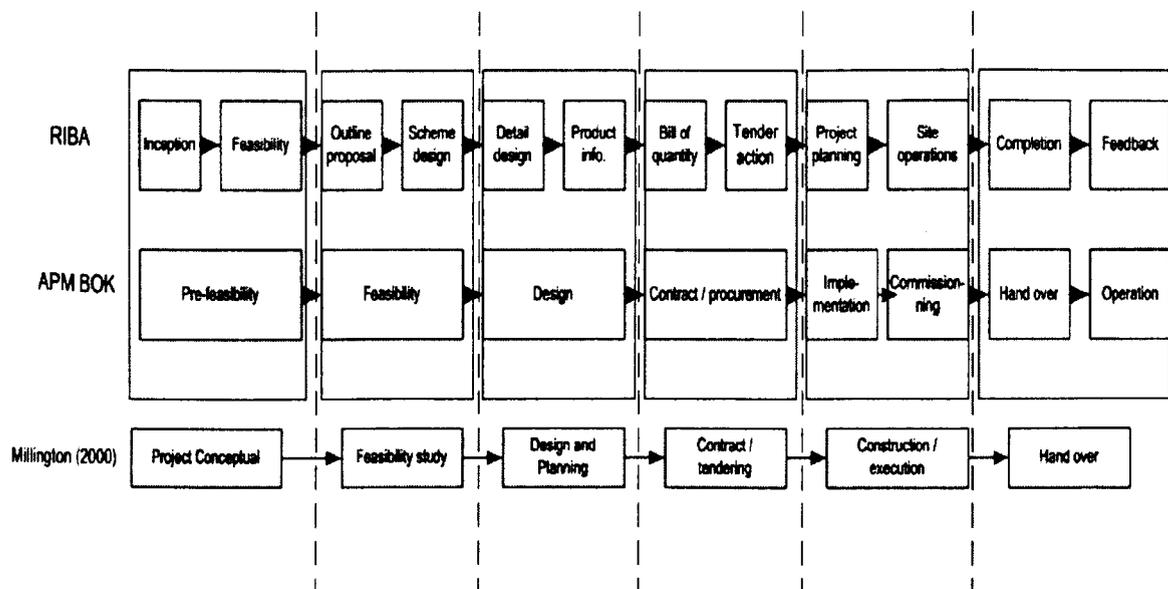
Adapt from RIBA, (2009), PMI (2004) and Millington (2000)
Figure 2: Stages in real estate development projects

The entire property development process is described as a series of different stages of continuous activities, but some of them may be undertaken simultaneously (Millington, 2000). However, by any definitions of development process (RIBA, PMBOK, Millington), the typical real estate projects share the *"project initiation or the project concept stage"*. This stage portrays the future outcome of each project, thus no projects could not be started without the proper project concept. Two major activities are enclosed inside this phase, which are project conceptualise and project feasibility study. The project feasibility analysis stage is extensively discussed in the next section, it addresses the process,

outcomes and its importance because of the study outcome informs risks to the developers, before the following costly stages commenced.

2.2. REAL ESTATE PROJECT FEASIBILITY STUDY

The importance of project conceptualisation stages included the necessary information for developers to make a further decision has been highlighted in Chapter 2.1. In order to provide the adequate information for making decision, an instrument that always employed by the developers is *"project feasibility analysis"*. Millington (2000) insisted that this stage is the most important in real estate project, since it briefs the developers to acknowledge and understand all project's scopes, limitations, idea, the usages, and any other related important information, including the probability of the project to sell in the current market situation. The project developers are able to decide whether they will carry on their project or terminate in this stage or postpone the following activities to the appropriate times, without waste of financial cost and resources.

Thompson (2005) defined the feasibility analysis as a controlled process for identifying problems and opportunity occurred during development stages, determining objectives, describing situations, defining successful outcomes and assessing the project costs and benefits, which associated with several alternatives to solve the problems. Matson, (2000) described that the feasibility study is an analytical tool used to define how a business would operate under a set of assumptions and a number of project resources (the facilities, equipment, production process, etc.) and the financial aspects (capital, cost, expense and profit etc.). This study is conducted to see the performance of project technical and economic feasible aspects, and also shows the sensitivity of the business in the basic assumptions. In this regard, it assists the decision makers to consider between the alternative of development plans, as well as to permit planners and designers to outline their ideas on paper before implementing them. This can reveal errors in project design before the implementation which would cause negatively affects to the project progress, and an application the lessons gained from a feasibility study can significantly lower the project costs. Thompson (2005) supported that the thorough feasibility analysis can prevent further project negative impacts caused by wrong decision-making, it is act as *"safeguard"* against wastage of further investment of resources, time and cost. If the project is seemed to be feasible in accordance with the results of the study, the decision

makers shall progress their project. This study also assists the developers in revealing the possible outcomes of the further project investment, it support some useful information in the planning stage in order to reduce the project time and cost.

A feasibility study package normally includes market study, which typically involves testing of the geographic locations and usually involves parcels of land. It helps in determining the best location, availablility of land and evidence of land values, including to test alternative land uses for a given pieces of land, developers have to complete feasibility studies before they will achieve the approval of property development (Danter, 2007; Millington, 2000). Moreover, Graaskamp (1981) indicaed that the real estate project feasibility processes shall be also include with the following issues;

- *Strategy studies* to select the project objectives, tactics and decision making criteria.
- *Merchandising studies* to survey for the consumers' behaviour, the competitors and evaluate the potential of market and trade area.
- *Legal studies* to investigate the impacts caused by the legal or related laws, the appropriate contractual terms, and the political situation.
- *Physical designs studies* the studies of project design and planning, including engineering, services, land plannning and architectural design.
- *Compatibility studies* to study of the project impact to the surrounding community and environment, public or the local policies.
- *Financial studies* to study the economic modelling, project capital, present value, the expected return of investment and project cash-flow analysis.

This feasibility analysis has a significant role in assessing the real estate project' vitality and risks, it shall be conducted to forecast the uncertainties, which affect to the return on investment and income stream (Frodsham, 2007). However, the most important information that it provides to the decision makers is *"risks and the consequences of risks"* (Millington, 2000). This analysis also assists in identifying the risk sources, the quantification of their potential effects and guidance on mitigation and management in order to project managers/decision makers to make a better decision (Smith, 2002). Thompson, (2005) and Matson, (2000) concluded that the good feasibility analysis shall report the risks that will occurred during the project development stages, as well as

provide the options to the decision makers to consider on continue or pause the project activities.

Due to the importance of feasibility analysis as discussed above, this analysis has a significant role in helping the decision makers to identify and analyse the outcomes of risk involved in real estate project. However, this study does not quantify risks in a numerical format, it is not able to inform or rank the seriousness of risk to the decision makers. Therefore, this research attempts to develop the comprehensive risk assessment model, which grounded on the concept of feasibility analysis, the model will be shown in Chapter 6 and 7 hereinafter.

2.3. RISKS AND REAL ESTATE INVESTMENT

This section focuses extensively on the decision-making process of practitioners towards continuing their real estate projects, and emphasises on risks in every real estate development process. The definitions of real estate investment are given, in order to expand more understandings about real estate contexts, the returns and risks within this business and to fulfil the requirements of the research.

2.3.1. Real estate investment

Brown and Matysiak (2000), CISDM, (2006), Newell and Web (1995) summarised that the real estate investment is involving with the purchase, ownership, management, rental and/or sale of real estate for profit. An improvement of any realty property as part of an investment strategy is generally considered as a real estate development. Real estate development project is different from other types of investment in term of the limited liquidity in comparison with other investments.

Failure in real estate investment may caused by the investor goes into negative cash flow for non-sustainable period of time, often forcing them to resell the property at a loss or go into insolvency (Lam et al., 2001). The real estate markets are also the illiquidity market, because of each property is unique and not directly interchangeable, which represents a major challenge to an investor seeking to evaluate prices and investment opportunities (Millington, 2000). For this reason, the location is significant factor to be concerned while investing in this market because it also involved with the purchasing price and the competitors within the same area. Investing in real estate projects also

requires a long transaction time, which increases transactional risk, but also provides many opportunities for investors to obtain properties at bargain prices (Keeping and Shiers, 2002).

Normally, real estate assets are expensive than other investments such as bond or sharing (CISDM,2006), in order to purchase real estate asset in the normal practice, an investor will be financed by financial instrument or debt, such as a mortgage loan collateralised by the property itself, with a large portion of the purchase price. Investors usually seek to decrease their equity requirements and increase their leverage, and then their return on investment (ROI) could be maximised. Lenders and other financial institutions usually have minimum equity requirements for real estate investments they are being asked to finance, typically on the order of 20% of appraised value (Sagalyn, 1990). Investors seeking low equity requirements may explore alternate financing arrangements as part of the purchase of a property (i.e. seller financing, seller subordination). Thus, it is concluded that the typical real estate investments are contained with the following sources:

- Market listings (by using a multiple listing service or commercial information exchange)
- Real estate agents or brokerage services
- Wholesalers (by financial institutions or public agencies)
- Public auction (foreclosure sales, estate sales, etc.)
- Private sales

Cash flow analysis is widely used by the real estate investors to monitor their profit obtained and cost spent during the investment period. It also provides the following related information to investors to make their decision making towards investment in real estate (Benjamin et al., 2001; CISDM, 2006; Hoag, 1980):

- *Net Operating Income (NOI)*: NOI is the sum of all positive cash flows from rents and other sources of ordinary income generated by a property, minus the sum of ongoing expenses, such as maintenance, utilities, fees, taxes, and miscellaneous. NOI typically presents as the asset purchase price, or in term of capitalisation rate. It is a commonly used to measure the performance of an investment property.
- *Tax shelter offsets* : It offsets occur in the following three ways: depreciation, tax credits, and carryover losses, those will reduce investors' tax liability charged against income from other sources.
- *Equity build-up* It is the increment of the investor's equity ratio because of the portion of debt service payments devoted to principal accrue over time. Equity build-up counts as a

positive cash flow from the asset where the debt service payment is made out of income from the property, rather than from independent income sources.

- *Capital appreciation*: This is the increase in market value of the asset over time, particularly when the property is sold.

The characteristics of real estate investment as discussed above construed that the investment in this business is distinguish from other financial investment because of it requires the larger amount of money to be used as the capital of investment than the other investments.

Another difference of real estate investment is that the investors have to bear the higher consequences of risk than others. It is in accordance with the income generated and the complexity characteristics of real estate, the developers also be affected by others sources of risk rather than financial risks alone. In this regard, risks may be arisen by many sources, with a different consequences affected to real estate projects. Many authors attempted to classify risks occurring in the real estate development process by the several means. However, this thesis limits the causes of risk in this real estate development business by employing the STEEP factors definitions as these factors cover on the major sources of risks in the real business case.

2.3.2. Real estate investment and risk considerations.

As earlier mentioned, the investor aims to maximise profit from the investment and the ROI (income and capital return). The good investment is one that produces high levels of both income and return when compared with the cost paid.

Huffman, (2002) extended that risks in commercial real estate investments are identified by the brainstorming techniques, so they are defined as critical factors affect the project's activities. By this definition, major risks associated in property projects are financial risks, which significantly increase the corporation's risk exposure, and also affect to the overall financial structure of the invested project, including the availability of funding during the project development process. Secondly, physical risks, these are associated with the physical space, the site' environment, design risks and the communication between the property's stakeholders. Finally, regulatory risks, these incur as the results of governmental oversight, legislation and new regulation.

26

Fraser, (1993) defined the property investment risk as the variability of its annual return (or Internal Rate of Return: IRR), and the return may vary as a result of changes in both income and price, this IRR concept of risk encompasses risk to income as well as risk to capital. He also provided the following sources of risk that occurred while investing in any property:

- *Liability matching*: As the duration and the type of property will reflect the degree of risk to that investment, therefore the investor shall address ability of investment returns to match with the investor's liabilities.

- *Liquidity*: real estate property is less selling liquidity than other investments, it requires more time for the purchasers to make a decision. That will affect to risk and return expected by the property investor apparently.

- *Marketability*: according to the illiquidity characteristics, real estate investment is less marketable than other investment, due to the demand of property are frequently fluctuated and may not balance with the supply in property market.

- *Taxation liability* the investors have to respond for a various taxes when they invest in property development such as income tax or property tax.

- *Transaction costs* that means a variety of expense appear during the transaction period of property from investor to the purchasers, such as legal fee, tax and stamp, brokerage fee .

- *Management costs* this cost is necessary for the property that needs the annual expense for repairs and insurance. That cost is distinguish from the other investments because of the property investors have to employ the management agency for the management duty such as rent collection, portfolio management and non-annual negotiations and rent review.

- *Investors' growth expectation* the expected growth rate of property investment are affected by the growth of both incomes and costs. Growth of income may be varied due to fluctuation of rental, economic situation and market conditions. Property investors shall concern on the depreciation of property because of the physical or economical obsolescence will cause a fall of value throughout the investment period (Baum, 1991).

All aforementioned risks shall be concerned when the developers decide to invest in a new property project, then risks may be significantly caused from the financial risks (i.e. loan, illiquidity of cash) and market risks (i.e. supply and demand, the forecast of market trend). However, when the projects progressing on the construction process, there are various risks occurred in this stage those also needed an intensive concerns, because those risks would affect to the project whether the fiscal or physical attributions. Miller and Lessard (2008), supported that risks in construction stage shall be classified into 3 major categories as:

- *Market-related risks,* these risks include *Market risks, Financial risks and Supply risks,* respectively. *Market risks* mean the ability of project managers to forecast demand of the project users or customers, as each project has its own customers, then variety types of customer create more difficulties to forecast demand accurately. *Financial risks* are related to the shortage of funds and funding sources available to continue the project processes. *Supply risks* are similar to market risks in terms of both risk are associated with price and access uncertainties. Those arisen by an ill-prepared contract, limited of contract and procurement management, or by the type of project organisational structure (Khumpaisal, 2008).

- *Completion risks,* it comprises *Technical risks,* which caused by technical factors, affect their engineering difficulties, degrees of innovation and risks caused by the miscommunication amongst designers and construction teams. *Construction risks* refer to the difficulties that project owners, sponsors, all contractors and vendors confront in the construction process (Smith, 2002). *Execution risks* mean the issues arise from errors or conflicts in the task breakdown and delay in project schedule. *Operational risks* are the possibility that the project will not function as expected, the availability, capacity or efficiency are reduced from the plans.

- *Institutional risks* these mostly caused by external factors such as law and legal issues, political, community, social acceptability, any policies issued by the regulators and environmental regulation.

Baum and Crosby, (2000) stated that all investments are actually conducted under uncertain atmosphere, it is impossible to predict the level of return on investment precisely. Therefore, the investors need to take into account the factors that affect to the investment return that included risks in the process of making decision.

In order to make the investment decision effectively, Gallimore et al., (2000), Harris, (1998), Hargitay and Yu, (1993) suggested that this process can be carried out into 3 levels as:

- *Strategic decision level,* it relates to the setting of the overall company's policies, or the selection of investment and the allocation of funds. These decisions are the least structured and most imaginative, most risky with the most uncertain outcome, as they only predict the future of investment.

- *Tactical decision level,* the implementation of strategic decisions, these are mostly related to the selection of an investment project within the selected sector.

28

- *Operational decision level* or day to day decisions that support the tactical decisions. Their impacts are immediate, short term, short range, and usually low cost as well as cause the lease consequence of wrong-decision.

Moreover, both strategic and tactical levels are subdivided into selection, allocation and timing decisions, as show in Table 2.1.

Table 2: Classification of investment decisions

According to the hierarchical level of decision making above, the process of decision making towards real estate investment is concluded as dynamic, goals orientation and rely on the information of the investors. In this regard, information is combined with historical and predicted information. For example, economic and political situation of the invested area, the investment data and the performance in profit generating, the market information, the government legislations and policies toward investment, structure of tax and related tariff, including the current inflation rate. These factors would affect to the return on investment and the project cash-flow.

Millington, (2000) indicated that risks in real estate development affect to the expected ROI in the manners of the investment yields may increase before a project is completed. These are caused by a lower capital value as the anticipated rents cannot be obtained due to the passage of time and the economic or market situations (e.g. the number of competitors, the higher prices of development land, the increment of labour and construction materials cost, shortage of supplies). These suppress the developers in regard to the construction materials price, the increment of cost of funds in according to the delay in revising the construction materials prices.

The investors shall be aware that uncertainties and risks may be caused by several factors, in any forms, whether systematic or unsystematic, measurable or non measurable instead of consider only on the maximum profit. They shall consider on both of the external factors and internal factors, that

29

existed in the project environment. In this regard, STEEP or PEST factors (Morrison, 2007; Chapman, 2009), explained the relationship of factors that affect to decision making process clearly. Those risk factors such as the economic and political environment surrounding the project shall be also considered by the decision makers as well as the internal risks. The factors affecting to the decision making towards real estate investment are shown in the figure 2.1

Figure 2.1: Surround environment of investment decision making

The developers shall clarify their direction, investment objectives, the investment attitudes, including considered on the encircled environment impacts. They also require the relevant information, whether historic performances or the performance record of each investment option before making a decision. Other important information is the market condition, particularly the competitive situation in the trade area, and the distribution of products. An available of investment fund (capital) included the sources of fund, amount and cost of capital shall also be concerned by the developers while doing an investment (Baum and Crosby, 2008).

Moreover, the financial sector affect critically to the real estate sector because of the financial institutes injected large sum of money into the real estate that amplified the real estate boom. Hilbers et al., (2001) also explained that the high exposure of financial institutions to the real estate sector created the following impacts and these led to the financial distress situation:

- *Disaster myopia.* If the real estate prices have risen steadily for many years, the loan repayment record of real estate loans shall be good. The financial institutions (FI) may be lured by the risen real estate prices while the real estate cycle boom that made the loan-to-value ratios declined. The financial institutions normally expect the higher returns, but underestimate the related risks, as they perceived that the lending risks are low.

- *Inadequate data and weak analysis.* FI may underestimate the real estate risks because of inadequate information and weak analysis. Even the appraisers have the adequate information about the project (i.e. projected rents, discount rates, anticipated inflation, depreciation and vacancies) including the legal attributions of the projects. In the current practice, FI may have the distorted market information, which given current and past market values, but that may different from the sustainable, long-run and equilibrium prices (Adair and Hutchison, 2005).

- *The real estate prices collapse,* the value of collateral can quickly fall below the amount of the outstanding loan. This affects to the loan amount that FI made to other sector, and turn out to be an exposure to the real estate sector. As well as the illiquidity characteristics of collateral properties, these led to an obsolescent of their value, and require a large maintenance cost until the properties can be sold.

- *Perverse incentives or moral hazard.* A combination of high leverage and asymmetric information may lead to the riskier financing for the real estate projects if they are financed largely through equity. Highly leveraged real estate developers will distribute their risks to banks, then these led the banks with high leverage or imperfectly marketable assets refused or inclined to undertake risky real estate lending.

The real estate development project has the distinguish characteristics from other kind of projects due to the project uniqueness, each project is different in terms of location, property and attributions. It is a complicated project and contains several specific problems (due to its characteristics), it is also affected by the external causes of risks such as political turmoil, the transparency of government, or the changing of policy, those made the further outcomes hardly predicted (Raftery, 1994; Gehner, et. al, 2006; Lee, 2002; Hong et al., 1999). Therefore, Blundell et al., (2005) and Hendershott and Hendershott, (2002) concluded that the real estate project is a risky project, and the consequences of risk in the project would affect directly to project income stream. The decision makers or developers need to identify and assess the consequences of risks in order to mitigate risks during the development processes.

2.4. SUMMARY

The real estate project is concluded as a complicated and risky project, since it associated with several risks and uncertainties, which strongly influenced all related progresses inside the entire properties lifecycle. Risks can occur at any of a project whether, the conceptualised stage, design and planning, bidding and tendering, construction, or marketing and handover period, then these risks will affect to the following usage of the property (Millington, 2000; PMBOK, 2004). However, risks in this business are almost beyond the developers' expectations, because of they are only focus on financial or economic risks, but lack of concern on another important factors such as social, technological, marketing and political, which are normally associated in every real estate projects (Morrison, 2007; Gehner, et al., 2006 and Clarke and Varma 1999)

As real estate projects is an income generated property, therefore Booth, et.al.,(2002) suggested that real estate risks can be effectively managed within an overall framework of risk management processes, the risk assessment techniques shall be equipped with a variety of complimentary approaches, which are grounded in a rigorous and preferably quantitative statistical framework, as well as several techniques such as rigorous analysis of subjective issues.

This chapter concluded that real estate development process is a process that the developers seek to invest or achieve their objectives by the improvement of land by construct or refurbish the building. The real estate project is an income generating project and usually a high value project contained with a land value and cost of development (building cost), and needs a long development duration. It is thus affected by various kind of risk whether external or internal factors. It is a risky project and it has the distinguish characteristics from other project types in regard to its uniqueness, but complicated and contains some particular problems. To extend the impact of risks to the real estate project, the classification of risk in this real estate project is emphatically discussed in the chapter 3 hereinafter.

CHAPTER 3 RISK CONSIDERATIONS AND ASSESSMENT PRACTICES

3.1. INTRODUCTION

As earlier discussed in chapter 2, real estate project is a risky project that associated with various sources of risks that affect to the income stream of a project and to the decision making process towards risks. This chapter discusses the categories of risk and classify risks in this industry by their magnitude and sources of risks. It also describes the risk assessment principle based on the general risk management theory. Therefore the risk assessment methods which popularly used in the general business will be analysed in order to investigate their feasibilities to use in this real estate development industry. The drawbacks of these methods will be summarised in order to inform the establishment of the risk assessment model that suit with Thailand real estate industry context.

3.2. CLASSIFICATION OF RISKS

This section classifies risks in general term and in the real estate business, in order to support the risk assessment criteria that are grounded on the definition of STEEP factors, which is used as the major assessment criteria of this thesis.

Risk is generally defined as a concept that denotes a potential negative impact to an asset, project or some characteristic of value that may arise from some present process or future event and risk is often used synonymously with the probability of a known loss. It is determined as *"the possibility of something happening that impacts on your objectives. It is the chance to either make a gain or a loss. It is measured in terms of likelihood and consequence"* (ACT, 2004). However, risk is scientifically defined as the exposure to adversity or loss or a chance of danger, Crossland et al., (1992) categorised risks as:
- Risks for which statistics of identified casualties are available.
- Risks for which there may be some evidence, but where the connection to between suspected cause and injury to anyone individual cannot be traced
- Experts' best estimates of probabilities of event that have not yet happened.

It is then determined as an abstract concept and intangible matter, difficult to measure by any instruments. Raftery (1994) and Hilson and Murray, (2009) distinguished risk and uncertainty that risk is concerned with uncertainty and consequences, but it has the quantifiable attribute, whereas

uncertainty does not. Then, risk is possible to make a statistical assessment or the probability of a particular event, whilst uncertainty is used to describe situation where it is not possible to attach a probability to the likelihood of occurrence of an event. It is then construed that risk is an uncertainty that contain a positive or negative effect on one or more objectives as well as having a consequence and probability.

In term of real estate business, risk also covers on the variation of the expected rate of return from an investment (Baum and Crosby, 2008). By this determination, risk is defined as: firstly, loss, damage or any undesired consequences impacted to the project. Secondly, risk is the probability that a particular adverse event occurs during a period of time, or results from a particular challenge, risk in statistical theory also follows through all the formal laws of combining probabilities. Thirdly, risk is the probability of loss and the significance that affect to the organisation or individual (IRM, 2002). Hargitay and Yu, (1993) also termed risk in the business context as the unpredictability of the financial consequences of actions and decisions. Then, it is referred as a set of unwanted and uncertain events in operational terms, but in the analytical sense, risk is the description of the extent to which the actual outcome of a decision that diverge from the expected outcome.

In the context of investment, risks are usually expressed in either probabilistic terms or in terms of variability. Hargitay and Yu (1993) defined the analytical terms of risk as:
- The probability of loss
- The probability that the investor will not receive the expected or required rate of return
- The deviation of realizations from expectations
- The variance or volatility or returns

According to the aforementioned definition of risk, risk is simply illustrated in the following equation (Byrne, 1996):

$$Risk_n = P_n \ X \ l_n$$

Where P = Probability of loss

l = the significance of the loss

Equation 3: The definition of risk

34

Raftery (1994) extended this simply definition of risks into the terms of probability and impact, he categorised risks into four main categories as

- High probability - high impact
- Low probability – high impact
- High probability – low impact
- Low probability – low impact

The impact of risks had been described that it may cause whether positive or negative, upside or downside, but the least important type of risk is low probability-low impact risk. However, each type of risk needs to be assessed to determine their potential and their critical outcome to the project progress.

Risk shall be considered at the heart of every investment decision, when an investor puts money into other assets or investment that mean there is a trade-off made between risk and return. However, with the property investments, the tenants can default affecting the rental income stream and there is no certainty over the level of property values in the future. Changes in these and other variables can have a significant effect on the delivered level of returns – hence uncertainty and potential volatility in returns (Chapman, 2009; Ling and Naranjo, 1999).

A classification of risk in according to its attributions is discussed in the next section, it starts with the discussion about the origin of risk, follows by the characteristics of risks in the business domain and the implementation of STEEP factors as the risk assessment criteria for this thesis.

3.2.1. Systematic and unsystematic risk

Brown and Matysiak (2002), Baum and Crosby (2008) defined risks in property investment as *"total risk"*, which is associated with several factors, and it is subdivided into 2 major categories of *"systematic"* and *"unsystematic or specific"* risks. Total risk is conceptually denoted as *"Total risk = Systematic risk + Unsystematic risk"*. In this regard, the systematic risk is caused by several external factors that affect to the investment, such as a change of government policy towards the property investment. That means the investors or developers are not able to control both probability and consequences of risk caused by the economic and political issues. While,

the unsystematic or specific risk can be limited controlled by investors or developers, the developers can investigate into the companies and projects they are going to invest as well as can make decision for investing based on project or management team performances. Thus, some causes and consequence of unsystematic risks are controllable as most of them are caused by the internal factors.

Hargitay and Yu, (1993) summarised the component of systematic and unsystematic risks, that the systematic risks are combined with the following components;

- *Market risk* related to the fluctuation in the market that the investors or developers intend to involve.

- *Cyclical risks* related to the variations in the business cycle.

- *Inflation or purchasing power risk* related to the uncertainty of the future purchasing power of the returns produced by investments.

- *Interest rate risk* related to the fluctuation of interest loan rates, particularly in the real estate development area, in which the developers have to loan large amount of capital from banks or financial institutions.

Whilst unsystematic or specified risks are consisted of the following components;

- *Business risk* this risk associated with company's business operations and this is influenced by the organisational characteristics, product mix, competition and the general orientation of the management team.

- *Financial risk* is depending on how the company or project's operations are financed. This includes the company or the projects D/E ratio[1], since the larger the debt finance, the larger associated financial risk (Huffman, 2002).

- *Liquidity risk*, this liquidity risk is the degree of difficulty associated with the realisation of the capital invested, the divisibility and marketability of the asset, and the costs involved with the capital realisation. In this regard, this covering on the risk caused by an illiquidity of project funding during project processing (Chen and Khumpaisal, 2009; Lam et al., 2007).

- *Sector risk*, this risk is the extent to which sector price movements affect a particular investment, but sometimes this risk type is defined as semi-systematic.

- Other specific risks which usually affect individual investment such as location concentration, construction and execution risks.

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[1] D/E = Debt/Equity Ratio

According to the definitions of systematic risks above, the real estate projects are normally associated with some decisive risks. For example, risk of project schedule delay (V.T. Luu et al., 2008) or the exceed expense than the expected budget (Smith, 2002). Those risks are involved in all real estate development stages, and critically influenced the related progresses at all properties lifecycle. Moreover, it was insisted that risks occur at the project initial stage (feasibility study or design and planning) will influence the income stream, further execution and utilisation of the properties (Chen and Khumpaisal, 2009).

3.2.2. Objective and subjective risks

Risk is classified by their characteristics and origins, as well as they are categorised by the developers or decision makers' justification or perceptions. However, risk is arguably stated as the multidimensional perceived, it containing different meaning in different contexts. In some situation risks are not only physically perceived, but these can be perceived by the social and organisational factors Crossland et al., (1992). It is then construed that risk perception could not be measured by only the mathematical or statistical, because risks are also caused by human error, social and political phenomenon.

Then, risk also being classified into the *"objective"* or statistical risk and the *"subjective"* or perceived risk. By this classification, objective risk is unique, substance, could be physically measured or identified and can be determined precisely by quantitative risk assessment methods (Pidgeon et al. 1992).

Meanwhile, subjective risk is contrasted as an individual perceive to an unexpected event. The degree of subjective risk is depending on the people experience on their history and their expected possibility of the occurrence. It may alter the behaviour of the risk taker if it is an undesirable risk, or one that has a good chance of occurring if something is done and it is also involved with subject probability or the perception of decision maker about the likelihood and the consequence of the event (Spaulding, 2008).

The subjectivity of risks was supported by the definition of *"risk attitude"*, it is defined as the chosen response of an individual or group to any uncertainties that occurred during the project progress, and driven by perception. Understanding risk attitude is a critical success factor that

promotes effective decision-making in risky situations (Hilson and Murray, 2009). As well as the attitude to risk informs the decision-maker in regard to the inclination to accept uncertainty or take risk (Byrne, 1996).

Raftery (1994) supported that the risk attitude is a key feature of the decision making process toward risks in the business context. Where the risks of particular investment reflect the higher ratio, this encourages the investor to accept risk and also add some extra premium to make worth of the investment. That is the originality of *"high risk, high return"* maxim, or *"risk-return trade off"* concept (Campbell and Viceira, 2005) that the investors (particularly the aggressive investors) want to invest in the risky market situation in order to maximise their profit, whether in the short term or long term investment. Dimson, (2000) simplified that the investment risk denotes the possibility of that the investor could lose money. If an investor decides to invest in any investment with a relatively low risk, the potential return on that is typically low. Vice versa, an investment with a high risk factor also has the potential to garner higher returns. This risk maxim is widely applied in the financial markets, where they price the loans for the investors. If the investment project is relatively risky, then the interest rate will be higher than the lower risky projects (Raftery, 1994, pp. 61).

Some real estate developers are more prejudice to accept higher risks, it is because of the nature of real estate project that generate the higher income as *"Typically, the private companies are thought to be the greatest risk takers but the extent to which they feel comfortable with risk varies and most of them would actually deny that they take any risks without careful assessment"*. (Byrne, 1996, pp.6)

The aforesaid statement conforms to Graaskamp (1981) in regard to all project stakeholders aware that they have to accept the significant level of uncertainties about their cash budgets and other expectations of income returned from the investment in the property development project. All parties enter the project with a set of assumptions about the future in a business society that changing at an accelerating rate. He concluded that the level of risks that developers able to take are varied in accordance with their expectation of income return and time spent for development as well as the attitude to risks of the developers.

In order to measure the attitude to risk, Pennings & Smidts (2000) concluded that there are two major approaches currently used, which are the expected utility (EU) model and the psychometric approach, respectively. These two models are different in the principles and the conducted procedures. Expected Utility (EU) is considered as the basic principle of economic behaviour under uncertainty (French & French, 1997). However, this approach is arguably understanding by the layperson level or each project, the value derived from this approach may not specify the real risk values. EU is novel model to measure the risk preferences or the rational behaviour for risk decision making, but it could not measure the riskiness of decision alternatives as an objective concept (French and French ,1997). Rabin (2002) extended that risks in this business associated with the complexity of the structure of decision problems and the cognitive limitations of the decision makers, this EU which constructed based on a few rational behaviour assumptions is insufficient to describe the real preferences of individuals.

3.2.3. The definitions of STEEP Factors

This thesis assumes that risks in real estate projects are mostly associated with the consequence of STEEP factors (Morrison, 2007). He defined that STEEP factors produce some severe impacts during the project development process or investment, therefore the decision makers must concern these factors prior any particular project management actions. Hence, risks in real estate project shall be considered, in any particular classifications whether systematic or unsystematic risks, subjective or objective risks. For instance, risk may relate to the separation of design from construction, lack of integration, poor communication, uncertainty, changing environment and increasing project complexity and economic changes such as inflation and deflation, regional economic crises including greater pressure from political issues (Gehner et al., 2006; He, 1995). STEEP factor risks and their consequence should not be underestimated as those will impact to overall project management theories in regard to project schedule delay, cost overrun and improper project quality, which then cause serious lost to project stakeholders and public interest (PMBOK, 2002).

STEEP factors analysis is widely used in the business decision making, its name may varied as PEST, TESP or STEP. However, they have the similar contents, as they are all concerning about political, economic, sociological and technology aspects. These analyses were developed to analyse both the consequences of risks caused by the related factors, as well as to measure the market potential and situation, market attractiveness, business potential, and suitability of access

market potential. PEST analysis uses four perspectives, which provided a logical structure that helps the decision maker to understand, presentation, discussion and decision-making towards those four dimensions. (Chapman, 2009)

The classification of risks in term of STEEP category is pragmatic as well as it is clearly understood by all project participants. Nezhad and Kathawala, (1990) extended the risks affect to the decision-making process in an investment project as:

- *Socio-cultural factor* covers on the conflicts between the countries' norms and the investors' own beliefs and cultures.

- *Economic/Financial factor* the investors shall concern on the economic system and current situation of where they are investing, as well as the economic infrastructure of the investment area, which included an access to human resources, product standardisation and existence or lack of technology may vary the development cost. In most countries inflation and currency exchange rate additionally create further difficulties for and investment.

- *Political risk.* Gehner et al., 2006 also defined that political risk may exist when discontinuities occurred in the project environment, which is difficult to anticipate when they affect from the political instability condition. It also covers on risk which caused by the government changing of the fiscal or trading policy.

- *Legal factor* this causes a risk to the investor subject to the legal system, the degree of legal enforcement and regulatory body who response for legal issuing in investment regards.

- *Technological factor* includes the availability of the appropriate technology for construction or manufacturing and the ethnocentric orientation in the invested area.

- *Physical factor* means the physical attributions such as transportation, natural resources, climate, topography, territorial size of the invested area.

- *Availability of resources* the decision makers shall make decisions regarding the range of responsibility management towards employees, labour union, training and development of employee, payment and welfare. However, this factor also causes risk when the developer has more competitors in the same market (Danter, 2007).

- *Market factor* the investors have to consider on the competitive condition of the market, the opportunities for the product orientation including the channels to distribute the product to customers as well as the barriers to entry to other market restrictions, supply demand cycle and fluctuation of overall market trade area.

These factors are not complicate and provide the exact meanings, therefore the STEEP factors covers on a large area risks or any factors that affected to real estate project progress.

The above statements also support the applicability of STEEP factors as the major risk assessment criteria in Thailand real estate projects. Their definitions and coverage will be extended in chapter 5.6. The criteria contain 33 sub-criterion and divides into 2 parts in according to the risk magnitudes as risk consequences and likelihood (frequency), respectively.

According to the scopes and limitations of this thesis and the classifications of risk above, then the real estate projects risks in this research are included:
- This thesis focuses on "*systematic risks*", which affect strongly and directly to project progress. However, the established risk assessment criteria also cover on several specific risks in order to strengthen the assessment process.
- Risks mostly contain the subjective value, these portray the perceptions and perspectives of the related persons (i.e. practitioners) towards any uncertain events occurred in the real estate projects, but the assessment criteria also included some objective (quantifiable) risks.
- This thesis determines risks by their sources, thus it assumed the coverage and requirements of STEEP factors as the major source of risks in real estate development projects.

The statements above will be following by the researcher in order to develop the risk assessment criteria (see section 5.6) that affixed with the further risk assessment model introduced by this thesis.

3.3. RISK ASSESSMENT PRACTICES

As earlier discussed, the real estate projects suffered from a variety of risks' consequences that associated with the uncertain factors in both subjective and quantifiable formats, these risks must be concerned during an investment in the real estate projects.

Chen and Khumpaisal, (2009) stated that the current risk assessment techniques are not adequately precise, as these can roughly estimate the degree of risks. In the present time, risks in each property project are identified by management level, using brainstorm techniques, panel discussion or individual ranking (Younes and Kett, 2007). However, these techniques depend on the personal opinions and experience, and sometimes not convincing enough due to lack of quantitative

measurements using reliable tools or instruments with strong theoretical basis (Bienert and Brunauer, 2007).

Baldwin et al., (2000) additionally supported that the current risk assessment techniques do not provide the sole key to decision maker, even they are precisely designed, due to the different understanding of risks contexts and technical aspects of each technique. Moreover, ill-founded risk assessment techniques may cause the severe burden to the project through the imposition of unreasonable constraints on the operation process.

Crossland et al., (1992) recommended that risk assessment techniques shall be simply used in any complex situations, these shall be equipped with the reliability analyses, and shall be the cost-effective techniques that suited the practitioners' requirements. For example, the project managers can use these techniques to make decisions towards the requirements of planning regulations in allocating the project site.

As the Thai practitioners currently lack the proper risk assessment methods (Pornchokchai, 2007; Krittayanavach, 2007), this section especially supports the thesis' aim in regard to put forward a risk assessment framework to this industry. The definition of risk assessment basis was discussed earlier. Then, the importance of risk assessment will be discussed, followed by criticising and analysing the current risk assessment methods, which are the event tree analysis (ETA), Risk Assessment Matrix (RAM), the application of financial ratio, and Monte Carlo Simulation (MCs). These aforesaid risk assessment methods will be compared in their concepts, requirements, and procedures in order to investigate their practicalities and feasibility to implement in the real estate industry.

3.3.1. The basis of risk management and assessment

The risk management process is typically ongoing, iterative process, even each project is different and unique (Khallafalah, 2002). It aims to provide information to the decision maker to make a better decision at any project stage and it is not actually the risks' prediction, but it combined with the various activities and shall be addressed at any stage of project life cycle (Smith, 2002, pp.101). Then, Raftery, (1994) described that risk management process approach is combined with three major steps (see figure 3).

Figure 3: Risk Management Process

- *Risk Identification and Initial assessment* : this process defines and categorises overall project risks, the categories of risks may include organisation risks, operational risks, project risks and system risks (V.T. Luu, 2008; Khallafalah, 2002). Another risks identification method is to identify them by the sources such as STEEP or PEST factors (Morrison, 2007). After all risks identified, the initial process to assess all risks consequences shall be started. Tasmanian Government (2006) indicated that risks cost the following consequences to the real estate projects.

  - Project outcomes are delayed or reduced;
  - Project output quality is reduced;
  - Timeframes are extended;
  - Costs are increased.

Smith (2002) stated that the risk identification practices shall combine historical project, industrial checklists and workshop brainstorming session. The brainstorming session was recommended as the appropriated methods because of it provides the most updated information, which suited the real project conditions, and these also exactly equivalent to value management approach. Raftery (1994) supported that to use this technique effectively, the decision-maker shall work closely with the project team and deal with the internal risks by breaking the whole project into a small piece to facilitate the decision-making process, while the external risks shall be emanated from the business and physical

environment. The project stakeholders' impacts and the quality of the contractual documentations shall be included as the sources of project risks as well.

This process generally produces the lists of potential sources of risks, which classify risks based on their impacts and likelihoods. It also indicates the serious risks (classified as high impact and high probability) that attracted the consideration of the decision-makers (Smith, 2002).

- *Risk analysis* Macdonal et al., (2004) defined this risk analysis (assessment) as a systematic process for identifying potential hazards and the likelihood of those hazards, this process is the important portion of the entire risk management process and Raftery (1994) supported that the project risks essentially required the systematic, experienced and creative identification analyses. Thus, it could be concluded that risk assessment is the controllable device that deals with the identified risks and assesses their impacts. It generally analysing risk in terms of likelihood and consequence. The decision makers may develop some tools to assist a determination of the level of likelihood and consequence, and the current risk level (ACT, 2004). Byrne (1996) additionally identified this analysis step is a combination of three aspects:

  - The measurement or assessment of probability;
  - The use of any indicator to measure the individual attitudes to risk;
  - Sensitivity and simulation

This risk analysis step usually associates with various tools and instruments, both systematic and non-systematic. The information used in this step is gathered from many sources, such as secondary information or the panel discussion to analyse the project risks. (Chadborn, 1999).

- *Response and Mitigation*: It is really important to identify mitigation strategies at the early project stage, due to the practical risk mitigation strategies reduce the chance of a risk will occurring and/or reduce the severity of a risk (Byrne, 1996).

Amongst the whole risk management process, risk assessment is an important step as this is the determination of quantifiable or subjective value of risk related to a concrete situation and a recognized threat (or hazard). Risk assessment process is created to list and assess the probability (or likelihood), the impact (or consequence) and the traceability of each risk item or the consequence of each factor (Wrona, 2009). This process can be done by assigning each item on the list, such as for

44

an objective risk, it should be assigned by a numerical rating (1 to 4 or 5), and a subjective term by using the level of consequences such as high, medium, or low. If a risk is harder to forecast, or intangible then it is presumed that his risk has higher impact. Vice versa, if this risk could be predicated earlier, then its affect is lower.

In business term, risk assessment is defined as the step to evaluate the consequence of risk and this shall be commenced after the identification of risk. The outcomes of this step shall be used by the decision makers to develop a strategy towards risk in the project (Clarke and Varma, 1999). However, the overall strategy shall be implemented in the organisational scale by every project stakeholders (see figure 3.1).

Figure 3.1: Continuous risk management process

Jutte (2009) additionally supported that risk assessment step is affixed with the whole risk management process, and this process is a crucial process, particularly for the decision makers to use results from this process as the information to support for the further decision making towards risks and project's vitality. Therefore, the earlier the decision makers can identify and assess risks (positive or negative, opportunities and threats mean less time would be spent to respond to risks. Then they can discourse those identifications and risks' consequences to the stakeholders. However, the most important rules are risk prioritise and analyse, that means the decision makers have to use the information gained by an identification process and the experts' judgements to rank and level the degree of each risk (ACT, 2004; Smith, 1997). This also included a setting of the highest impacted risk as the first priority to response or mitigates its consequence. These statements are constructed based on the principles of risk management standards (see figure 3.2)

This diagram clarifies the components of risk assessment as this process shall be commenced after the decision makers identify the risks. They have to analyse risks to determine the existing controls as well as the risks' likelihoods and consequences occurred during the project development process,

and the decision makers have to rank the level of risks based on consideration on these risks magnitude (Byrne, 1996). The assessment process which grounded on comparing risks against the established criteria then established, risk criteria can be considered and constructed based on the decision makers' *"classification of risks"* and their requirements. The categories of risks are varied in accordance with the perception of the decision makers or the current project situation (Pidgeon, 1992). As earlier mentioned, STEEP factors (Morrison, 2007 and Chapman, 2009) can be used as the criteria to assess risks in real estate development project, the activity conducted simultaneously within this risk assessment process is *"prioritise"* all risks by ranking the priority of each risk (risk with the highest impact needed to be responded firstly), this shall be conducted in order to provide more options for the risk treatment step.

Figure 3.2: Risk management flowchart

As discussed in the chapter 3.2, risk is mathematically defined as where the probability of loss multiplying with the significance of loss. In order to assess risk quantitatively, risk assessment consist an objective evaluation of risk in which assumptions and uncertainties were already clarified and presented. However, one difficulty of risk assessment is that both of potential loss and

probability of occurrence are hardly measured. The chance of error in the measurement of these magnitudes is large and may cause a severe affect. For example, a risk with a large loss and a hardly occurred is treated differently from one with a low loss and likely occurred (Flyvbjerg, 2006). Even both risks are theoretically need an equal priority in dealing with first, but in practice it can be very difficult to manage when faced with the scarcity of resources, and time.

The losses of objective risks, such as project cash-flow, interest loan rate or fluctuation of exchange rate, could be expressed in terms of currency amounts. Whilst the subjective risks (i.e. impact of environmental or political issues), loss can be assessed in a form of common metric, such as a country's currency, or some numerical measure of a location's quality (Raftery, 1994; Nezhad and Kathawala, 1990).

One dilemma for decision makers to deal with risk assessment is the determination of the acceptable risks in order to prioritise and treat the urgent risks, they essentially need to identify an acceptable risk in particular circumstances to have a target for the risk assessment process. However, it does not imply that the decision makers will not try to reduce the further risk which can be achieved at an acceptable cost. Then, the ideal risk assessment technique shall be realistic and able to allocate limited financial resources on the basis of cost-benefit assessment (Crossland et al., 1992).

According to the risk assessment procedures discussed earlier, this process is concluded as the process to identify the probability (likelihood) of risks against the level of risk impact (consequence), but this shall be affixed with a risk prioritise process in order to provide information for the further risk treatment actions. Risk assessment process shall be commenced after all project risks in each stage had been clearly identified. This process shall be mandatory associated with the established criteria, such as STEEP factors. However, the decision makers shall also considered on setting the mean of acceptable risks as these will be an obstacle to risk assessment process.

There are several risk assessment techniques currently employed in the general and real estate business, for examples sensitivity analysis, risk premium etc. (Blundell et al., 2002; Byrne, 1996; Fraser, 1993). However, this thesis straightforwardly discusses on the popular methods that currently used in general business, these are limited to 4 methods as these are discussed in the next section.

3.4. CURRENT RISK ASSESSMENT METHODS.

According to the difficulty in assessing risks in this industry, the developers have modified the assessment tools that suit their requirement and their projects' environment. These techniques have been developed based on the nature and source of risks as mentioned in the chapter 3.2 and 3.3 earlier. These tools can be categorised based on the inputs, outputs and their processes as quantitative and qualitative, respectively (Tan, 2003). The quantitative approach articulates risk in numerical terms, for example, expected financial loss and probability of return, whereas the qualitative approach relies on the opinions of the decision makers, i.e. results are summarised in words like *"low"*, *"medium"* and *"high"* (Yazar, 2002). An example of the qualitative method is risk assessment matrix, which the assessors rank their judgements against the single occurrence (Khumpaisal, 2008). While, the quantitative risk assessment methods almost perform based on the Monte Carlo simulation to identify how risks affect to project schedule and budget (Intaver, 2010).

This section therefore descriptively analyses both quantitative (the applications of financial ratio and Monte Carlo Simulation) and qualitative risk assessment techniques such as Event-tree analysis (ETA) and risk assessment matrix (RAM). Then these techniques will be critiqued in terms of the feasibility to implement as the risk assessment tools in the real estate industry. Their advantages and drawbacks will be summarised and these will inform the foundation of appropriate risk assessment technique for this industry.

3.4.1. Event Tree Analysis

Event Tree Analysis (ETA) is simply defined as a general technique to identify the consequences of a potentially hazardous event (Andrews and Dunnett, 2000). It is constructed based on binary logic, in which event either has or has not happened or a component has or has not failed, thus this ETA analyse the consequences arising from a failure or undesired event (IET, 2009). Quantification of the event tree diagram allowed the frequency of each outcome to be predicted. This analysis helps in producing a risk curve to assess the acceptability of the response to hazards, particularly the potential hazardous trigger event (the initiator). It is an inductive, forward logic, technique which examines all possible responses to the initiating event. The branch points on the tree structure usually represent the success, failure, or partial failure of different systems and subsystems which can respond to the

initiating event. Andrews and Dunnett, (2000) and IET (2009) summarised the process of ETA into the following 5 steps as:

- *Define the undesired event*: ETA method shall be processed by experienced decision makers to overcome and materialise the undesired events.

- *Obtain an understanding of the system*: After the decision makers' selected undesired event, then they have to study and analyse all causes which affecting the undesired event. The experienced system analysts and system designers can help the decision makers with understanding the overall system and provide full knowledge of the system.

- *Construct the tree:* After the decision makers acknowledged the causing effects and their probabilities, the fault tree shall be constructed. Event tree is based on AND/OR gates that define the major characteristics of the event tree.

- *Evaluate the event tree*: It is needed to evaluate the event tree for any possible improvement and this step introduces the controlling process of the identified hazards.

- *Control the hazards identified:* This step aims to ensure that the hazards event identified, the treatment methods are pursued to reduce the probability of occurrence.
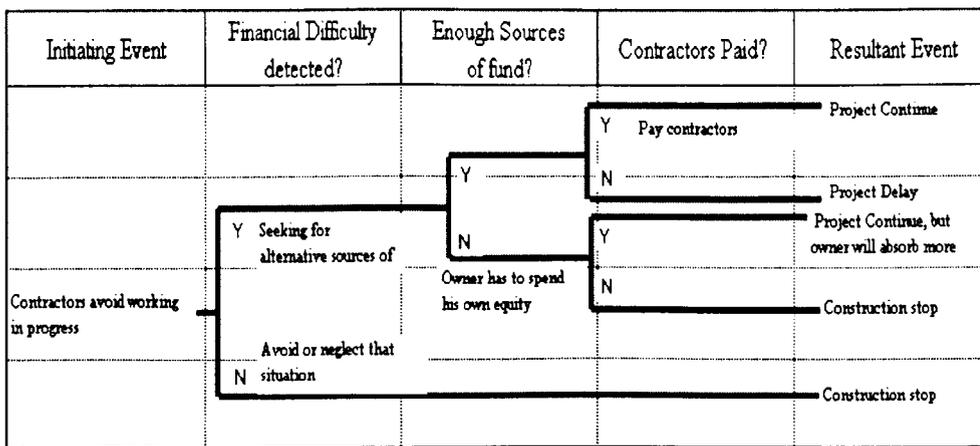
Sources: Individual study

Figure 3.3: Simple Event Tree Analysis: Risk of contractors' payment

This ETA is classified as the qualitative assessment approach, since the inputs and outputs of this method are relied on the decision makers' judgements towards the single event. Although this ETA is simply constructing and understanding, but it provide less precise data for the decision making process towards risks. Crossland et al., (1992) argued that there are several problems associated with the ETA utilised as this technique do not provide how to treat common-cause failures, but focuses especially on a single event of failure. It hinders the propagation of uncertainties in the primary

inputs as well as it did not ensure a sufficient degree of comprehensiveness of the systems definition. It lacks of how to specify each problem numerically traceable and not provide the form and parameters of probability distributions to incorporate in the failure-data inputs.

3.4.2. Applications of Financial Ratio

As the real estate project is an income generating project, the developers always apply *"financial ratio"* to assess the financial risks in the projects (Pyhrr, 1973). Risks in real estate investment was divided into 2 categories of *"business risk"* which means the probability that an investment will not generate the expected level and pattern of productivity, and *"the financial risk"* or the extra risks that created by debt financing, as well as an increment of interest and degree of leverage financing. Financial risks also associated with the financial illiquidity or the investor's capacity to pay back of the debt. However, he concluded that the developers pay less attention to risks occurring in the projects, as this industry lack of innovative risk assessment methods (Pyhrr, 1973).

The developers may additionally assess risk by measuring the investment return, they then assume some financial ratio to assess the project financial status such as Internal rate of return (IRR), capitalization rate, Net Operating Income, Profit/Equity (P/E ratio) and discount rate (Sagalyn, 1990). These ratios are often used in the project financial feasibility analysis to forecast the projects' profit and loss. Some popular financial techniques used in the development process are following summarised:

- *The Internal rate of return (IRR)*: IRR is actually used for analysing how effectively of the project capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. The developers would invest if they found the high IRR, it is also used to rank the projects' potentials as a substantially higher IRR value would provide a better chance of growth (Investopedia, 2010). Moreover, it also indicates the highest level of risk that accepted by developers (Farlex, 2010).

- *Return on investment (ROI) expectation*: this ratio is actually used alongside with IRR to support the decision makers to select the best investment options.

- *Net present value (NPV) or net profit* this value is theoretically derived from the discount cash flow (DCF) analysis in order analyse the profitability of an investment or project. It informs the decision maker of the difference between the present value of cash inflows and

the cash outflows in the project investment. The higher NPV value equal to higher probability of the project to success in products selling and project financing issues (Farlex, 2010).

- *Capital Asset Pricing Model (CAPM)* this is used to determine the required rate of return of a real estate project, it also includes the asset's sensitivity to non-diversifiable risk (or systemic risk), as well as the expected return of the market and the theoretical risk-free asset's return (Sagalyn, 1990; Nabarro and Key, 2005; Strischeck 2007).

However, Wheaton et al., (2001) and Hendershott, (2002) argued that the developers mostly depended on the past and subjective information which were inaccurate to predict the future risks. These financial ratio assumptions are made specifically for each development scenario and depended on the highest level of risks that the developer aimed to achieve. Another disadvantage of using financial ratio is that these ratio mainly used to assess risks caused by financial related factors, but did not concern on the other critical risks which also affect to the project progress (Huffman 2002, Gibson and Louargand, 2002). Thus, this method is only suitable for the financial background persons and not an appropriated method for other background project stakeholders.

3.4.3. Risk Matrix (RM)

The "*Risk Matrix (RM)*" method has been developed in order to simplify the project risks to the laypersons. It is generally accepted by the real estate practitioners, due to its simplicity to use and understand even in the complicated real estate investment (i.e hotel project) (Kindinger, 2002; Rafele et al., 2005; Younes and Kett, 2007). Chadbourne and Sanders, (1999) and Khumpaisal, (2008) supported that RM is easy to identify the critical risk that affected the managerial activities and project resources. They also summarised an establishment of RM into four phases as:

- Identifying all possible risks that may occur during the development stages.
- Assessing the potential impact and probability of each risk, the input of this phase shall be in percentages (%) in order to clarify the potential risk in the project.
- Prioritising the risks based on the impact and probability assessments. To assess the impact of risk, the ranking method is encouraged when using this Risk Matrix, as the ranking depends on the impact of risks to the overall project process.

51

- The final phase is to manage or mitigate each risk. The mitigation methods shall be brainstormed and discussed amongst all project participants to find the most appropriate method.

RM is usually presented in a simply matrix format (see figure 3.4), the horizontal axial represents degree of consequences, while vertical axial represents the probabilities or likelihoods of risks. RM is divided into 4 quadrants where the users use the brainstorming or discussion techniques to adjust their opinions in each risk's likelihood and consequence. Then, input each risk into the appropriate quadrant.

Likelihoods

Consequences
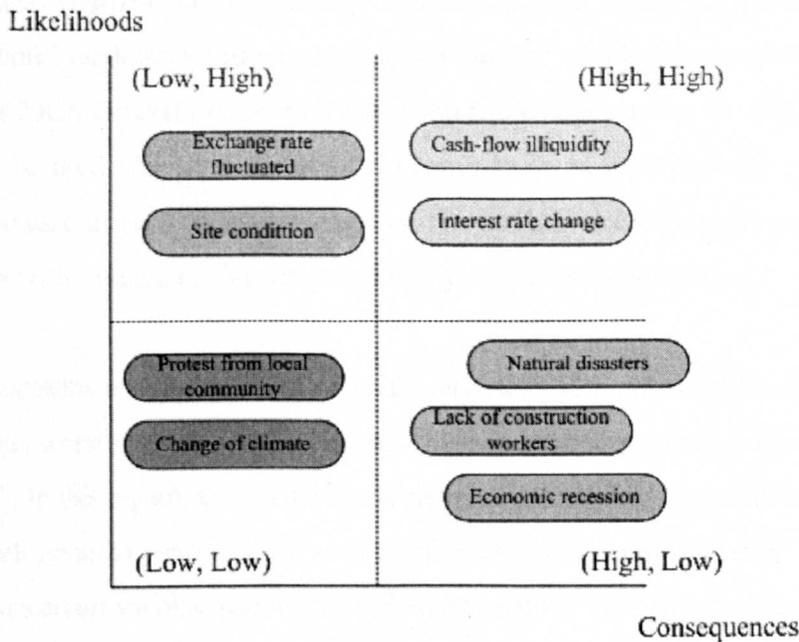
Source: Individual study

Figure 3.4: Simple risk assessment matrix

Although this RM is simply in using and communicating to every project participants at any level, the significant disadvantage of risk matrix is that the data for matrix calculation are directly derived from either panel discussion or ranking method, which mostly contain the subjective value as these rely on personal opinion without using the reliable quantitative measurements and/or the strong theoretical basis. Furthermore, it does not allow the comparison of each criteria, and results calculated by this method are normally subjective, do not provide the detail of data to help the developers to structure their decision- making process (Chen and Khumpaisal, 2009). In fact that risk factors are numerous, particularly in large real estate projects, and the ability of humans to assess many factors at the same time is very limited (He, 1995). Thus, the results calculated by RM may be fluctuated during each calculation due to the experts' judgement and attitudes towards risks would be non-consistent.

The drawbacks of applying RM to assess real estate project risks lead to the invention of the mathematic and statistical techniques to enhance the quality of analysis tool and provide more precise data. The example of this analysis is the application of *"Monte Carlo Simulation (MCs)"* as this will be discussed in the next section.

3.4.4. Monte Carlo Simulation (MCS)

"Monte Carlo Simulation (MCS)" is created based on advance mathematic and statistical simulation techniques. It is popularly used in the business area because it could analyse the uncertainties in the complicated projects in term of numerical format. It is defined as the randomised method based on a class of computational algorithms that rely on repeated random sampling to compute their results. The results of an MCS depend on the repeated computation and random or simulated-random numbers, it shall be used when it is infeasible to compute an exact result with a deterministic algorithm. It is also used in many industries to analyse risk and help decision- making process in any uncertain events such as variation of interest rate (Murthy, 2003; Palisade, 2008).

MCS starts with inputting a combination of uncertain variables which are manually chosen (such as best/optimistic case, worst/pessimistic case, and most likely/normal case), these analyses are named *"what if scenario"*. In this regard, this model considers random sampling of probability distribution functions as model inputs to produce large amount of possible outcomes instead of a few discrete scenarios. Each uncertain variable within a model is assigned as *"best guess"* estimate. The users require a sequence of numbers which are random, independent, real and uniformly distributed in the range zero to one to establish MCS model. Murthy, (2003) recommended that the users shall develop the table of random number and keep in any storage devices to pursue more precise results derived by this method. The results provide probabilities of different outcomes occurring. Hence, the outcome generated from this simulation method can be represented by probability distributions graphs (or histograms) or converted to error bars, reliability predictions, tolerance zones, and confidence intervals.

According to its capacity, MCS is used as the uncertainty propagation analysis method, where the goal is to determine how random variation, or error affects the sensitivity, performance, or reliability of the system that is being modelled. According to this characteristic, it is categorised as a sampling method because the inputs are randomly generated from probability distributions to simulate the process of sampling from an actual population. However, this method requires a large amount of

variables to structure the precise risk analysis model. This simulation would be appropriated when the user had developed a set of quantitative variables, which set up based on statistical information Murthy, (2003).

MCS has another significant disadvantage as it cannot quantify the subjective risks, despite the fact that real estate projects always affected by the unquantifiable risk factors (i.e. social, political or the psychological factors) (Booth et al., 2002). MCS is clearly the mathematic-wised analysis method, so it only calculated quantitatively, as well as this simulation is not a practical risk assessment for laypersons or the practitioners, who have less understanding in the advance statistics and do not have time or resources to afford this model.

Farragher and Kleiman, (1996) additionally supported that MCS is not an appropriate tool for laypersons to assess risk or support the decision making processes in the real estate investment. They indicated that most of investors preferred the conventional analysis (i.e. discount cash flow analysis), but none of them preferred statistical approaches like MCS because of this is not a practical way to deal with interdependencies amongst the critical variables and this simulation is only an efficient concept, but less applicable in the real business.

3.4.5. The current risk assessment methods review

Each aforementioned risk assessment method has different characteristics, processes, advantages and drawbacks, but it is quite clear that there is no universal risk assessment method appropriated to every types of real estate project. An application of any risk assessment method depended on the characteristics of project, qualification of the users and the availability of resources or time to complete the analysis of risks.

The existing risk assessment methods shall be then compared in terms of their capacity, requirements, advantages, limitations, and it simplicity before an introduction of the novel analytical approach to this industry (French and French, 1997). These risk assessment methods will be compared, using the criteria based on extensive literature review with a reference to the requirements of academia and practitioners. The criteria to evaluate the appropriate decision making model as a supportive tool for decision-making process is therefore adopted in the Table 3.

Table 3: Comparisons of academia and practitioners requirements of Appropriate decision making models

As discussed in the table of requirements above, the comparison and summation of these bespoke risk assessment methods were developed based on the following attributions:

- *Definition*, it summarises the general descriptions and the different concept of each method.
- *Requirements*, the required data/input to create a calculation process of each method, it is also include variables that need to be developed by the users.
- *Procedures*, it is a brief description of each calculation processes.
- *Outcomes*, type of results derived by each method's procedure, included the presentations of data.
- *Advantages*, it includes the flexibility, the quality of results provided by each method, include the simplicity to interpret the data.
- *Limitations or disadvantages*, these limitations can be influenced by the methodology's complicatedness, the subjective or non-measurable type of data, and the difficulties to understand the calculation procedures of each method.

General descriptions of the mentioned risk assessment methods are provided, with the explanations, the findings gathered by extensive literature review, and those are summarised in Appendix II.

All aforementioned risk assessment methods are specifically suitable for the particular business area. However, those techniques had some disadvantages in dealing with the potential risks in real estate industry, their drawbacks are included:

- *For the qualitative techniques*, (i.e. ETA and RAM). Although they have the advantages in their simplicity and they are focus especially on the high damage risk, but they have the similar difficulty in regard to they do not provide much appreciated precise data for the

advance decision making processes. It is because of both techniques relied on the data gained by expert's judgements, which are not quantitatively analysed. Another disadvantage is that these methods do not allow comparisons amongst each variable. Therefore, the decision makers are hardly investigating the correlation between each variable and criteria to settle the proper risk assessment framework.

- *For the mathematical quantitative techniques,* which are financial ratios and MCS, they are constructed based on the complex mathematical/statistical foundations. However, they focus exclusively on the financial risks, and not concern on any other risks. They did not prove their effectiveness in assessing other sources of risk, as well as these techniques suited the strong financial/mathematical background persons, not flexible for laypersons.

According to the drawbacks of the mentioned risk assessment models, it can be concluded that these models are not feasible enough to use in the complex real estate projects as these could not provide the adequate flexibility (user friendly) to the users as well as these are focus extensively on one single occurrence (i.e. financial, ad-hoc risk) in the project, but not cover on other related issues. These findings encourage the introduction of the idealistic/pragmatic risk assessment method to this industry. It can be concluded that the ideal models shall be simply understood by laypersons, provide more flexibility to the users, they must provide the precise data for the decision makers and shall be grounded on the rigid framework. These conclusions were conformed to Blundell et al.. (2005) and Booth et al., (2002) that the ideal risk assessment methods shall be established based on the quantitative framework, but also allow to assess the subjective risks.

The disadvantages of the current risk assessment methods informed that risks in the real estate projects are usually complex and these involved with various kinds of risks. Therefore, the developers or decision makers in this industry required the systematic assessment model that provides more flexibility in assessing risks originated by any sources, or in any formats, in order to help them making the decisions whether to continue or suspend their investments. An implementation of the risk assessment model in Thailand's real estate industry becomes an issue in this thesis investigation, as it will be studied in the designed data collection processes, the results of this model will be described and explicated in Chapter 6 and 7 hereinafter.

3.5. SUMMARY

This chapter aims to support the theoretical classification of risks, as risks in real estate industry had been determined by the coverage of STEEP factor, which is widely used by the decision makers or project managers to form the supportive criteria before making a decision towards investment in real estate.

The extensive scopes of risks in this industry were also limited in this chapter, risks were defined as *"the systematic risks"*, contain with subjective values and these are originated by the perceptions towards STEEP factors. The literature review also confirmed that the seriousness of risk is varied in according to the developers/decision makers' perceptions. Moreover, this chapter informed some features of the ideal risk assessment methods that suit the developers' requirements, and the disadvantages of the current risk assessment techniques found informed the foundation of the suitable risk assessment model.

The further risk assessment model will be purposed in chapter 6.3.3, its features will be supported by the findings of literature review and the qualitative data approaches (see chapter7.5.5, the idealistic risk assessment model).

All information gathered from the literature review informed the selection of research methodology, strategy and further data collection/analysis procedures, implied the future surface of the appropriated risk assessment techniques as well as given the idea to establish the suitable risk assessment criteria for this particular industry. These philosophical stances and research strategy will be discussed in the chapter 4, whilst the data collection and analysis, included the designated risk assessment criteria will be described in chapter 5.

CHAPTER 4 RESEARCH METHODOLOGY

4.1. INTRODUCTION

The essential guidelines to continue the research were given in the introductory chapter, the theoretical framework had been underpinned by the literature review processes. To respond the research's questions and objectives, it is necessary to clarify the research strategy, philosophy and methodology prior the data collection started. The selection of the strategy is constrained by factors related to ontological and epistemological background of this thesis, opportunity to access to informant, data collection and analysis, and the availability of resources, respectively.

One objective of this thesis is to explore the detail of risks embedded in Thailand's real estate industry, therefore this research will investigate on the practitioner's perceptions, opinions and experiences towards risks, the industry context, the possible cause of risks, and the required risk assessment methods. This information will help in developing the practical risk assessment model that suit with the requirements of this industry.

The research questions and thesis objectives confined the selection of research philosophy, strategy and the administration of data collection and analysis, as these research philosophical considerations and appropriated research approaches will be useful for the data collection processes in both research phase.

4.2. PHILOSOPHICAL CONSIDERATIONS

An appropriate research paradigm must be set up before the whole research being undertaken, the research paradigms are defined as the overall conceptual frameworks within in the area of researchers work, or paradigm is a set of linked assumptions about the world which is shared by a community of scientists investigating the world (Healy and Perry, 2000). In this regard, a research strategy herein is discussing based on three philosophical assumptions, which are ontology, epistemology, and methodology, respectively. These paradigms are cited in order to help the researcher defining the reality (risk in Thailand's real estate business) and the relationship between this phenomena and researcher, as well as support the thesis' philosophical stances and objectives (Creswell, 2007). The assumptions towards each philosophical stance include the characteristics and implication for the practical usage are summarised in the following Table 4.

Table 4: Philosophical assumptions with implications for practice

Sutrisna (2009) described that the research philosophy commonly comprises two branches of ontology and epistemology. Ontology logically precedes epistemology, whereas epistemology precedes methodology, these are actually portraying a bigger perception of the research. This influenced the researcher to clarify and select the paradigm and strategy for this thesis prior the field research continued. Therefore, this thesis research continuum starts with the philosophical considerations, research ontology and epistemology, practical considerations, reasoning and methodology, respectively.

The ontological stances are firstly discussed, they are normally divided into objectivism and constructivism, respectively. Guba and Lincoln, (1994) and Sowa (2010) defined that the ontology is the claims and assumptions about the nature of reality, claims about what exist in the specific domain, what it looks like, what units make it up, and how these units interact with each other. Objectivism is declared as phenomena and their meanings are occurring independently from the actors. Whilst constructivism asserts that phenomena and their meanings are continually being accomplished by the actors or the actors are in a constant state of revision (Sutrisna, 2009). Constructivism holds that truth is a particular belief system held in a particular context. It also inquires about the ideologies and values that lie behind a finding so that reality consists of *"multiple realities"* that people have in their mind (Healy and Perry, 2000). The researches associated with this paradigm, depends on interaction between the researcher and respondents, the researcher has to become a part of their data collection works or field works (Guba and Lincoln, 1994).

The epistemological paradigms are then discussed, there are two competing paradigms often cited to support the philosophical background of the social science research, which are positivism, and interpretivism, respectively. Positivism advocates the application of methods of natural science to the study of reality and beyond, thus the truth must be discovered by the researcher (Sutrisna, 2009). Fellows and Liu, (2008) supported that positivists assert in common that there are observable facts which can be observed and measured by an observer, who remains uninfluenced by the observation and measurement. The positivist approaches relate to a hypothetic deductive approach, as that reasoning is required alongside the testing of the research hypotheses.

Meanwhile the interpretivists seek for the realities by developing subjective meanings of their experiences toward certain objects or things, these meanings are varied and multiple, which lead the researcher to broaden the complexity of views rather than narrow the meanings into a few categories (Creswell, 2007). Livesey, (2006) supported that the reality (in interpretivists' belief) does not exist in an objective, observable form, the meaning of reality is depend on the behaviour of the people. Johnson and Onwuegbuzie (2004) stated that this paradigm contends that multiple-constructed realities abound, that time and context-free generalisations are neither desirable nor possible.

An interpretivism approach significantly realise that reality, particular social reality is complex and situated in time and space, the causal explanations could not overcome these complexities and dynamics. Therefore the hypothetic deductive approach is not suitable for the research which needs to investigate the reality in the social world. Generally speaking, the researcher shall employ the "*inductive approaches*" to explain the subjective meanings, and position himself in the research to acknowledge how the interpretations flow from the respondents' backgrounds, then the researcher make an interpretation and conclusion of the findings or use the qualitative data collection approach such as semi-structure interview (Sutrisna, 2009; Creswell, 2007; Guba & Lincoln, 1994; Fellows & Liu, 2008; Livesey, 2006).

By the aforementioned philosophical considerations, the researcher identifies constructivism as the appropriate ontological paradigm, due to risks are considered as the phenomena, which typically occurred in every real estate projects. The perceptions of risks in the project are varied in according to the decision makers' experience and reflexes to the occurrence of risks. Risks are termed as "*reality*" in this study and needed to be investigated of their impacts to real estate projects and stakeholders. The characteristics of both paradigms are showing in the Table 4.1.

Table 4.1 Contrasting implications of positivism and interpretivism

Interpretivism is identified as the epistemological approach of this study due to the reasons that firstly, the researcher is directly involve as the *"insider"* in Thailand's real estate sector, he acknowledged the impact of risk in this business. Secondly, it is due to the subjective and perceptive characteristics of risks, the researcher needs to interpret and describe risks and their consequences prior establish the risk assessment criteria. In this regard, the raw data retained in the collection process are formed in term of participant's opinions, or judgements, those are depended on the participant's experience in risks and the consequences. Those raw data are necessary to be interpreted and input into the purposed analytical model, before the analysis process undertaken.

However, this thesis also employed some positivism theories, especially the research progress and data collection methods had been employed, as the aforesaid model required the large number of respondents to conduct the proper statistical tests. This is in according to the thesis' aim in developing an innovative risk assessment model for the specific industry. Therefore, the research approach and methodology, which are suit to the aim of thesis and the interpretivism nature of the reality (risk) being studied had been adopted, it was designed that the "mix-method" shall be the suitable research approach to respond to the characteristics of this thesis. The application of mix method will be discussed in the chapter 4.4 hereinafter.

4.3. RESEARCH APPROACH AND REASONING

The research method generally divided into two major approaches, quantitatively and qualitatively, both methods have its own core and different characteristics (Creswell, 2007; Fellow and Liu, 2008). They are able to adopt for positivism and interpretivism approaches, Chan, (2009) extended that the traditional researchers prefer the quantitative method, while the qualitative methods tended to be favoured by the modern researchers in built environment areas. The differences between qualitative and quantitative method are summarised in the Table 4.2 as:

Table 4.2: Comparison of qualitative and quantitative research methods

	Qualitative method	Quantitative method
General framework	- Seek to confirm hypotheses about phenomena - Instruments are more rigid style of eliciting and categorising responses to questions - Use highly structured methods such questionnaires, surveys.	- Seek to explore phenomena - Instruments are more flexible, iterative style of eliciting and categorising responses to questions - Use semi-structured methods such as interviews, focus groups.
Analytic objectives	- Quantify variation - Predict causal relationships - Describe populations' characteristics	- Describe variation - Describe and explain relationships - Describe individual experiences - Describe group norms
Question format	- Closed-ended	- Open-ended
Data format	-Numerical (obtained by assigning numerical values to responses)	-Textual (obtained from audio, video, and field notes)
Flexibility in design	-Study design is stable from beginning to end - Participant responses do not influence or determine how and which questions researchers ask next. - Study design is subject to statistical assumptions and conditions	- Some aspects of the study are flexible (i.e. wording of particular interview questions) - Participant responses affect how and which questions researchers ask next. - Study design is iterative, that is, data collection and research questions are adjusted according to what is learned.

Source: Adapted from FHI, (2010), pp. 3

The quantitative research attempts to make generalisations based on precisely measured quantities as well as encourages the researcher to make robust generalisations about the group being researched (Guy,1987; Higgins, 1996; Field, 2005). This research will generate mathematic statistical data (in numerical format), and involve gathering data from a large sample or population, usually via a questionnaires. The questionnaire survey techniques are employed to investigate the reality and used as the guiding principle to distil what the researcher needed to find out into the minimal number of questions with the large samples.

Alternatively, qualitative research method is used to explore and understand people's beliefs, experiences, attitudes, behaviour and interactions. It allows the researcher to share the

understandings and perceptions of others and explore the perceptions of homogenous and diverse groups of population. It is concerned with collecting in-depth information, that typically refer to a range of data collection and analysis techniques, which both produce and analyze text data, allow for more in-depth analysis of social, political, and economic processes. Samples of this method tend to be smaller than the quantitative approaches, thus in-depth interviews or group discussions are two common methods used for collecting qualitative information (Berg, 2009). Using a qualitative approach not only allows the researchers to examine more deeply on the relevant issues of the research perspective, but also enables a wider aspect of understanding as this approach provides a standard to measure the raw data (in subjective format) rather than using the statistical mathematical devices, since it allows the researcher to review all data thoroughly, and it also stresses the researcher to concentrate on in-depth understanding of the data rather than judge or predetermine potential research findings only (Kok, 2009, pp.129).

The comparison of research methods in Table 4.2 supported that this thesis is inclined to be qualitative approach, because of it investigates the judgments, opinions, and experiences in terms of subjective value, in order to find out the affects of risk to the real estate projects. The informants are the *"insider"* of this industry's context (project managers, experts etc.). Therefore, data gathered by the designed collection process must be interpreted, and input into the established calculation model. This research also reflects the inductive nature of the data collection methods, and focuses especially on the decision makers or managerial level in the real estate projects. However, some quantitative data collection techniques had been adopted in order to respond to the research aim that need to set up the formal risk assessment model as well as strengthen the validity and reliability of this research.

Each aforementioned paradigm has the reasoning of research to support the paradigm's continuum, the research reasoning is the logic of the research, the role of existing body of knowledge gathered in the literature study, and the way of researcher to utilise the data collection and subsequent data analysis (Sutrisna, 2009).

Two major axial of research reasoning are deductive and inductive (Healy and Perry, 2000). Deductive research entails the development of a conceptual and theoretical structure prior to its testing through empirical observation. A deductive method is typically started with the literature review and then identified and state a single selected problem leading to the isolation of the major research question in which the existing knowledge may be inadequate. This method is usually

followed by formulating hypotheses which can be accompanied by a series of sub-hypotheses, that may be formed in terms of conceptual model propose to deal with the identified problems. The subsequent data collection using the proposal data collection methodology followed by the analysis resulting in the findings closely related to the existing knowledge (Sutrisna, 2009).

Meanwhile, the inductive reasoning is intending to understand the phenomena in question by applying the less-structured methodology to gather richer and deeper information, inductive research is mind-opened for any possible results while proposing a set of further step for data collection in attempt to answer the phenomena in question (Guba and Lincoln, 1994). The literature review is less important in the earlier research phase in order to reduce the influence to the researcher's concept and results gathering.

The distinctions between these two reasoning are described as the deductive explains the reality via analysis of causal relationships, generally uses the quantitative data as well as the statistical controls to verify the formulated hypotheses. This reasoning also associates with the highly structured methods to ensure the validity of data. Whilst the inductive reasoning relies on the subjective meanings to describe the reality, this reasoning typically uses the qualitative data. The researcher shall commit for researching in every setting, however, this reasoning employs less structured methods to validate the information (Ross, 2005; Sutrisna, 2009).

According to the nature of this research, it is relied on an inductive reasoning, since it attempts to explain the perception and characteristics of risk in the subjective mean. As well as it generated the qualitative data gained by individual judgement and opinions, the research therefore bounded with the less structure in the data collection process to gain the valuable information from a number of selected participants.

Table 4.3: Summary of the research methodologies

Ontological	Constructivism	This research emphasise on analysis of the risks as a phenomena in every real estate projects
Epistemological	Interpretivism	- The researcher is a part and has the background experiences in Thailand's real estate business sector (an "insider" of this situation). - Risks are subjective and needed to be interpreted in this current situation
Reasoning	Inductive	Research information being determined by criteria within the non -controllable environment with less structured data collection methods.

To recap, this research positions the constructivism stance in terms of ontological, interpretivism as the epistemological stance, inductive reasoning, respectively. However, it also adopts some positivism theories and the quantitative techniques in order to respond to the research aim in regard to develop the proper risk assessment model for the industry.

4.4. RESEARCH APPROACH

4.4.1. Selection of research method

The appropriate research approach shall be designed in order to minimise the limitations of the research such as the accessibility and availability of data, resources used in between the research process and the limitation of time and to suit this thesis' philosophical stances.

Then "*the pragmatism*" (Creswell, 2007) were selected as the appropriate approach to respond to the research questions. According to the nature of this research, the data collection process is not relying on either quantitative or qualitative stance solely, and the researcher did not commit to any one system and reality. He has his own freedom to choose the best methods to meet the requirements of this research (Cresswell, 2007). With this approach, the researcher can yield the richer data within the limitation of this research.

Another reason to support the pragmatism approach is this study not committed to one system of reality, as it adopts "*interpretivism*" epistemology, but also applies some of "*positivism*" theories (see Chapter 4.2). This also uses both of quantitative and qualitative data collection methods to investigate the research questions. Moreover, the pragmatism is less concern on the philosophical traditions, since this research adopts a series of indicative hypotheses and combines both quantitative and qualitative data collection techniques to gather data in both mathematical statistical and personal judgement in order to provide a basis for further investigation to gain more precise data.

The researcher seeks for the best strategy to gather validates and reliable data, then the "*triangulation*" of the research approach in regard to data collection must be concerned. Patton (2002) and Johnson (1997) defined this as a typical strategy for improving the validity and reliability of research as well as to evaluate the research findings. It strengthens a study by combining methods, and using several kinds of methods or data, including using both quantitative and qualitative approaches. The concept of data triangulation is to allow research participants assist the researcher in the research question as well as with the data collection. Engaging multiple methods will lead to

more valid, reliable and diverse construction of realities. Denzin (1970) additionally explained that triangulation is an approach in which multiple observers, theoretical perspectives, sources of data, and methodologies are combined. It is generally viewed as an involvement of using more than one method of investigation and more than one type of data. Within this context, quantitative and qualitative research approaches are perceived as the different ways to examine the same research problem. By this meaning, the validity of conclusions will be more increased when the mutual information is revealed and the triangulations are divided into formats of:

- *Data triangulation*; this involves gathering data through several sampling strategies, the portion of data may be collected from different times, different social situations, and a variety of people are involved. This triangulation is divided into 3 types as: Time triangulation means the data collection at the different points of time. Space triangulation is a process that undertaken at several locations, which must be initially identified the relation of places to the study and information, and personal triangulation which is data collection from various levels of informants, groups or collectives.

- *Investigator triangulation*; it is the interaction between two or more researchers with different backgrounds and proficiency in the same study. Each researcher must have significant role in the study and his/her area of expertise must be complementary. All investigators will discuss their individual findings and reach a conclusion.

- *Theoretical triangulation*; this relates to the use of more than one theory in the analysis and interpretation of the same data by studying the benefit and effects of these theories on the information.

- *Methodological triangulation*; or between-method triangulation or within-method triangulation. It means using more than one method to yield data. This involves with the contrasting research methods, such as a questionnaire and interview, which includes combining quantitative research and qualitative research and is designed in the form of simultaneous implementation or sequential implementation. The purpose of the research and a logical argument for using each method shall be considered, more further studies shall be undertaken if the findings from these methods are ambiguous or in negative way.

Therefore, this research is constructed by combining the between-method triangulation, methodological triangulation and data triangulation together in the data collection processes to collect information from the Thai practitioners in form of both qualitative and quantitative formats. The research strategy shall be a mixture of both quantitative and qualitative approaches, in order to strengthen the research's validity and reliability, as well as to triangulate the data received from each research phase.

4.4.2. Mixed Method

Aforementioned research philosophies informed the practical consideration of the appropriate research strategy based on the accessibility of information, and feasibility to complete the research within the resource limitation and the nature of this research. As resource availability is one constraint of research completion, particularly accessibility to the information sources. While the nature of research was important since it limits the selection of research strategy and remove the inappropriate strategies from the body of research (Moayad, 2005).

The mixed method was adopted in the research processes, because of it reflects the flexibility of research approaches, it mixes and matches in conjunction with method selections, to achieve the combination most appropriate for a given inquiry problem. Thus, the practical demands of the problem are primary; inquirer flexibility and adaptive are needed to determine what will work best for given problem. Greene et al., (1989) indicated the five types of mixed method evaluation designs, which regarded to the triangulation, complementarities, development, initiation and expansion as detailed in Table 4.4.

Johnson and Onwuegbuzie (2004) supported the usage of mixed method as it combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study. It is an attempt to justify the use of multiple approaches to answer the research questions, rather than rely only on one research stance. Therefore, it provides more flexibility in terms of expansive and creative form of research, as "*it is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research*" (Johnson and Onwuegbuzie, 2004, pp.17).

The mixed method provided more flexibility to the data collecting and data analysis processes, as it adopted the strength of both quantitative and qualitative research approaches, and provides the triangulation for this study in terms of stronger validity and better understanding of the phenomena with the information derived from multiple perspectives (Green et al., 2005).

The aforesaid reasons supported the appropriateness of mixed method, as this applied a series of inductive hypotheses and utilised the quantitative data collection techniques (questionnaire survey) to gather numerical data to provide the basis for further investigation and the interview techniques to provide the richer data, in order to support the constructivism and interpretive characteristics of this research.

Table 4.4: Five purposes of mixed method evaluation designs

Another reason influenced a selection of the mix-method is the nature of this research, as it is constructed based on a mixture of paradigm, which conceptualised the qualitative research stances, but implemented some quantitative technique to fulfil the objectives of studying. This study also needs the triangulation in research process, therefore in the stance of data collection, the mix-method is selected as it covers on the reliability and validity of this research.

4.5. RESEARCH DESIGN

Both of quantitative and qualitative research approaches have their limitations due to their characteristics and practicality. The limitations of both approaches could be mitigated by triangulation. In the manner of the quantitative data benefits from comparisons with qualitative data, it is necessary to cross-check that qualitative data against quantitative findings. The weaknesses of one approach can be compensated by the strengths of another. A combination of both research approaches shall provide better impact and evaluation data, and enable the researcher to understand gain richer data in terms of in-depth opinions or judgements (Dudwick et al., 2006).

The overall research framework and strategy are illustrated in Figure 4, it starts with defining the research topic, which informed the further research questions definition as well as the establishment of research aims and objectives. Moreover, this provides a guideline for selecting the research methodologies. This research is logically grounded on the qualitative stances, but it adopts several quantitative data collection techniques for strengthening the reliability and validity of data. Therefore, the mixed method was selected as the suitable research method, the researcher adopted a two-phase design (Creswell, 2007) because of this research's design was a component design, in regard to the data retain their original form within this study, and the results inform the next stage of research, consequently.

The phase one was designed as the quantitative data collection approach, which relying on the large-scale questionnaire survey, the outcome of this phase was the outline of risk assessment model (constructed based on statistical tests). Meanwhile the qualitative approach was undertaken in the second research phase, it adopted the interview and case study methods in order to explore and explicate the model derived from the first phase.

Both research phases have the significant role in this study, as they are a mixture of the quantitative data collection techniques with the qualitative research philosophies. The extensive literature review informed the selection of the appropriate research instruments, as well as helped in establishing the risk assessment criteria, which is used alongside with the research instruments and the purposed assessment model. The proper research strategies and research designs also informed the selection of data collection methods, the questionnaire survey technique is adopted to gather large scale of information from the real estate practitioners in the research area. The pilot study has provided the useful information that needs for a further modifying of research instruments, several statistical tests

69

also being used to analyse the data, in order to develop the model based on the requirements of samples. Another technique employed in this pilot study stage was interviewing with the real estate experts, this enable the richer data in terms of opinions and judgements from the practitioners (see Appendix III).

The data collection process is conducted to explore the opinions of the real estate practitioners towards the seriousness of risks, and the practitioner's perception of risks in order to modify the risk assessment model. This process comprises the following methods:

- *Self-administered questionnaire* the respondents can conveniently complete a questionnaire on their accords without any influences, an aid of researcher and they get the same questions. It also provides a chance to revise the respondents' response. However, this type of questionnaire requires clear instructions and a very careful wording of items, and its questions shall be simple to answer (Kumar, 2005). This method will be implemented in the larger samples scale (the practitioners in the studied area).

- *Interview with the practitioners*, these will be conducted in order to find some richer relevant information to respond to the research questions (i.e. the features of the new risk assessment model). The interviewees are selected from the group of real estate developers in BMA area. More than ten interviewees are expected to be invited, in order to provide more precise data, as the analysis outcomes can be adapted to various requirements of each real estate project types, these participants would be sub-categorised by the type of their real estate projects and project conditions (e.g. areas, and size of projects). These processes are facilitated by the interview records that contain the questions designed for yielding an in-depth investigation about the practitioners' perceptions, the current risk assessment practice, the ideal or practical assessment methods, and any comments or suggestions for the further studies (see details in Chapter 5).

This second phase provides the data in qualitative, subjective and interpretive formats, therefore the researcher has to explain all results from this phase, comparing with the first phase's findings, in order to provide the methodological triangulation to the gathered data.

The risk assessment model will be then developed based on the information gathered by questionnaire surveys together with the data collected by interviewing with the practitioners. It will be validated and proven for its feasibility and reliability by the real estate experts' judgements throughout the interview process as shown in Figure 4.1.

A selection of research topic

Based on the researcher's interest and background

Particular area

Risk assessment practices and Thailand real estate business context.

Defining Research Questions

- What kind of risk had the most impact to the overall Thailand real estate development business?
- How do the Thai practitioners perceive towards STEEP factor risks?
- Do the Thai practitioners satisfy in the risk assessment techniques that they currently use?
- What should be the ideal risk assessment technique/method that suitable to Thailand real estate business context?

Aims and Objectives

- To investigate possible causes of risks and their consequences embedded in Thailand real estate industry.
- To address any particular risks that occurred in this industry.
- To explore the current risk assessment practices and the ideal risk assessment techniques that suitable with Thailand business context.
- To develop the comprehensive risk assessment framework for Thai real estate developers.
- To introduce the alternative risk assessment models, which constructed based on both quantitative and qualitative characteristic of risks.

Literature review

- In the area of risk assessment theories and real estate development.
- Thailand real estate business context

Risk assessment criteria

- Established up based on the requirement of STEEP factors.

Research Methodologies

1. Ontology - Constructivism
2. Epistemology - Interpretivism
3. Axiology - Value - Laden
4. Reasoning - Inductive

Selection of research approach

Mixed Method approach
- Tri-angulation
- Combination of the data gained by both quantitative and qualitative
- Feasible to access to data
- Flexibility in data collection

Phase One

1. Establish risk assessment criteria.
2. Piloting study
3. Modifying the questionnaire and interview questions (structure)
4. Large-scale questionnaire survey

Phase Two

1. Semi structured interviewing
2. Qualitative Data analysis
3. Introduce the innovative risk assessment model
4. Model validation and explication based on case study approach

Conclusions and recommendations

- Phase 1 and 2 findings
- Contributions to knowledge
- Thesis limitations
- Recommendations to further research

Figure 4: The thesis design and strategy

71

4.6. RESEARCH PROPOSITION AND HYPOTHESES

The central research proposition established is that the risk assessment technique, which enables the Thai practitioners to monitor and assess risks are necessarily required, but they are far too remote in this particular sector (Pornchokchai, 2007; Khumpaisal et al. 2010). Moreover, Thai developers perceived the existence of risks caused by STEEP factors as these risks affect to the progress of project in term of project delay, cost overrun and lack of product quality (PMBOK, 2004).

To pursuit the aforesaid propositions, the data collection and analysis methods are developed and presented in Chapter 5. These propositions can be investigated by formulating a series of hypotheses, which were established in order to explain the phenomena of "risks" in Thailand's real estate industry. These hypotheses also formulated to support the creation of risk assessment model and these are all able to test by the statistical techniques. While, the sub-hypotheses helped in categorising the respondents' characteristics, these research hypotheses are summarised as:

Hypothesis 1: It is expected that the there is no significantly difference between the Thai practitioners' perceptions toward risks in the real estate projects. A series of sub-hypotheses was also developed to test the differences of risk perceptions in the following categories.

- The positions of the respondents (Hypothesis 1.1)
- A decision making role toward risk management/ assessment in real estate project (Hypothesis 1.2)
- An experience in project risk assessment/ management (Hypothesis 1.3)

If the null hypothesis of these sub-hypotheses were rejected, it could be implied that the consequences and likelihoods of risk are varied according to the role of decision-makers, experience and attitude towards risks of the respondents.

- *Hypothesis 2:* Real estate projects in the studied area are affected by the consequences of STEEP factors. In order to test this statement, it is expected that a statistically association shall be found between the following variables:
  - The organisational type of business and organisational turnovers in million Baht. (Hypothesis 2.1)

- The typical projects that respondents participated and the related regulations. (Hypothesis 2.2).

- The position of respondents and the current risk assessment methods. (Hypothesis 2.3)

- A role in decision-making towards risk and experience in using the systematic risk assessment model (Hypothesis 2.4)

If the aforementioned sub-hypotheses are supported, that means the organisational sizes and type of real estate projects in the studied area (BMA area) influenced to the respondents' perceptions of risks.

It was assumed in the Chapter 1 that Thai developers did not use the proper risk assessment method despite they have suffered from the risks. The researcher had to prove that Thai developers require the systematic risk assessment method, therefore the hypothesis 3 which related to the implementation of the model was formulated.

- *Hypothesis 3*: It is necessary to implement and adapt the systematic risk assessment methods (techniques) as tools for the practitioners to assess risks in the real estate projects. A series of sub-hypotheses were then formulated to respond to this hypothesis, which are described as:

  - There is correlation between the satisfaction of the systematic/formal risk assessment models employed by the respondents (Hypothesis 3.1)

  - The satisfaction in the current risk assessment methods is varied in according to the experience in using the systematic risk assessment techniques of the respondents (Hypothesis 3.2)

If hypotheses 3.1 and 3.2 were supported, it could be drawn that this industry requires the systematic risk assessment method. The further statistical test of the research variables shall be undertaken to test hypotheses 4 and 5, which are solely related to the establishment of the risk assessment model.

- *Hypothesis 4*: the statistically significant and positive correlation amongst the risk factors (STEEP factors) shall be existed.

- *Hypothesis 5* : If hypothesis 4 supported, it is expected that all risks factors (contained in risk assessment criteria) could be clustered or ranked as the higher order factor structure, in accordance with their level of consequences and likelihood.

These hypotheses were tested based on the following premises:-

Premise No. 1

There are several sources of risks in Thailand's real estate projects, but these risks had been classified into 5 groups of STEEP factor. This premise influences an establishment of risk assessment criteria, which were modified to suit with the real Thailand business context.

Premise No. 2

Risks affect to project progress in term of delay of project schedule, cost overrun and the quality of products do not meet the customers/users requirements.

Premise No.3

Risks may be differently perceived by the practitioners in accordance with their working experiences, the role in real estate project/organisation and the type of project that they are participated.

Premise No. 4

The proper risk assessment techniques are necessarily required by the Thai developers to structure their decision- making processes in regard to risk assessment and the further risk treatment action.

Premise No. 5

Thai practitioners have lack of the systematic risk assessment techniques, the recent methods that they used are panel discussion or by their intuitive/experience, which provide less precise data for the risk analysis process.

Premise No. 6

Real estate projects in Bangkok Metropolitan Area (BMA) and vicinities have been affected strongly by the risks caused by external factors such as economic or political factors rather than those in the remote area, since BMA is a heart of Thailand economic, business and political activities.

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┌─────────────────────────────────────┐
│  Establishing the concept of this research  │
└─────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────┐
│     Developing the research questions       │
└─────────────────────────────────────┘
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│  Literature review to support the research  │
│                questions                     │
└─────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────┐
│          Formulating hypotheses              │
└─────────────────────────────────────┘
                    │
                    ▼
┌─────────────────────────────────────┐
│   Development of research strategies and     │
│              methodologies                   │
└─────────────────────────────────────┘
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                    ▼
┌─────────────────────────────────────┐
│  Research design and select the appropriate  │
│                approach                      │
└─────────────────────────────────────┘
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Phase one

- Establishing risk assessment criteria
- Identifying the research variables
- Developing the research and measuring instruments
- Pilot studying and data analysing
- Modifying the research instruments for contextual appropriateness
- Administrating the questionnaire survey
- Quantitative data analysis
- Developing the risk assessment model based on results from survey

Phase two

- Establish the risk assessment model
- Interview with practitioners
  - For gathering richer data in regard to expertise's judgements, opinions towards risks
  - To better understanding in the current practices of risk assessment in real estate development
- Qualitative data analysis
- Case study approach
  - To validate and explicate the risk assessment model
- Summary of findings
- Conclusion and recommendations

Figure 4.1 : Summary of the thesis data collection processes

4.7. SUMMARY

The researcher selected the constructivism paradigms as the research ontology due to it emphasised on the assessment of risk as being considered as the typical occurrences in Thailand's real estate projects. Whereas the interprevism was selected as the epistemological stance, because of risks are usually the subjective aspects that required the interpretation of the researcher, as well as the researcher is an insider of Thailand's real estate industry. The inductive reasoning was used since the information would be gathered and determined by the assessment criteria within the non-controllable environment with less structured data collection processes. However, several positivist theories had been adopt in order to provide more flexibility and reliability in gathering the information to develop the risk assessment model.

The mix method was adopted in the data collection process, as the quantitative data collection process (the questionnaire survey) will be employed alongside with the qualitative approach (interviews with practitioners) in order to support the research philosophy, which tended to be more qualitative stances. This research also affixed with a series of hypotheses in order to verify the quantitative attribution of research populations. In the case that the hypotheses were accepted, particularly the hypothesis 5, these would help in creating the risk assessment model as the perceptions of risks will be factorised and clustered in order to from the assessment model.

The next chapter will briefly discuss the research instruments, the selection of the appropriated data collection method including the data theories and analysis techniques to summarise those hypotheses.

CHAPTER 5: DATA THEORIES AND ANALYSIS

5.1. INTRODUCTION

As mentioned in Chapter 4, a mixture of research philosophical approach was selected because of its appropriateness and practicality to explore the research questions. This chapter discusses the procedures of designing the measuring instruments, administration of questionnaire surveys, the pilot study, the data analysis tests which applied the quantitative data collected from both pilot and the large scale field study. Moreover, the established risk assessment criteria will be presented in this chapter as well as this will be developed as a tool to help collecting the data from the samples.

This research employs the mixed-methods approach for collecting data, and uses a theoretical framework adapted from the industrial risk assessment processes to identify and explicate the suitable risk assessment model. It started with collect the data by the quantitative approach data in order to develop the model, it also associated with qualitative data in order to fulfil and strengthen the reliability of this research.

5.2. PRELIMINARY RESEARCH CONCEPT

As the mixed-method approach was adopted as the research methodology, it informed the design of the further data collection and analysis. It was also decided that the research instruments are combined with questionnaire survey to investigate the respondents' perceptions of risks and the current risk assessment practices, and the interviews that provide more in-depth information and useful suggestions from the real estate practitioners.

Field research approach is decided as the key data collection method in order to initially verify the updated practitioners' judgements about the risks. It is employed to study the behaviour in the natural setting of its occurrence, it involved with the real time and face-to-face interaction in a real-life location and situations, where the researcher participated. It is also meant an attempt to solve a problem by analysing the studies in order to understand the behaviour and perceptions of risks, as well as to know the contents and contexts of risks in the real estate domain (Warren and Karner, 2007; Burgess, 1982). Guy et al., (1987) stated that field research is often associated with qualitative, however, quantitative data sometimes led the researcher to find out for further qualitative study, because of the theories underpinned in this research required the different type of data, whether measurable of subjective and the essential idea is that the researcher shall go into the field to observe the phenomenon in the real business situation (Fellow and Liu, 2008).

The data instruments such as questionnaire interview records and risk assessment criteria were suggested to be validated and strengthen in their reliability. The trial study was conducted to evaluate the quality of the data collection process and the practical consideration before the large scale field research, as well as to understand the studied area contexts, the respondents' profiles, the informants' accessibility, included the limitations before the large scale research undertaken.

5.2.1. Pilot Studies

The pilot studies were conducted by included all key aspects of the large scale field research, including the information's accessibility. These were aimed to reveal the strength and weakness of the expected research instruments, prior using in the real case (Aldridge and Levine, 2001).

As this research emphasised on Thai practitioners' perceptions of risks, therefore the research instruments were equipped by the modified risk assessment criteria (Chen and Khumpaisal, 2009), these were adjusted to suit with Thailand's property context. Hence, in order to test the feasible of the questionnaire and to gather some useful data, the samples had been selected similarly with the large scale study, but it also considered on their positions in the organisation or projects and decision making role and experience in risk assessment/management. Two research instruments had been employed during the trial studies, there were the questionnaire survey and interviewing with the practitioners (see details in Appendix III).

5.2.2. The findings of Pilot Studies

The pilot studies informed that the actual research instruments shall be modified to provide more reliability and validity to the main research. The drawbacks found during these studies were summarised as firstly the respondents avoided answering some important questions because of the inconsistent linkages between the questions. Secondly, when all questions translated into Thais, some questions were found as repetitive and inconsistency. Finally, the risk assessment criteria and the evaluation methods were developed based on UK's real estate business contexts, which are different from the Thailand's context.

It also revealed that the large-scale questionnaire shall be free of logical linkage between questions, in order to reduce the complexity, the language used shall be simplified and expressed the exact

meaning. The further research should be equipped with the precise assessment criteria that modified to suit with Thailand's context.

The interview processes were employed to gather in-depth information and the better understanding of Thai practitioners' perception of STEEP, and the current risk assessment practices. The interviewees stated that the economic and political risks shall be significantly prioritised by the developers. In regard to the risk assessment practices, their companies had established their own risk assessment techniques (i.e. risk assessment matrix and use the personal/individual judgements). They also given that an innovative risk assessment technique shall be implemented for Thailand's real estate sector, but it need to prove in its effectiveness, efficiency and flexibility. Furthermore, the interviewees informed the risk assessment criteria shall be modified to suit with Thailand context, this criteria shall consider on the trend of real estate development sector in the Stock Exchange of Thailand (SET) index, as this reflected overall Thailand economic situation. The fluctuation of construction materials prices, particularly reinforcement steel and fuel because these affected to the overall construction cost and time. For the marketing point of view, these criteria shall include the political turmoil and situation, The Customer Confident Index (CCI) and Customer Potential Index (CPI) and the customer income after expense and tax.

The pilot interviews had additionally yielded meaningful data and provide the appropriate large-scale interviewing framework. Descriptive questions were useful to encourage the interviewees to explain their judgement and experience as well as give some useful solution to modify the further risk assessment criteria and research approaches.

5.3. RESEARCH VARIABLES

The researcher had defined all research variables before the whole research process commenced, in order to narrow down the investigated area (Trochim, 2009). In this regard, the research variables contain numerical, statistical or qualitative value and these may be varied in accordance with the surrounding environment (Straker, 2009).

The research variable are normally divided into 4 categories as:

- *Experimental variables* (independent or explanatory variables), which cause the effects to the studying. These independent variables are the variables that manipulated by the researcher (Trochim, 2009; Straker, 2009).
- *Dependent variables*, are the results, the affects, or the gains or losses produced by the impact of the independent variables or the predicted outcomes.
- *Controlled variables*. Control variables are extraneous factors, possibly affecting the research, that are kept constant so as to minimise their effects on the research outcome.
- *Uncontrolled variables*. These variables are theoretically free from any controlled factors and could be stated in two formats which are confounded variables (correlated biases) and the error variables. In this regard, confounded variables have hidden influences of unknown size on the results, whilst the error variables also affected the research process (Oppenheim, 1992)

The scales of measurement are then considered in this discussion, because of the types of data are regularly identified in terms of the nature of the measurement scales. The typical four scales of measurement are nominal, ordinal, interval and ratio, respectively (Fellow and Liu, 2008). Isadore and Benz (1998) provided an example of these four measurement scales as follows:

- *Nominal scale*; is the basic scale (i.e. numbers) and used only for identifying or classifying the objects and respondents.
- *Ordinal scale*; indicates the relative position of the object but not the magnitude of difference between them (i.e. ranking in order of 1st, 2nd)
- *Interval scale;* aims to compare the differences between the objects or distinguish one object amongst the others, it could be indicated by 0-10 scale or Likert scale (1-5).
- *Ratio scale;* possesses all the properties of the others scale of measurement and adding with an absolute zero point. Then, this scale can classify and rank the objects in terms of number and compare intervals or differences.

Fellow and Liu, (2008) also suggested the data analysis techniques, which are suitable to each measurement scale as described below:

Table 5: Scales of measurement and data analysis techniques

In the first phase, the questionnaire set had been established to measure and test all research variables, those were categorised in accordance with Oppenheim's definitions. The research variables and their characteristics (types, data format, measurement scales and statistical tests) had been summarised in the variables table (see Appendix IV). However, all of these variables are fallen into the nominal and interval (scale), as there are 20 variables counted as nominal, which used to characterise the respondents' profiles, organisational types and project types, whereas the other 90 variables were interval variables and used to measure the perceptions towards risks and the assessment methods.

5.4. THE MAIN QUESTIONNAIRE SURVEY DESIGN.

The pilot studies informed some missing points during the data collection process, for example the complicated logical linking between questions, then the main questionnaire survey was therefore designed to be as simply, short and attractive as possible to gather only related information. Kumar, (2005) indicated that the advantages of applying the questionnaire survey are cost and time reducing, its administrative convenience, this offered the greater anonymity, and increase the likelihood of obtaining accurate information in some sensitive situations. Ross (2005) suggested that the questionnaire designed and the type and style of question must ensure that appropriate terminology and correct wording would be used, as well as the follow up procedures shall be addressed in order to convince the respondents that their response needed. The questionnaire set was designed

following these aforementioned suggestions, it contained the exact meanings and simple for the respondents. The researcher also considered on the following aspects to facilitate the questionnaire survey process:

- *The nature of investigation*, the questionnaire techniques would be more suitable in the case of some respondents may feel reluctant to discuss some sensitive questions.

- *The geographical distribution of the study population*, this questionnaire technique shall be considered when the research population are widespread throughout the large region.

- *The type of study population* - This questionnaire survey is presumed as the cost reduction technique for research if the study population capable to understand the questions (Kumar, 2005).

Therefore, the questionnaire set was translated into Thai to facilitate the respondents to reply as much accuracy information. It was affixed with the covering letter given the researcher's contact details and purpose of the survey. The respondents were requested to consider their opinions by ticking on the appropriate boxes, it took about twenty to thirty minutes to complete. The more complex question (question 18) was presented within the middle and end of the set, while the questions that needed more details of the respondent's opinion were stated at the end to gather the commitment of the informant. The questionnaire set was divided into 4 sections as:

- *Section One*: it comprised ten questions with an aim to gather the respondents' details, their personal attributions such as working experience (years), the decision making role towards risk, educational background included the satisfaction of the current risk assessment techniques and the practices employed by the respondents (in case of did not use any risk assessment techniques).

- *Section Two*: This section consisted with seven questions (question 11 -17), in order to realise the respondents' organisation and project's details.

- *Section Three*: This section was a crucial part of this questionnaire survey, as it aimed to form up the risk assessment model based on the magnitude of risk's perceptions. The respondents had to level the consequence of each risk as well as indicated the frequency of the similar risk type in the column provided. There was only one question (question No.18) in this section, but it comprised 5 major criteria and 33 sub-criteria (according to STEEP factors requirements).

- *Section Four*: it contained with the open-ended questions to enquire for the project risk management plan and any particular risks that affect to the respondent's project.

The questionnaire set utilised a column and landscape layout to address the importance of questions. Each question was typed in bold and white colour, distinguished from the answer categories by highlighting in blocks of text and font size. The final actual-used version of the questionnaire is attached in Appendix V. It was designed to measure both qualitative and quantitative variables, in terms of nominal, interval and scale (NOIR) levels of measurement (McClelland, 2009). The examples of each type of measurement are illustrated as follows:

The Nominal level. A series of categories had been set up in order to measure the qualitative data, these required the respondents to indicate only one most appropriate answer to the questions (the individual, organisational and project's details). For example, the positions in organisation or project question, this was drawn from the typical real estate project participants (Byrne, 1996) and divided into 5 categories and the others, thus this question was used to identify the position of respondents.

Q1.	Which of the following best describes your position in project? (Please tick only one)
	Project Manager / director
	Financial Manager / director
	Project coordinator
	Site manager / Superintendent
	Engineer / Architect / Designer
	Others Please define

Figure 5: Example of nominal question used in the questionnaire

These nominal questions were carefully designed to improve the response rate, if a questionnaire is short and simply, then the response rate would be higher (Kumar, 2005).

The Interval scale, this questionnaire was contained with a variety of Likert scales, these were used to gather the attitudinal data, the satisfaction of the practitioners towards the current risk assessment techniques, as well the perceptions of STEEP factors. The figure 5.1 and 5.2 showing the examples of this scale as these enabled the respondents to state their own opinions in five level of attitudinal scale (1 – lowest, 3 – neutral and 5-highest).

Q7.	Please rank your satisfaction about that formal risk assessment approach that you have ever used.

1 = Very dissatisfied 2 = Dissatisfied 3 = Neutral 4 = Satisfied 5 = Very satisfied

Effectiveness	1	2	3	4	5
Efficiency	1	2	3	4	5
User-friendly	1	2	3	4	5
Flexibility	1	2	3	4	5
Value-for-money	1	2	3	4	5

Figure 5.1: Example of Likert scale question used in the questionnaire

The figure 5.2 illustrates an example of using scale measurement to gather the perception of risk, in regard to the consequence and frequency of each risk.

Q18. Please indicate your perceptions toward the following risks in the consequent and likelihood terms (Please ring O)										
Criteria	Please rank the consequences of this risk affect to your projects? 1 = Very low, 2 = Low, 3 = Neutral, 4 = High, 5 = Very high					Please rank the frequency of this risk occurring in your projects? 1 = Never occurred, 2 = Hardly, 3 = Neutral, 4 = Likely, 5 = More likely				
Social risks	Consequences					Frequency				
Local community does not accept your project.	1	2	3	4	5	1	2	3	4	5
Local community does not participate in your project.	1	2	3	4	5	1	2	3	4	5
You have to compensate some public liability to local community	1	2	3	4	5	1	2	3	4	5
Difficulty in recruiting workforce to complete your project	1	2	3	4	5	1	2	3	4	5

Figure 5.2: Example of Likert scale question used in the questionnaire (Question 18)

5.4.1. The administration of surveys

The questionnaire's reliability and validity had been verified by both experts' judgements and the statistical technique before the field-research works started. For example, the second pilot test was conducted in order to test the questionnaires' practicality, 30 non-random set were sent out on 5 November 2009 and there were 67% (20 out of 30) returned and the corrections were correspondingly made to check the translation of words to Thai language. This return rate indicated that the potential respondents were interested in this research area and portrayed the main survey' feasible. The Cronbach's Alpha test (Field, 2005) was then employed to test the reliability of the scale questions, particularly question no.18. This was tested on 78 variables, and the results had indicated the exceptional reliability of this questionnaire set (see Figure 5.3).

Reliability Statistics

Cronbach's Alpha	N of Items
.968	78

Figure 5.3: The reliability of the questionnaire survey

The Alpha value was 0.968, which indicated that this questionnaire set was reliable enough to be launched into the large scale survey.

5.4.2. The selection of samples

The samples were the real estate practitioners (i.e. developers and experts), which the literature review indicated that these are the decision-makers who responsible for risks at every project stages. BMA and its vicinities (see Figure 1) were specified as the studied area, in accordance with its importance as the central of the nation politic and economic activities, the high population density and the highest residential units demand (REIC, 2009; AREA, 2008). The number of real estate developers in the mentioned area was approximately two hundred forty one (241), in any organisational type, size and turnovers APTU (2006).

The data of this investigation were therefore collected from a variety of participants in Thailand's real estate sector. It is however decided that the survey should be undertaken with all population in the studied area due to the number of population was not a large amount, as well as to prevent the errors due to the sampling method to the population (Ross, 2005). This was also in accordance with Yamane (1968)' rule of determining the sample size in a case that the population numbers were not able to identify, the appropriate number of samples shall be four hundred. Therefore, four hundred (400) sets of questionnaires were distributed to the respondents (i.e. developers, or real estate professionals) in the mentioned area by various methods. The researcher also applied the real estate developers' directory developed by AREA (2008), which contained the name of housing projects, the developers name, type and characteristics of project, and contact details as the database for data collection processes.

5.4.3. The distribution of questionnaire and follow up procedures

Total four-hundred (400) sets of questionnaire were started to deliver to the real estate developers and experts in December 2009. The distribution process also utilised the information technology devices to reduce the postal cost and time. The distributed procedures of these questionnaire are summarised as:

- *Mailing device* fifty (50) sets were sent out by postal mail to the respondents' address. The questionnaire packages included a covering letter, questionnaire (4 pages) and a pre-stamped envelope addressed to the researcher's place. This was started in February 2010, with an expected return date of April 2010. However, it was recognised that the timing of survey obstructed the return rate, due to this time was overlapped with Thai New Year Festival (every April). Real estate industry was busy during this festive season, then, this allowed more duration of return in order to collect as much as possible data from the respondents.

- *Electronic Mail (E-mail) device,* one hundred (100) sets were distributed by this device. The developers' email address database was gathered from APTU (2006)'s real estate developer database. This method was selected in according to its advantages as the speed of sending could help in distributing to various respondents. As well as this was an economical device, which reduced the postal cost and also convenience for the respondents to fill up and return on the expected return date (Kumar, 2005).

- *Web Based device,* one hundred (100) sets were distributed via web based survey facilities. The respondents were invited by emailed or others personal contacting to fill the questionnaire in the website stated underneath this paragraph. The web based device was decided to use due to its convenience in data collection process, it provided variety of options to design, and facilitated in a real-time data monitored, captured and analysis (BOS, 2009). However, the research preferred the following website, since it provided the Thai language interactions for the respondents:

    http://spreadsheets.google.com/gform?key=tXzUB6Y4C5C3R5S25psj15g&pli=1#.

- *Self hand-in distribution device,* one hundred and fifty (150) sets were delivered to the respondents directly. This device helped in face-to-face interaction between the researcher and the population in order to provide some necessary information to the respondents (Kumar, 2005).

The distribution and return rate of each device are summarised as follows:

Table 5.1: Summary of questionnaire distribution devices

Methods	Sent out (sets)	Returned (sets)	% of return	Started date	Expected return date
Postal mailed	50	4	8	February, 2010	April, 2010
Emailed	100	54	54	December, 2009	April, 2010
Web Based	100	25	25	December, 2009	April, 2010
Self hand in	150	127	84.66	5th February, 2010	April, 2010

The follow-up procedures were employed to convince the non-respondents with emails, telephone, or other methods. Each questionnaire set was administrated by the questionnaire distributing and returning log that assisted in following up and aware of the number of non-respondents. An initial letter inviting the non-respondents to take part in the survey was emailed one week in advance of the expected return date. That letter informed the non-respondents highlighting the importance of this research as well as the contribution to Thailand's real estate body of knowledge.

Respondent ID	Sent to (Name of Organisation)	Delivering methods 1 = Posted 2= Emailed 3= Website 4 = Handed	Sent on Date	Expected return date	Returned (Y/N)	Follow up action
1	KT of ABC Development	1	2/2/2010	2/3/2010	Y	No
2	SY of AOP Consultants	2	13/2/ 2010	13/3/2010	N	Re- emailed on6 March 2010
3	SWP of Boxes development	3	13/2/2010	13/3/2010	N	Re- emailed on6 March 2010
4	MM of Kilpatrick developer	4	12/2/2010	12/3/2010	N	Re-emailed on5 March 2010
400	ADR of Wrexham development	3	14/2/2010	14/3/2010	N	Have seen in the conferences and already informed

Figure 5.4: The example of questionnaire following-up log

After the following-up procedure had been undertaken, the return rate was 52.5 % (210 out of 400). It was considered as the fair response rate for conducting the further quantitative data analysis (Field, 2005).

5.5. INTERVIEW WITH THE PRACTITIONERS

The interview procedures were adopted as the appropriate methods to collect the in-depth data from the selected participants. The researcher continued to utilise the same interview procedures with the pilot studies for the large-scale interview process. However, some questions and the risk assessment criteria have been modified in order to strengthen the interview's validity. The sub-criteria such as the macroeconomic impacts, variation of construction materials, the customers' affordability and the political turmoil had been added into the assessment criteria (see Appendix VI). The trial interviews also informed that the interviewing structure should be modified due to the time spent in each interview was about thirty to forty-five minutes. The informants were the business persons and felt less convenient to provide that such time for the researcher.

The semi-structured interview technique was then selected as the research's interviewing technique, because of it provides more flexibility for researcher and the interviewees, as well as reduces time spending in each interview process. However, the researcher had included some specific topics into each interviewing. An interview guideline, which is an informal "*grouping of topics and questions that the interviewer can ask in different ways for different participants*" (Lindlof & Taylor, 2002, p. 195) had been prepared in order to help focusing on the topics and provides some freedom to tailor the questions in accordance with the interview context/situation, and to the respondents.

According to these conveniences, the interviewees were allowed to express as much of their idea, judgements and perceptions of risk in their real estate projects. However, these answers were bound by the lists of questions prepared by the researcher, and the interviewing processes were controllable and almost finished in the time limited (20-30 minutes). Each interview was conducted in Thai language, in order to facilitate the interviewee to reveal his/her individual risks perspectives.

The interview record form was then created under the scope of "*the interview framework*", which was developed based on the literature review and the trial interviews. This framework assisted the researcher to keep on the progress by providing the topics and issues of discussion, and allowing the researcher to design the sequences and wording of questions during the interview. It also ensures that the data's comprehensiveness and systematic data were collected from each respondent (Boydell, 1998).

The interview participants were divided into two tiers, which were Thai real estate developers and experts, respectively (see Figure 5.5). The interview process was conducted in order to investigate each respondent's perceptions of STEEP factors risks, the current risk assessment techniques, as well the satisfactions toward the used risk assessment techniques. In addition, this interview also aimed to gather the other sources of risks (rather than STEEP factors) that affect to the real estate projects. An interviewee was asked to use a project portray the affect of STEEP risks and also asked to level the consequences of each risk with his/her current project (1 is the lowest, 5 is neutral and 9 is the highest). However, this was not the mandatory process, the interviewee could object or not participate in this process in any reasons, either the limitation of time, lack of knowledge in risk assessment or their business confidences.

The interviewee's answers had been recorded by the interview record form that consisted of six pages included a covering letter describing the aims of the research. The interview record contained the following three sections.

-   *Section 1: The participants' details.* This aimed to gather the interviewees' personal details (i.e. an educational background, working experience, the risk assessment /management experience). In addition, this section focused extensively on the decision-maker roles towards real estate risks and the risk assessment practices, and this also allowed the interviewees to accentuate the current risk assessment practices and their satisfaction towards these techniques.
-   *Section 2: The projects details.* All project's detailed information (i.e. type of development, any other useful information to consider the related risks) were exposed in this section. The interviewee was invited to use his/her project as a case study to presume risks and their causes, consequences and frequency. However, this section especially focused on the particular risks that might affect to project progress such as the project accessibility and the affect to selling volume.
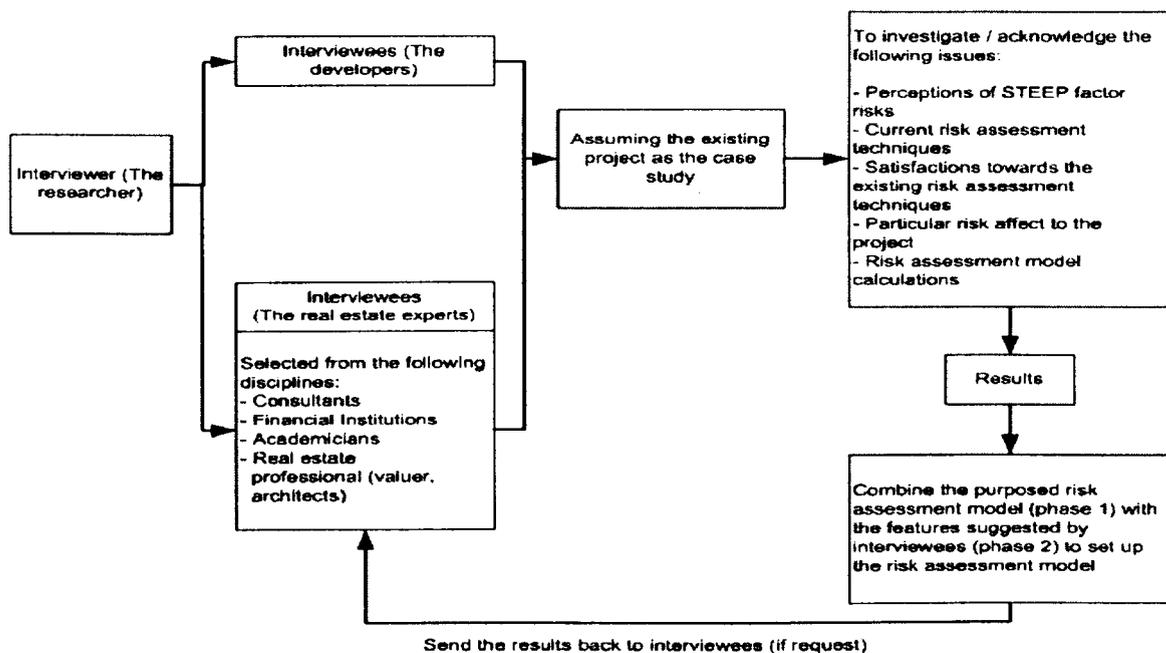
Figure 5.5 The research interview framework

- *Section 3 Risk assessment criteria*. This section contained with the risk assessment checklist, which established against the requirements of STEEP factors. The interviewees used their projects as the case study to rank the consequence and likelihood of each risk to their participated projects. The assessment criteria comprised five major risk categories, according to STEEP factors' requirements and it also contained with thirty-three (33) sub-criteria, these would be detailed in chapter 5.6 hereinafter.

In regard to the LJMU's research etiquette, the researcher briefly summarised this research aim and objectives, and then asked for the permission to record and digitalised of the interviewee's voices. The consent form issued by LJMU's research committee was presented, in order to help the interviewee decide whether to continue the interviewing or withdrawn and it also protect the confidentiality of each interviewee, the participants' details such as real name, personal data, and organisation were not being mentioned or published in any media.

To recap, the semi-structure interview technique was adopted in the qualitative data collection process because it provide the richer data for analysing the complicated nature of risks in Thailand's real estate industry.

5.6. RISK ASSESSMENT CRITERIA

The risk assessment criteria were created based on extensive literature reviews and the suggestions from the trial studies. They were established against the STEEP factors in regard to the impact of risks on each project development stage. These were classified in both quantitative and subjective formats and were summarised to use as the research instrument during the data collection process.

The pilot study informed that the risk assessment criteria shall be added with the consequences and frequency of each risk's occurrence into the criteria to enhance the assessment criteria's quality and suitability with the business context, as well as provided more simplicity to the respondents in answering the questions. Therefore, each criterion has been divided into 2 axial of risk magnitudes, which are consequences and frequency, respectively (see Chapter 3.2).

These criteria were used in both research phases, it was presented by question 18 in the questionnaire survey set, and they were also attached in the section 3 of the interview structure records that asked the interviewees to rate their perception of each risk. They consisted of five major criteria and their 33 sub-criterion in according to the STEEP factors' requirements. These assessment criteria are briefly discussed in the following section, and the summary of assessment criteria is illustrated in Appendix VI.

5.6.1. Social Risks

Social risks are mostly caused in the subjective format, and Thai practitioners given less attention to this risk because of they believed that social risk would not affect seriously to their project activities (Khumpaisal et al, 2010). Moreover, the industry also developed the technique to assess social risk's consequences (Baccarini and Archer, 2001), but it did not form in quantitative measurement in order to inform the seriousness of risk numerically. In this research, the social risk assessment criteria consisting of:

- *Community acceptability*, the developers need to consider this factor, because the new developed project would contrast to the local community benefit in regard to a change in local resident' daily life or the public utility usage (Chen and Khumpaisal, 2009), and this criteria shall be evaluated by degree of local community's acceptance to new project.
- *Community's participations*, this relates to the perception of local community towards new development project, how the project designed to suit the real requirements of the local

residents (Cartersville, 2007) and how the projects communicated their proposal to the local residents. This risk could be evaluated by degree of discourse of partnership and empowerment to community (Atkinson, 1999).

- *Public liability*, this shall be measured by degree of project impacts to local public health and safety or degree of compensation if the project causes any damages to the community or local residents. It could be also evaluated by the amount of compensation/fine that the developers paid to the local community to reciprocate the public interest or the damage to the local's premises (Zuckerman et al., 2001).

- *Workforce availability*, this could be measured by consensus methods of workforce targets in the project trade area. It also included the availability of skilled workers, as well as how to recruit the workers for the project in any manners (Citeman.com, 2010; Phillips, 2010; Danter, 2007). Therefore, this shall be measured by the degree of scarcity of workforce to complete the project.

5.6.2. Technological risks

The technological risks were defined by the researcher as the risks typically cause affects or difficulties to project participants in the stage of design, project deliveries, construction or execution, till property usage stage. These covered on risks that associated with the basic construction project requirements of schedule, cost and quality, as well as the risks affected by the quality of accessibilities and transportation to the project. (PMBOK, 2002; Smith et al., 2006; Flyvbjerg, 2003). The criteria used to assess these risks are summarised as:

- *Accessibility and evacuation*. This risk affects to the real estate project in term of attracting the customers to buy the properties with good accessibility, it also affects to the value of project in case that the project located in a poor accessibility, the project prices would be dropped drastically (Campbell and Tennant, 2008). This risk is evaluated by degree of easy access and quick emergency evacuation in use (Moss et al., 2007).

- *Amendments*, The amendments in design or construction works would consume the overall project schedule and the project income stream (Smith, 2002; Khallafalah, 2002). Therefore, the seriousness of this risk shall be measured by the possibility of amendments in design and construction.

- *Constructability*, Constructability means a system for achieving optimum integration of construction knowledge and experience in the construction activities such as planning, constructing, and operations in the construction process as well as balancing the project

constraints to achieve objectives (CII, 2010). These cover on the particular risks during the construction stage that related to design and construction matters and would be assessed by degree of technical difficulties in construction (Khallafalah, 2002).

- *Duration of development*, VT. Luu et al., (2008) indicated that the longer time spent in construction stage equalled to the severe loss of project income and the following activities, especially the selling processes. It is necessary for the developers to measure the delay in their construction process and this is measured by ratio of total duration between design and construction per 1,000 days.

- *Project Integration* or the miscommunication between each project participants to others or to the project's customers, this leads to the conflicts between developers and the contractors/designers (PMBOK, 2002). This risk shall be evaluated by the delay (days) caused by a miscommunication between project participants.

- *Facilities management (FM),* FM only scoped in this research as the management activities of the premise after handover to the users included with the operations, processes and manpower to manage the properties' lifecycle (i.e. control, maintenance, utilisation, disposition and other activities) that ensure the property-legislations conformation (Zello, 2010). This shall be measured by degree of complexities in facilities management, and it could be measured by its performance to handle a large number of customers (Moss et al, 2007).

- *Transportation's convenience* as mentioned above, good accessibility and the good transportation would draw more customers' attentions (Campbell and Tennant, 2008). The quality of transportation to project site must be also considered by the developers, this also included the transportation of construction materials to site. The researcher applied the degree of public satisfaction to the mass transportations provided to the new project area, and the transportations' accessibility to assess this risk (Couch and Dennemann, 2000).

- *Utilities and Infrastructure* Ernst & Young (2009) stated that an inadequate infrastructure and utility affected to the real estate project and the properties' value apparently since each resident need an accessibility to the basic utilities (i.e. electricity, water) and the access route to their premises. It is necessary to consider this factor in developing the real estate projects, and this shall be measured by the degree of public satisfaction towards utilities and infrastructure (US Government, 2008).

5.6.3. Environmental risks

The real estate projects typically produce severe affects to the surrounding environment or to the local communities due to its size, participants and development's duration. Environmental risk in this industry generally related to the adverse environmental impacts generated from the construction/operation processes. Huge load of pollutions (i.e. construction noise, CO_2 or suspense dust) have been produced during the development process and those affect to the surrounding area (Lister, 2008). The environmental risks assessment actually has a key role play in the large scale real estate project construction process, since it helps the developer understanding the components and environmental issues of the developed site. This also helps the project sponsors to identify sources and components of hazards in their projects in order to analyse the likelihood of hazardous substances in the ecological system (the release probabilities, quantities, and rates), identifying the sensitivity characteristics of the risk receptors, estimating risk with reference to an accepted close-response relationship, and evaluating the acceptability/tolerability to the estimated risks (Harrop and Nixon, 1999). There are 4 risks consisted in this category:

- *Environmental Impact Assessment (EIA) approval* This research focuses especially on the delay caused by the approval process from the ONREPP[2], it lacks of enforcement and qualified officers to deal with the approving processes of the real estate or industrial projects. These cause a delay to the submitted projects and led to the burden of the developers to wait until the approval. This EIA however specified that the real estate projects mandatory need an ONREPP approval. If the developers do not build exceed the limitation of ONREPP, they do not have to acquire EIA (Pratumsinchai and Panswad, 2009). The duration (days) of EIA delay is used as an indicator in order to measure this risk.

- *Quality of surrounding environment impact*, measured by overall value of the Environment Impact Index (EII), which was a subjective quantitative measurement of various adverse environmental impacts that could be potentially generated from processes or operations during the entire project period. (Chen et al., 2005).

- *Pollution during the development*, the real estate projects actually produce a huge load of pollution such noise, dust or waste water and these would disturb the local resident' health and safety or business interest (Meherik, 2002). This could be measured by the degree of pollution affect to the local community (USEPA, 1998).

- *Site conditions*, This covers on the capacity of the land to handle the further development included risks caused by other natural adversities, the quality of site, the contamination in

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[2] Office of Natural Resources and Environmental Policy and Planning (ONREPP)

land, and the natural disasters such as the flood risks as these would deteriorate the property and land prices drastically (Speyrer and Ragas, 1991). These could be measured by degree of difficulties in site preparation before project commenced (Garcia-Villarreal, 2002; FTA 2007, pp 4-4).

5.6.4. Economic risks

An uncertainty in economic and financial situation has the significant influence on the real estate development process, as the project sponsors normally required the highest return of investment, and they have to bear the high economic (financial) risk as well. The typical economic risks in this industry are caused by the variation of interest rate, loan and developer credit, sources of development funds and project D/E ratio (Sagalyn, 1990; Case et al., 1995; Nabarro and Key, 2005; Strischeck 2007). The developers additionally require the highest properties' life cycle value that could be measured by Net Present Value (NPV) achieved from the investment (Smith et al.. 2006; Adair and Hutchison, 2005). IPF (2007) disclosed that an investment in the commercial real estate assets delivers an income stream return, but the income stream is uncertain to forecast because of there are many unforeseen events which affected to an income stream.

Moreover, risks caused by marketing managerial factors such wrong estimated of demand and supply of the properties would cause the critical impact to real estate project. These factors included the characteristics, attribution of buyers and tenants, included the degree of competitive in the trade area (Miller and Lessard, 2008; Adair and Hutchison, 2005).

Strischek (2007) suggested some mandatory requirements that should be added into economic risks criteria such as original and banks appraised value, capitalisation rate from appraisal and loan to value at inception, and it is necessary to measure risks by utilising a sensitivity analysis on the income/loss data[3] of the property. Blundell et al., (2005) added some criteria such as sector balance score to measure the fund's structure, the location concentration to measure the percentage of each fund's capital value, development exposure, asset/lot size concentration, the lease length and tenant concentration to measure the percentage of the annual rental payments.

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[3] capitalization rate from appraisal, net operating income, vacancy rates, space rental rates, debt service coverage, interest rate spread, floor, and ceiling and annual principal and interest payments

Furthermore, the developers generally utilise the interest rate as significant indicator for measuring economic risks as the variation of interest rate affected their earnings by changing its net interest income, the level of other interest-sensitive income, and operating expenses associated with each specific real estate development FSA (2005), and those changes also affected the underlying value of a firm's assets, liabilities and off-balance sheet instruments and the present value of future cash flows.

There are 14 risks in this risk mode those related to marketing, macroeconomic and project funding aspects, they are briefly described as:

- *Brand visibility or brand awareness*, this is a media to communicate the occurrences of products to the target customers and to build the relationship between customers' perceptions towards products (Macdonald and Sharp, 2000). For the Thailand's real estate industry, the customers had perceived brand and reputation of developers and set this as the decision making criteria to buy houses (AREA, 2008). This risk shall be measured by using the degree of developer's reputation in developing each specific real estate project (D&B, 2007; Adair and Hutchison, 2005).

- *Demand and supply*, there are 2 aspects related to the risks caused by the wrong forecasting demand and supply of properties in the trade area. First, it is the competitive situation in the trade area, the developers not only confronted with the directed competitors, but they also faced the indirect competitors such as the rental units, used houses (Porter, 2008), then it is necessary for the developers to assess the competitive in the trade area by using the degree of competitiveness of the same property type in the trade area (Adair & Hutchison, 2005). Secondly, the developers may misestimate the real demand and the supplies of properties/ projects in the trade area. There is currently an oversupply situation in Thailand's property market that articulate *"the buyer market"* situation (Vanichvatana, 2007). Hence, the forecasting of these demand and supply is the major activity in real estate marketing because of it helps developers to decision whether invest or terminate their project (YAERD, 2010). Thus, this shall be measured by rating the degree of seriousness in wrong-estimating the demand and supply of similar property type (Adair & Hutchison, 2005).

- *Market liquidity* is an ability to undertake property transactions in a way to adjust the projection rate and risk profiles without disturbing underlying prices. It includes the ability to execute large transactions without influencing prices excessively, the narrow gap between bid and offer prices, the speed of the transactions, and the resilience of the speed with which underlying prices are restored after a disturbance (Crockett, 2008, pp. 14). The

selling volume of properties and the selling prices of those in the local market were adopted to assess risk caused by the ill liquidated in the real estate market (AREA 2008; Adair & Hutchison, 2005).

- *The customer affordability*. Thailand economic/political situation influences the customers' confidence to buy houses even though there is an oversupplied situation and the prices of property dropped (REIC, 2009). This is evaluated by using the mortgage rate, or housing loan rate issued by Thai commercial banks, and these also indicated the ability of customers to repay mortgage (AREA, 2008; House of Common, 2006).

- *The effectiveness of marketing strategy*. The marketing strategy is defined as a concept of building an organisation based on the profitable satisfaction of customers that help achieving success in the high competitive markets (QuickMBA, 2010). The number of property sold, produced and inventories are used as the indicator to measure the effectiveness of the developers' marketing strategy in order to quantify this risk (AREA, 2008). This risk can be subjectively measured by scale of impact of project selling rate to the project marketing strategy (Menon et al., 1996).

- *Development fund*. This risk affects strongly to property projects in terms of the shortage of development funds that delay the construction process and lead to the loss of income stream (Adair & Hutchison, 2005; Strischek, 2007). The amount of fund injected to the project and the sources of funding are considered as the indicators to measure this risk (Adair et al., 2000).

- *Fluctuation of interest rate*, this risk affects to the project income stream, because of the developers must repay the debt to the financial institutions, the variation in the condition of payment is the crucial factor of the developers' cost of finance (Sagalyn, 1990; Case et al., 1995). It is assessed by degree of impacts to project investment in regard to an increment of interest rate (Sagalyn, 1990; Nabarrol and Keys, 2005).

- *Project Cash flow liquidity*, this risk has the strongly impact to the real estate developers since they have to build the properties against the pressure from the financial institutions, they have to manage the construction cost, especially the contractors' payment. This risk shall be evaluated by the degree of ability to pay the contractual sum (Lam et al., 2001).

- *Investment return*. there are some financial indicators to measure the expected investment return in real estate such as IRR, NPV or ROI (Nabarro and Key, 2005; Strischeck, 2007) (see Chapter 3.4.2). In regard to assess the financial risk, the practitioners preferred the capitalisation rate as it enables them to determine the rate of return quantitatively (Case et al., 1995). Thus, the percentage of and capitalisation rate required by the project sponsors

(Sagalyn, 1990; Watkins et al., 2004) shall be used to evaluate risk caused by the expectation of investment return.

- *Project depreciation* A property is usually loss in its values due to wear and tear, physical deterioration and age (Baum, 1991). However, this research only assesses the perception of the practitioners towards property physical depreciation and its impact to the customers' purchasing decision making. It is therefore measured by the property depreciation rate calculated by straight line method (Baum, 1991).

- *The variation of construction material prices* this had been additionally input in the criteria due to its importance to the real estate projects. This factor is taken into macroeconomic risks' account due to it is generally influenced by the unstable economic situation and this lead to the project construction cost variation (Mansfield et al., 1994). The researcher used the reinforcement steel prices index issued by National Statistical Office Thailand (NSO, 2010), as an indicator to assess this risk

5.6.5. Political risks

The political risk is classified as possibility that political decisions or events in a country that affect the business climate in a way that investors will have their returned less than expectation when invested. They are diversified into two different concepts as firstly, political risks caused by governmental interference action, which related to all undesired outcomes of political activities of the government to the private business. It is represented by confiscation, currency repatriation and limit to business transactions. Secondly, the occurrences of any political events imposed upon the firm such as violence, terrorism and guerrillas (Hong et al., 1999).

Good example of Thailand political risk was the latest coup d'état in 2006, this caused an extreme impact on political and economic policies, and the new reformed cabinet announced the new policies for governing a country. The foreign or local developers who have inadequate knowledge of those policies postponed their investment and the Bank of Thailand (BOT) issued a policy to protect the currency exchange rate from foreigners' invasions, but it also discouraged the foreign investors (BOT, 2009). Furthermore, the problems accumulated from the previous cabinets could not be solved and those caused unpredictable political risks that influenced Thailand's real estate industry. These were the reasons of the current political situation instability and these considerably cost the nation with high severe economic impacts. However, political risks in this research are limited to the following only:

- *Overall political situation*, as mentioned above, Thailand political situation is in the chaotic situation due to the several groups of protestant, the political turmoil and mayhems. These affected to both developers and customers in term of they would less their confidence in the properties transactions. This risk is measured by degree of protest by the public, and the awareness of the current political situation (Arthurson, 2001).

- *Relevant authorities approval*, More days consumed by approval process, more risks affect to project's schedule and it costs the higher interest to be repaid to financial institutions (Hong et al.,1999). This risk is then evaluated by total days of construction/design approval process by planning committee or local officers. (Flyvbjerg et al., 2003).

- *Local development plan contradiction*, there are several local regulations related to the Thailand' development industry such as BMA planning regulation (2004) or Construction supervisor act (1992). These regulations had the mandatory enforcement to the developers because of their development plans must be conformed to these conditions, otherwise their projects may be terminated. This risk is evaluated by the degree of contrast between the project plan and the local development policy (Pellman, 2008).

Aforesaid assessment criteria are equipped with the research instruments, in both of the questionnaire survey and interviewing processes, in order to investigate the perceptions of risks to the respondent's real estate projects. However, these criteria had been adopted based on the Europeans or British practitioners' perception towards STEEP risks only, these may not absolutely suit with Thailand context. As Thai practitioners had the different point of view towards STEEP from the westerners (see Chapter1). These criteria put forward the risk assessment framework, and their outcomes informed the overall perceptions of Thai practitioners in order to create the systematic risk assessment models based on the advanced statistical techniques.

5.7. QUANTITATIVE DATA ANALYSIS

The main questionnaire set combined with twenty-one questions, containing with ninety-seven (97) variables. The total sample size was four hundred (400), and the response rate was satisfied (52.5% or 210 of 400). The data were analysed with the aids of SPSS for windows, which provided the wide range of data analysis and management techniques (Field, 2005). The statistical methods employed during the data analysis process were the non-parametric tests (chi square), and parametric tests (i.e. independence sample T-Test, and analysis of variance (ANOVA). The tests also included the correlation test, and factor analysis in order to test the formulated hypotheses and develop the risk assessment model (see Chapter 4.6) .

5.7.1. Chi- square

Fellows and Liu (2007) defined Chi-square as the non-parametric statistical tests used to compare the observed and expected frequencies of variables which fell into three of more categories and testing whether mort than two population proportions. Moreover, this is a measurement of association of the independence between two variables consisting of nominal data, a table of observations concern on two sets of variables constructed. It shall be used to measure the observed and expected frequencies, while using the cross-tabulation (crosstab) function, this informs that whether the null hypothesis (null H_o is defined as the expected and actual patterns of distribution of the two variables of interest are the same) (Drea, 2009). Davies (2009) supported that the confidence intervals provide different information from the hypothesis tests. Hypothesis testing produces a decision about any difference, either that is statistically significant or that is statistically non-significant. Therefore the degrees of freedom of the data collected from the real estate practitioners with reference to the number of components could be identified. Chi-square tests were employed in the question Q1 against Q2 and Q5, in order to measure the association between the respondents' position and their role in making-decision towards risks, as well as their experience in assessing or managing risk in real estate projects.

5.7.2. Independent Samples T-test

This test is generally used to determine whether the mean of a sample whether it is similar or different to the mean of population (Fellows and Liu, 2007), it is effectively used to measure the difference between the means of two variables or two level of measurements (dichotomous) and usually applied to the interval and ratio data types (McClelland, 2009). It was employed in the

question Q2 against the interval questions such as question Q18, in order to compare the mean of the perceptions of risks of the decision-makers and non decision makers.

STATSOFT, (2010) suggested the interpretation method of independent samples T-Test by evaluating the P-level. This represents the probability of error involved in accepting the research hypothesis about the existence of a difference and this is also the probability of error associated with rejecting the hypothesis of no difference between the two categories of observations in the population when the hypothesis is true. If the difference is in the predicted direction, only one half (one "*tail*") of the probability distribution could be consider and thus divide the standard *p*-level reported with a t-test (a "*two-tailed*" probability) (McClelland, 2009).

5.7.3. Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) is theoretically used to analyse the nominal variables with more than two levels of measurement against the scale variables, it can be used to measure the difference between means, this test could be used for two or more means, and usually applied to interval and ratio data types (McClelland. 2009). In addition, ANOVA could be named as "*F-test*", which is the ratio of the variance among conditions (between-groups variance) to the variance within conditions (within-groups, or error variance). One-way ANOVA tests are employed to test the questions with at least three groups and to compare whether the average values or levels of one variable differ significantly across categories of the independent variables (Fellows and Liu, 2007). In this research, it was used to measure the perception of risk (Q18) of the practitioners that fallen into six categories of positions (Q1), and to measure the perception of risks of the respondent who had the different working experience in years (Q4).

This ANOVA test was considered as one of the appropriate statistical tests to this research, due to it was involved with some questions with more than two variables or conditions, it will determine whether any of a set of means differs regardless of number of groups means involved in the test.

5.7.4. Correlation analysis

Correlation test is used to express the relationship between two variables, which are one or more known values, realisations of the independent variable and the other unknown or dependent variable (Fellows and Liu, 2007). Kinnear and Gray, (2008) simplified that the correlation as a measure of a linear relationship between two variables X and Y, and this could be described in Pearson correlation formula as :

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}}.$$

Where X and Y are denoted as variables,
              $\bar{X}$ and $\bar{Y}$ are the Mean of these two variables

(Courtesy of http://en.wikipedia.org/wiki/Pearson_product-moment_correlation_coefficient, accessed on May, 25th, 2010)

Equation 5: Correlation analysis

The outcomes of correlation are the coefficients to measure the strength and direction between pairs of variables and the dependency of the level of measurement (Field, 2005). Argyrous (2005) indicated that there are two types of correlation coefficient, which are Pearson's r and Spearman's *rho*, these used for analysing data and establishing the correlation between variables, and the measurement scales used should be at least interval scales, but other correlation coefficients are available to handle other types of data. Drea (2009) supported that a correlation coefficient (r) is an indexed number used to measure co-variation or the amount of change in variable x, which is systematically associated with a change in variable y. The correlation divided into 2 types as positive correlation, that when x moving up towards 1, y would be moved in same direction, and negative correlation, in which y move in the other direction as x moved. This coefficient (r) represents also the linear relationship between two variables (Argyrous, 2005; Kinnear and Gray, 2008).

These coefficients are ranged from -1.00 to +1.00, where -1.00 represented a perfect negative correlation while +1.00 represents a perfect positive correlation. A value of 0.00 represents a lack of correlation. In order to interpret the level of correlation (r), there is a rule of thumb to justify the level of correlation as: 0.0 to 0.19 is very weak to negligible correlation; 0.2 to 0.39 is equal to weak, low correlation (not very significant); 0.4 to 0.69 is moderate correlation, 0.7 to 0.89 is strong with high correlation and 0.9 to 1.0 is utmost strong correlation (STATSOFT, 2010).

102

If the correlation coefficient is squared, then the resulting value (r^2, the coefficient of determination) will represent the proportion of common variation in the two variables such as the magnitude of the relationship (Kinnear and Gray, 2008). Another important value is the significance of the correlation that combined with the strength or magnitude of the relationship. In order to evaluate the correlation between variables, hypothesis shall be assumed as the null hypothesis (*Ho*) formulated as no relationship between two variables. *Ho* will be rejected if the significance of the correlation is below 0.05, and this correlation would be suitable to suggest the regression variables for the further analysis Drea (2009).

The correlation techniques were used to identify the relationship between the nominal data and the interval data as these investigated the relationship between the satisfaction of the current risk assessment practices, and the perceptions of STEEP factor risks.

5.7.5. Factor analysis

Factor analysis was applied in this research as a data reduction method to decrease the number of variables as well as to structure the relationships between variables (classifying variables), a large number of variables can be merged together into factors describing general concepts. The research variables shall be extracted into a relatively small number of factors (factors extraction) that can be used to represent relationships amongst sets of many interrelated variables (DeCoster, 1998; STATSOFT, 2010). Factor analyses are performed by examining the pattern of correlations between the observed measures and to measure variable with highly correlated (either positively or negatively) or likely influenced by other factors, then the variables that are relatively uncorrelated are likely influenced by different factors (DeCoster, 1998).

This analysis was used to explain and level the risks' consequences and frequencies affected to the real estate project's progress. The "*Exploratory factor analysis (EFA)*", which attempted to discover the nature of the constructs underlying a set of response (DeCoster, 1998) was employed to analyse the collected data. It was assumed that the risks are associated with any factor, but there was no prior theory and nobody uses factor loadings to intuit the nature and perceptions of risks in the Thailand's real estate sector. The researcher need to consider the level of measurement, the factorability of the correlation matrix, multivariate normality and linearity including sample size and missing variables treatments (McClelland, 2009). This EFA was concluded as the major factor analysis of this research as it would help in constructing the further risk assessment model.

Exploratory Factor Analysis (EFA)

EFA is commonly used to identify the nature of the constructs underlying responses in a specific content area, and the relationship of the sets of research variables. It is also used to demonstrate the dimensionality of a measurement scale included the most important factor when classifying a group of items. EPA additionally generates the *"factor scores"* representing values of the underlying constructs for use in other analyses (DeCoster, 1998).

This EFA was conducted to determine the number of common factors underlying in STEEP factors and their strength of the relationship, as well as to reduce the trivial data and to factorise the component under STEEP factors. It is usually combines with two processes, which related to the extraction and rotation of factors. This research employed the principal component analysis (PCA), which is suit with the exploratory nature of this research. The researcher did not have a causal model, but simply wanted to reduce a large number of factors into a smaller number of underlying latent dimensions (Garson, 2010). As earlier mentioned, there were 66 factors related to STEEP factors risk assessment criteria (consequences and frequencies), and those shall be minimised to a small series of components.

The following steps were applied in order to perform this EPA effectively (DeCoster, 1998, Kinnear and Gray, 2008):

- The correlation test had been conducted prior EFA to generate a correlation coefficients matrix to compare the possible pairings of the variables, and this also helped in extracting the factors. Moreover, Cronbach's alpha tests were used to test the reliability of the dimensions, where high correlation between items was found, this means it should be considered to validate and suggest a reliable dimension (Ross, 2005).
- The principal component extractions were used to determine the number of components. In this regard, this extraction and the eigenvalue calculation had identified the importance and the percentage of variance of a particular vector. The scree plot techniques were also used to visually identify these values and to consider the number of factors.
- The varimax rotation methods were used to rotate the factors (axes) in order to maximise the loadings of some factors and reduce the trivial factors as well as to maintain independence amongst the mathematical factors, remain orthogonal at the right angles and these orthogonal rotations. The rotated component matrices were used to describe and

interpret the importance of each risk. It was considered that the factor loading shall indicate the importance of each risk and the components after rotation shall be used to represent the risk's seriousness perceptions.

- The factor loadings produced by varimax rotations were expected to be 0.700 or higher to confirm that independent variables identified a priori, (0.60 – 0.70= high, 0.51 – 0.59 = average and 0.00 - 0.40 = low). However, a lower level such as 0.500 also being accepted in the case that the real data gathered by the survey do not yield the appropriate level of factor loadings (Raubenheimer, 2004; Hair et al., 1998)

- The risk components were defined by considering the possible theoretical constructed that assigned to the observed pattern of positive and negative loadings. The option of multiplying all of the loadings shall be -1 to ease an interpretation. This research employed the factor loadings as the benchmark to prioritise the level of risks, a criterion of ensuring that the average communality was over 0.50 was taken when the sample size exceeded 200 (50% of total samples), in order to exclude the non-important risks factors.

- Factor scores for further analysis had been constructed for the further analyses using the factors as variables. The score for a given factor was a linear combination of all of the measures, weighted by the corresponding factor loading. Factor scores were varied from value of 1 (strongly positive loadings) to a value of -1 (strongly negative loadings), and a value of 0 to intermediate loadings. The factor scores were stored as a group of variables for the further analyses.

According to the EFA processes above, this analysis produced a hierarchy of risks in the Thailand real estate industry, it also clustered and adjusted risks in the appropriate components. The factor loading derived from this analysis indicated the level of each risk's seriousness and then rank them in an proper order. However, in order to order to strengthen the effectiveness of the further multivariate models and reduce the non-important factors, the researcher filtered only 5 criterions with the highest factor loading in each STEEP category, and summarised into a model that comprised 25 high impact risks. This also provides more flexibility (user-friendly) to the users, because of they can only concentrate of the high impact risk in their project, and also reduce resources to assess/manage the trivial risks, which has less significant impact to project.

5.8. SUMMARY

This chapter detailed the quantitative research processes, the statistical devices, data collection and analysis methods. It was decided that the mixed-method approach was the appropriate research's stance, due to its flexibility, and it responded to the limitation in the informants' accessibility. This approach provided the richer and reliable data to fulfil the research aims and objectives as well. The data collection methods were combined with questionnaire survey and the interviews with practitioners/experts), the results gathered by both approaches will be compared in order to triangulate the findings and summarised in the conclusion chapter.

The statistical techniques used during the quantitative phase, data collection and analysis were discussed in this chapter. It informed that the descriptive statistics will be used to describe the respondent's biographic data and project characteristics, whilst the parametric tests then applied to see whether any differences between the mean of the designated variables, the correlation and chi-square tests used to identify whether the relationships or the association between the variables. The risks criteria were filtered and categorised into groups in order to see the importance of STEEP factors to the real estate projects' progress as well as to form the supposed risk assessment model.

According to the attributions of Explorative Factor Analysis (EFA), this technique would help in forming the proper risk assessment model that suit with Thailand's real estate context and the developers' requirements. It was because of this test would help in categorising the samples into a group and to investigate the similarity or difference between the groups of them in order to test the research hypotheses (see Chapter 4.6). The outcomes of this analysis will be reported in the Chapter 6 that also included the development of the purposed risk assessment model.

CHAPTER 6 MODEL DEVELOPMENT

6.1. INTRODUCTION

The questionnaire surveys were carried out with the study samples, which were the Thai real estate project practitioners/stakeholders (i.e. project managers, financial managers, designers, etc.) in order to determine their risk perceptions and their opinions towards the current risk assessment practices. The returned questionnaires were counted at 210 sets or approximately 52.5% (210 out of 400), which was the fair response rate to continue the further statistical tests (Field, 2005).

Several statistical techniques were employed to analyse the raw data. The necessity comprehensive and meaningful summaries of all data are presented in this chapter, whist the details of those analyses are provided in the appendices. The results of these tests are presented under the following headings:

- The respondents' profiles, their organisation and project characteristics, these were described by the descriptive statistics. In this regard, all percentage were quoted as valid percentages including missing (preferred not answer) responses.
- A testing of the perception of Thai practitioners toward STEEP factors risks in according to the characteristics of samples (Hypothesis 1).
- The impacts of STEEP factor risks on the real estate projects in the studied area (Hypothesis 2).
- An implementation of the innovative risk assessment technique to this particular industry (Hypothesis 3).
- The correlation amongst the STEEP factors (Hypothesis 4), which led to the categorisation of those risks in the factor structure in accordance with their level of consequences and likelihood (Hypothesis 5).

This chapter produces an outcome of the quantitative phase which is the risk assessment model that created based on the advance statistical devices (Explorative Factor Analysis) and it will be strengthened and validated by the information gathered in the qualitative phase (phase 2) .

6.2. RESPONDENTS AND THE ORGANISATIONS PROFILES

6.2.1. Biographic of respondents

The first and second sections of the questionnaire were designed to determine the respondents' general demography and their participated projects. The respondents were requested to categorise their personal information relating to their position in project, working experience, the decision making role towards risk, included usage of any formal/systematic risk assessment methods in the first section, whilst the second section was designed to gather their projects' information.

The extractions of data from questions 1, 3 and 4 are shown in Table 6, the modal position of those samples was project manager/director as 29.5% (62 out of 210), engineer/architect and designer positions of 23.8% (50 out of 210). The others positions (i.e. quantity surveyors, property brokers, etc.) at 18.6% (39 out of 210). Nearly a half of them (49.5% or 104 out of 210) have post graduate or higher educational level, while 49% (103 out of 210) have undergraduate education. The modal number of working experience was 6 – 10 years (23.8% or 50 out of 210), whilst 22.4% (47 out of 210) had none to five years working experience.

Table 6: The personal information of the respondents

Question	Personal information	Categories	N= 210	Valid (%)
1	Position	Project Manager / director	62	29.5
		Financial Manager / director	10	4.8
		Project coordinator	30	14.3
		Site manager / Superintendent	19	9.0
		Engineer / Architect / Designer	50	23.8
		Others	39	18.6
		Missing	0	0.0
3	Educational background	Lower than vocational / technical diploma / certificate	1	0.5
		Vocational or technical diploma / certificate	1	0.5
		Bachelor degree	104	49.5
		Higher than bachelor degree	103	49.0
		None of the above	0	0.0
		Missing	1	0.5
4	Working experience (years)	0 – 5	47	22.4
		6 – 10	50	23.8
		11- 15	42	20.0
		16 – 20	38	18.1
		21 or above	33	15.7
		Missing	0	0.0

Some of the respondents' variables were dichotomously classified, which were Questions 2, 5, 6 and 10. These were aimed to collect their personal attributions such as decision making role towards risks, experience in risk assessment/management, and the usage of formal risk assessment model. The results indicated that 62.9% (132 out of 210) were the decision makers towards risks, and most of them (56.7% or 119 out of 210) have the risk assessment experience. However, it was found that only 22.9% (48 out of 210) have used any risk assessment models, and only 9.5% (20 out of 210) acknowledged the statistic applications such as AHP or ANP (see Table 6.1).

Table 6.1: The dichotomous data of respondents

Questions	Personal information (Two-tailed data)	Yes/ No	N = 210	Valid %
2	The decision maker role toward risks in the project	Yes	132	62.9
		No	74	35.2
		Missing (preferred not answer)	4	1.9
5	Experience in risk assessment / management	Yes	119	56.7
		No	88	41.9
		Missing (preferred not answer)	3	1.4
6	Used of any formal risk assessment model	Yes	48	22.9
		No	147	70.0
		Missing (preferred not Answer	15	7.1
10	Knowledge in AHP or ANP	Yes	20	9.5
		No	173	82.4
		Missing (preferred not answer	17	8.1

Question 8 resulted that the practitioners preferred the panel discussion or brainstorming techniques (40% of them or 84 out of 210), followed by using the self-research secondary data (i.e. survey within the trade area) as 21% (or 44 out of 210) (see Table 6.2).

Table 6.2: The currently used risk assessment methods

Question	Description	Preferred risk assessment Methods	N = 210	Valid %
8	Risk assessment methods popularly employed by the practitioners	By background or experience	25	11.9
		By panel discussion	84	40.0
		By using secondary sources of information (e.g. compare with other similar kind of project)	44	21.0
		Using information from reliable sources (e.g. Bank of Thailand etc.)	29	13.8
		Don't rely on any system	3	1.4
		Missing (preferred not answer)	25	11.9

The survey results above underpinned that Thai developers did not implement the systematic risk assessment techniques. These also encouraged the introduction of risk assessment model to this industry.

6.2.2. Organisational Characteristics

The respondents were asked to determine their organisation's type of core business, size of the company and organisational turnovers in question 11 and 12. There were five and six nominal categories given to identify the business's type and turnover (in form of million Baht). The results would enable an analysis of organisational types and size associated with their turnovers (See Table 6.3)

Table 6.3: The respondents' organisational characteristics

Question	Organisational characteristics	Categories	N = 210	Valid (%)
11	Type of business	Public company limited developers (registered in Stock Market)	57	27.1
		Public company limited developers (not in Stock Market)	31	14.8
		Small and medium size developers	68	32.4
		Developers' consultants or contractors (any size)	41	19.5
		Real estate experts (i.e. consultant, property management, valuation, designers)	8	3.8
		Missing (preferred not answer)	5	2.4

32.4% (68 out of 210) indicated that their organisations were small and medium (SME) size developers, whereas 27.1% (57 out of 210) involved in the public companies registered in Thailand Stock Exchange Market (SET).

In regard to the organisational turnovers, 55% (115 out of 210) of them were from the above 200 million Baht organisations, 12.4% (26 out of 210) had the organisational value between 101 to 150 million Baht, 8.1% (17 out of 210) were 11 to 50 million Baht, respectively.

Table 6.4: The organisational turnovers

Question	Description	Categories	N = 210	Valid (%)
12	Organisational turnovers (Million Baht)	Less than 10	13	6.2
		11-50	17	8.1
		51-100	15	7.2
		101-150	26	12.4
		151-200	16	7.7
		200 and above	115	55
		Missing (preferred not answer)	8	3.8

As this research studied on the projects constructed in the BMA area, the following questions 14 and 15 were designed to identify the respondents' typical real estate project and the specific location of their projects (represented by regulations).

Table 6.5: Typical projects and related regulations summary

Questions	Project Characteristics	Categories	N = 210	Valid %
14	The typical projects	Low rise residential / housing project	111	52.9
		High rise residential	40	19
		Retail	8	3.8
		Commercial	36	17.1
		Others	11	5.2
		Missing	4	1.9
15	Related regulation	Bangkok Metropolitan development Plan	102	48.8
		Bangkok Metropolitan Vicinity area development plan	70	33.5
		Any particular planning law and regulation	15	7.2
		Missing	22	10.5

Most of them (52.9% or 111 out of 210) carried out their project in low rise residential (i.e. housing projects), while 19% (40 out of them) involved in high rise residential projects (the building heights over 23 metres: Thai construction supervision Act, 1992), followed by 17.1% (36 out of 210) participated in commercial buildings (i.e. office buildings, hotels).

Question 15 was designed to allocate the respondents' project site, using the planning regulations/laws as the indicator to specify the trade area. Nearly half of them (48.8% or 102 out of 210) constructed their projects in the BMA's development plan, while the other 33.5% (70 out of 210) carried out their projects in Bangkok vicinity area (see Figure 1). There was only 7.2% (15 out of 210) of the respondents bound by other planning regulations, for example, the specific reservation area, or any other particular area.

The respondents' profiles above informed that the samples of this research were matched with the research's objectives stated that the population were majorly involved or participated in the real estate project located in the studied area. They were the decision makers towards and had some experience in risk assessment/management. It also yielded the fair response rate that enabled for the further statistical tests.

The statistical tests were then conducted, it started with the descriptive statistic testing of STEEP factors' risks perceptions and testing of hypothesis 1 in order analyse the respondents' awareness of risks against the established risk assessment criteria.

6.2.3. The perceptions of STEEP factors risks

Question 18 was asked to collect the respondents' perceptions towards each sub-criteria of STEEP factors, and the results of this question are reported in this section. It started with the descriptive statistic of each STEEP factor, where the Mean values of each sub criteria were used to indicate each risk's magnitude. These Mean values will be collapsed together to perform the advance statistical tests, which will be also included in this section.

As earlier discussed in Chapter 3.2, a magnitude of risk could be perceived by the consequences and frequency (likelihood) of risk affect to the project progress. The assessment criteria were divided into 2 tiers of *"Consequences"* and *"Frequency"*, each tier consisted of 33 sub-criteria. The comparison of means was conducted in order to explore the perceptions towards each risk alongside with the descriptive statistical techniques. In this regard, the consequences and frequency of all established criteria had been tested with the decision maker roles in the real estate projects.

Social risks

There are 8 variables contained within this social risks mode as shown in Table 6.6.

Table 6.6: Summary of social risks assessment criteria

No.	Evaluation	Question as stated in the questionnaire	Consequences (Variables name)	Frequency (Variables name)
1	Community acceptability	Local community does not accept your project.	SOC1C	SOC1F
2	Community participations	Local community does not participate in your project.	SOC2C	SOC2F
3	Public liability	You have to compensate some public liability to local community	SOC3C	SOC3F
4	Workforce availability	Difficulty in recruiting workforce to complete your project	SOC4C	SOC4F

The decision makers perceived that social risks had less impact to the project progress as mean values of all sub-criteria were below 3.00. However, they stated that the consequence of SOC4C shall be mostly concerned while managing the projects. (Mean = 2.95) whereas the least important factor was the consequences caused by SOC2C. The non decision makers towards risks also replied to this question in the similar trend with the decision makers.

Table 6.7: Consequences of Social Risks

The decision making roles towards risk		(SOC1C)	(SOC2C)	(SOC3C)	(SOC4C)
No answer	Mean	1.50	2.25	2.00	3.00
	N	4	4	4	4
	Std. Deviation	0.58	1.50	0.82	0.00
Yes	Mean	2.36	2.28	2.57	2.95
	N	132	132	132	132
	Std. Deviation	1.13	1.11	1.05	1.06
No	Mean	2.34	2.09	2.18	2.63
	N	74	74	74	74
	Std. Deviation	1.08	0.95	0.95	1.11
Total	Mean	2.33	2.21	2.42	2.84
	N	210	210	210	210
	Std. Deviation	1.10	1.07	1.02	1.08

The frequency of social risks as presented in Table 6.15 indicated that the decision makers perceived that the SOC4F were possibly occurred during the construction stage (Mean =2.70) followed by the likelihood of SOC3F (Mean = 2.33), and they paid less attention to the likelihood that the local community object their projects' development.

Table 6.8: Frequency of social risks

The decision making roles towards risk		(SOC1F)	(SOC2F)	(SOC3F)	(SOC4F)
No answer	Mean	1.25	1.50	1.75	2.50
	N	4	4	4	4
	Std. Deviation	0.50	1.00	0.50	0.57
Yes	Mean	2.06	1.90	2.33	2.70
	N	132	131	132	132
	Std. Deviation	0.88	.854	0.93	1.00
No	Mean	2.09	1.90	1.98	2.32
	N	74	74	74	74
	Std. Deviation	0.83	0.72	0.88	0.99
Total	Mean	2.06	1.89	2.20	2.56
	N	210	209	210	210
	Std. Deviation	0.86	0.81	0.92	1.01

According to the results of social risks above, Thai practitioners perceived that the social risks have the slight impact to their real estate projects. As the mean values of each criteria were all below the average (Mean < 3), but they considered that the workforce availability was the most important

issue amongst the others criteria in this group (i.e. the risks caused by the involvement of local community).

Technological risks

The technological risk mode comprised 16 variables as shown the Table 6.9 below.

Table 6.9: Summary of Technological risks assessment criteria

No.	Evaluation	Question as stated in the questionnaire	Consequences (Variables name)	Frequency (Variables name)
1	Project accessibility	Difficulty in access to your project.	TEC1C	TEC1F
2	Project amendments	Amendments in your project design and workmanship.	TEC2C	TEC2F
3	Project constructability	Project technical aspects are feasible to complete	TEC3C	TEC3F
4	Duration of development	Duration of development affect to your project cash-flow	TEC4C	TEC4F
5	Conflicts of the project participants	Conflicts between the you and your outsourcers (designers, contractors)	TEC5C	TEC5F
6	Facility management	Difficulty in property/ facility/ amenity management	TEC6C	TEC6F
7	Quality of public Transportation	Quality of public transportation to access your project	TEC7C	TEC7F
8	Quality of surrounding infrastructure/utilities	Quality of infrastructure / public utility surrounding your project	TEC8C	TEC8F

Thai practitioners indicated that the technological risks had slight impact on the overall project management processes, as the mean value of each variable was below average (mean < 3). The decision makers gave more attentions to the consequence of TEC2C risks (mean value of 2.98). Since it delays the project's progress and also cost the time for amending the design/product to conform to the customers' requirements. The next concerned technological risk was TEC4C, with the mean value of 2.73, followed by the conflicts between project participants (i.e. designers, contractors), with the mean value of 2.63. The least significant technological risk was TEC1C, the mean value indicated only 2.10. Whereas the non-decision makers perceived technological risks in the other manner, the most considerable factor was TEC4C as the mean value indicated at 2.79, TEC5C became the next, with the mean value of 2.75, followed by TEC2C with mean value of 2.74. The least impact factor was TEC8C, with mean value only 2.13. After combined the perceptions of both groups together, TEC2C indicated the highest value of mean at 2.89, followed

by TEC4C at 2.76, TEC5C at 2.67, TEC6C became the next factor at mean value of 2.50, then TEC3C at mean value of 2.42. The rest were TEC7C with mean value of 2.28 and TEC1C at 2.15, respectively.

Table 6.10: Consequences of Technological risks

The decision making roles towards risks		(TEC1C)	(TEC2C)	(TEC3C)	(TEC4C)	(TEC5C)	(TEC6C)	(TEC7C)	(TEC8C)
No answer	Mean	2.50	2.50	2.50	3.25	2.25	2.75	2.50	2.00
	N	4	4	4	4	4	4	4	4
	Std. Deviation	1.73	0.57	1.00	0.50	0.50	0.50	0.57	0.81
Yes	Mean	2.10	2.98	2.43	2.73	2.63	2.52	2.22	2.15
	N	132	132	132	132	132	132	132	132
	Std. Deviation	1.04	0.96	1.01	1.09	0.99	1.23	1.05	1.04
No	Mean	2.18	2.74	2.40	2.79	2.75	2.45	2.36	2.13
	N	74	74	74	74	74	74	74	74
	Std. Deviation	0.94	1.03	1.10	0.93	0.85	1.16	1.16	1.01
Total	Mean	2.15	2.89	2.42	2.76	2.67	2.50	2.28	2.14
	N	210	210	210	210	210	210	210	210
	Std. Deviation	1.02	0.98	1.04	1.03	0.94	1.19	1.09	1.02

The perceptions of technological risks' likelihoods were then discovered as the decision makers perceived that the most likely factor was TEC2F as mean value of 2.90, TEC4F and TEC5F became the second, their means indicated the same value at 2.54, project constructability was the third likelihood factor with the mean value of 2.23. The decision makers stated that the rarely event that affect to the project progress was TEC7F with the mean value of 1.95 (see Table 6.18).

The non-decision makers perceived that the TEC5F was the most likely occurred factor in their project, as the mean value indicated of 2.90, while the second was TEC2F, mean at 2.71, followed by TEC4F at 2.45. They reckoned that the TEC1F was hardly occurred, with the mean value of 1.94.

Table 6.11: Frequency of Technological risks

The decision making roles towards risks		(TEC1F)	(TEC2F)	(TEC3F)	(TEC4F)	(TEC5F)	(TEC6F)	(TEC7F)	(TEC8F)
No answer	Mean	2.25	2.50	2.25	3.00	2.75	3.00	2.25	2.50
	N	4	4	4	4	4	4	4	4
	Std. Deviation	1.25	0.57	0.50	0.00	0.50	0.00	0.50	0.57
Yes	Mean	2.03	2.90	2.23	2.54	2.54	2.11	1.95	2.10
	N	132	132	132	132	132	132	132	132
	Std. Deviation	0.92	1.06	1.00	0.99	0.99	1.04	0.93	0.91
No	Mean	1.97	2.71	2.14	2.45	2.90	2.29	2.25	1.94
	N	74	74	74	74	74	74	74	74
	Std. Deviation	0.93	1.15	0.97	0.86	3.55	1.09	1.14	0.87
Total	Mean	2.01	2.83	2.20	2.52	2.67	2.19	2.06	2.05
	N	210	210	210	210	210	210	210	210
	Std. Deviation	0.93	1.09	0.98	0.94	2.24	1.06	1.01	0.90

The results of both groups were combined together to identify the most likely technological factor, They construed that the risks caused by the project design and amendment always occurred in their projects, as the mean value of 2.83, the second factor was the likelihood of conflicts between project participants with mean of 2.67, followed by the frequency of risks caused by the development duration at 2.52. Whereas Thai practitioners paid less attention to the following factors, which were the likelihood of the inappropriate quality of project accessibility as mean value equal to 2.01, the poor quality of infrastructure/utility and transportation to site at the mean value showed as 2.05 and 2.06, respectively. It was because of most of the samples' projects located in the BMA area, where the necessary infrastructure, utilities and mass transit system had been fully provided. Therefore, these risks have the less impact on the projects' progress, and the developers did not recognise this factor as a serious risk in managing the real estate projects.

Environmental risks

There were 8 variables consisted in this risks mode as shown in the Table 6.12 below.

Table 6.12: Summary of Environmental risks assessment criterion

No.	Evaluation	Question as stated in the questionnaire	Consequences (Variables name)	Frequency (Variables name)
1	Delay in EIA approval	Approving from Environmental Impact assessment (EIA) authorities	ENV1C	ENV1F
2	Surrounding environment	Quality of surrounding environment impact to your project	ENV2C	ENV2F
3	Pollution	Pollution during construction process	ENV3C	ENV3F
4	Site conditions	The appropriateness of your project site's conditions	ENV4C	ENV4F

The survey resulted that Thai practitioners did not concern on the consequences of these environmental risks. As shown in table 6.13, there was no mean value exceeded than the average (mean< 3). Amongst these variables, the decision makers perceived that the ENV1C had the highest affect to their development process, as mean value indicated at 2.71. Meanwhile ENV3C also being concerned by the developers as well, the mean indicated at 2.56, followed by the impact of ENV2C to project customers and progress at 2.41, the least was the consequences of risks caused by an inappropriate site conditions at 2.26. The non-decision makers also perceived the consequences of environmental risks in the similar trend excepted they reckoned that ENV2C shall be prioritised rather than ENV3C as the mean valued indicated at 2.58 and 2.52, respectively. After combined two respondents groups together, ENV1C became the environmental risk that Thai practitioners given the most priority. Followed by ENV3C at mean value of 2.54, ENV2C at mean value of 2.47, and risks caused by ENV4C have the least impact to the practitioners' perceptions.

117

Table 6.13: Consequences of environmental risks

The decision making Roles towards risks		(ENV1C)	(ENV2C)	(ENV3C)	(ENV4C)
No answer	Mean	2.25	2.25	2.50	1.75
	N	4	4	4	4
	Std. Deviation	1.50	1.25	1.00	1.25
Yes	Mean	2.71	2.41	2.56	2.26
	N	132	132	132	132
	Std. Deviation	1.61	1.21	1.12	1.15
No	Mean	2.70	2.58	2.52	2.25
	N	74	74	74	74
	Std. Deviation	1.44	1.18	1.04	0.84
Total	Mean	2.70	2.47	2.54	2.25
	N	210	210	210	210
	Std. Deviation	1.55	1.19	1.09	1.05

According to the results in Table 6.14, the respondents paid less attention to the frequency of environmental risks occurrences, all the mean values were under the average (means < 3). The means were ranged from the lowest at 1.87 to the highest at 2.25. Amongst them, the decision makers perceived that the likelihood of pollution risks (ENV3F) often occurred while constructing the project (mean = 2.25).

Table 6.14: Frequency of environmental risks

The decision making roles towards risks		(ENV1F)	(ENV2F)	(ENV3F)	(ENV4F)
No answer	Mean	2.25	2.25	2.00	2.25
	N	4	4	4	4
	Std. Deviation	1.50	1.251	1.41	0.95
Yes	Mean	2.12	2.12	2.25	2.11
	N	132	132	132	132
	Std. Deviation	1.29	0.90	1.00	1.00
No	Mean	2.16	2.02	2.01	1.87
	N	74	74	74	74
	Std. Deviation	1.30	1.01	0.95	0.87
Total	Mean	2.13	2.09	2.16	2.03
	N	210	210	210	210
	Std. Deviation	1.29	0.95	0.99	0.96

The mean values of the rest variables were similarly, there were ranged between 2.11 to 2.12. The perceptions of environmental risks' likelihood had been combined to see the highest potential environmental risks. The results shown that Thai practitioners given more precedence to the frequency of pollution during the construction stage (ENV3F), followed by ENV1F, ENV2F and ENV4F, respectively.

Economic risks

These economic risks are the critical factors that need to be concerned while managing the real estate project, since the real estate is an income generating project and its incomes are affected by various external economic factors (Adair et al., 2000). In this research, these criteria were designed to cover the actual economic risks in Thailand's real estate business context. The related variables and evaluation questions are summarised in Table 6.15 below:

Table 6.15: Summary of Economic risks assessment criterion

No.	Evaluation	Question as stated in the questionnaire	Consequences (Variables name)	Frequency (Variables name)
1	Brand visibility	Degree of your brand awareness in this trade area	ECON1C	ECON1F
2	Competitiveness	Competitiveness of the similar kind of project in your trade area.	ECON2C	ECON2F
3	Competitiveness	The selling rate of competitors in your trade area.	ECON3C	ECON3F
4	Potential of customers	Affordability of the purchasers in your trade area.	ECON4C	ECON4F
5	Marketing strategy/plan	The effectiveness of your marketing strategy / plan to your sell volume	ECON5C	ECON5F
6	Demand/supply	Demand and supply of your kind of property in your trade area	ECON6C	ECON6F
7	Competitors selling volume	Sell records of your competitors and affect to your project	ECON7C	ECON7F
8	Project selling price	Your project selling prices and impact to your selling volume	ECON8C	ECON8F
9	Project funding	Amount and sources of your project funding.	ECON9C	ECON9F
10	Interest rate	The fluctuation of interest loan rate	ECON10C	ECON10F
11	Project cash-flow	Illiquidity of project cash –flow	ECON11C	ECON11F
12	Return on investment	Your expected investment return	ECON12C	ECON12F
13	Project depreciation	The depreciation of your project	ECON13C	ECON13F
14	Construction materials price	The fluctuation of construction material prices (i.e. reinforced steel)	ECON14C	ECON14F

The results indicated that Thai practitioners attended on the affects of economic risks to their projects more than the rest of STEEP factors, as the mean value of these criteria were ranked between the lowest at 2.42 (ECON1C) to the highest at 3.03 (ECON2C). Amongst these variables, the decision makers reckoned the consequences of ECON2C shall be primarily included in the project feasibility analysis, as the mean value indicated at 3.03. The next was the effects of ECON7C with the mean value of 3.00, and then ECON14C with mean value of 2.97. The less significant economic risks were ECON13C its mean was 2.53, ECON6C, and the least was the impact of brand awareness to the customers' potentials (ECON1C), with the mean value of 2.42.

The non-decision makers also perceived that ECON2C strongly influenced to their project marketing's plan, with mean value of 2.93. ECON5C became the second as its mean value indicated at 2.90, followed by ECON3C and ECON 14C, both of the mean values indicated at 2.79. The trivial economic risks were described as ECON10C and ECON13C, both of their mean values were 2.51 and ECON4C with mean value at 2.50.

The mean values gathered from both respondents groups were combined to find the total mean of each variable. These indicated that the respondents perceived the risks caused by the competitiveness of the properties in the same trade area portrayed the highest impact amongst the other risk factors, as its mean equalled to 3.00. The consequences of the fluctuation of construction materials prices to their project became the second with mean value at 2.91. Then, the slight differences of the mean value between the consequences of the competitors selling records and the selling rate of competitors in the similar trade area were 2.90 and 2.89, respectively. On the other hand, Thai practitioners perceived that the following factors had the non-significant impacts to the project progress, which were the wrong estimation of demand and supply of the properties in the trade area (mean value equalled to 2.54), the project/properties depreciation with mean value of 2.53 and the least impact risk was the awareness in developers' brand and corporal images with the mean value of 2.52.

The perceptions towards economic risks' likelihood were then discussed (see Table 6.17), the decision makers perceived that ECON2F always occur while managing the projects, with the mean value of 2.83, followed by the likelihood of the competitors selling volume higher than the developers' expectation (ECON7F) with the mean value of 2.75 and ECON3F was the third frequency factors with the mean value of 2.67.

The non-decision makers reckoned that the ECON2F was the most likely occurrence in the project selling stage with mean value at 2.71, then the likelihood ECON14F was probable occurred with mean value at 2.64. Then, the likelihood of ECON3F and the likelihood of the marketing plan failed to response to the customers' requirements (ECON5F) were fairly occurred with their mean value both stated at 2.50.

Table 6.16: Consequences of economic risks

The decision making roles towards risks		ECON1C	ECON2C	ECON3C	ECON4C	ECON5C	ECON6C	ECON7C	ECON8C	ECON9C	EON10C	ECON11C	ECON12C	ECON13C	ECON14C
No answer	Mean	2.25	3.50	3.25	2.75	2.50	2.50	1.75	2.50	2.75	3.00	2.50	1.50	2.25	3.00
	N	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Std. Deviation	1.50	0.57	0.50	0.95	0.57	1.29	1.25	0.57	0.50	0.81	0.57	1.00	1.25	1.41
Yes	Mean	2.42	3.03	2.93	2.67	2.58	2.50	3.00	2.91	2.68	2.71	2.66	2.86	2.53	2.97
	N	132	132	132	132	132	132	132	132	132	132	132	132	132	132
	Std. Deviation	1.26	1.18	1.10	1.08	1.09	1.14	1.22	1.09	1.26	1.07	1.31	1.09	1.18	1.21
No	Mean	2.71	2.93	2.79	2.50	2.90	2.62	2.77	2.70	2.64	2.51	2.66	2.66	2.51	2.79
	N	74	74	74	74	74	74	74	74	74	74	74	74	74	74
	Std. Deviation	1.06	1.07	1.02	1.14	0.98	1.14	0.97	1.06	1.12	1.19	1.25	1.17	1.14	1.24
Total	Mean	2.52	3.00	2.89	2.63	2.69	2.54	2.90	2.83	2.67	2.65	2.66	2.76	2.53	2.91
	N	210	210	210	210	210	210	210	210	210	210	210	210	210	210
	Std. Deviation	1.20	1.13	1.06	1.10	1.05	1.14	1.15	1.07	1.20	1.11	1.27	1.13	1.17	1.22

The mean values of both groups were then combined to see which factor was the most likely occurred economic risk. Thai practitioners had moderate awareness in the likelihood of ECON2F as its mean value was 2.80, following by the frequency of ECON7F at mean value of 2.64, the likelihood of ECON3F became the third considerate factor with mean value of 2.61. This table however stated that Thai practitioners given less attention to the occurrences of the following risks, which were the likelihood of inadequate financial sources and supporting fund (ECON9F) with mean value of 2.30 and the likelihood of the project cash-flow illiquidity (ECON11F) with the mean at 2.27. Moreover, it was also revealed that Thai practitioners neglected the likelihood of the property obsolescence as the mean value was only 2.23.

According to the survey' results, Thai practitioners concentrated on the consequences and likelihood of the economic risks, particularly the impact from the competitors in the similar trade area and the impact of this risk to their selling rates, as it affects the developers' establishment of marketing plan and the forecast of the demand/supply in the real estate market. Unexpectedly, the respondents had given less attention to the risks caused by the monetary or financial issues, which supported by the mean values as indicated in Table 6.16 and 6.17. Mean values of the marketing competitive factors (i.e. ECON2C, ECON3C, ECON2F) shown the higher value closed to the average level, while these of the financial factors (ECON9C, ECON10C) indicated the lower mean value. However, these results did not represent the overall Thai practitioners perceptions towards economic risks as a whole, because of this economic risk criterion was established in according to the European and UK's economic contexts. Therefore, the results gathered by this descriptive statistic must be validated and triangulated by the other statistical devices or other research approaches.

Table 6.17: The frequency of economic risks

The decision making roles towards risks		ECON1F	ECON2F	ECON3F	ECON4F	ECON5F	ECON6F	ECON7F	ECON8F	ECON9F	ECON10F	ECON11F	ECON12F	ECON13F	ECON14F
No answer	Mean	1.75	3.75	3.00	2.50	2.50	2.50	2.00	2.50	2.75	2.75	2.75	1.75	2.00	2.75
	N	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Std. Deviation	1.50	0.95	0.00	0.57	0.57	0.57	0.00	0.57	0.50	0.95	0.50	0.50	0.81	1.25
Yes	Mean	2.27	2.83	2.67	2.39	2.39	2.27	2.75	2.58	2.32	2.42	2.27	2.49	2.21	2.57
	N	132	132	132	132	132	132	132	132	132	132	132	132	132	132
	Std. Deviation	1.17	1.24	1.11	1.00	1.08	1.04	1.19	1.09	1.10	1.04	1.17	0.97	1.07	1.09
No	Mean	2.39	2.71	2.50	2.21	2.50	2.44	2.48	2.41	2.24	2.17	2.24	2.22	2.27	2.64
	N	74	74	74	74	74	74	74	74	74	74	74	74	74	74
	Std. Deviation	0.93	1.05	0.89	1.03	1.02	1.06	0.96	1.07	1.04	1.07	1.10	0.91	1.11	1.24
Total	Mean	2.30	2.80	2.61	2.33	2.43	2.33	2.64	2.52	2.30	2.34	2.27	2.38	2.23	2.60
	N	210	210	210	210	210	210	210	210	210	210	210	210	210	210
	Std. Deviation	1.10	1.17	1.03	1.00	1.05	1.04	1.11	1.07	1.07	1.05	1.13	0.95	1.07	1.14

Political risks

According to the literature review, the political risks affected strongly to the Thailand's property industry. Then, the survey was conducted in order to investigate this finding and to reveal the practitioners' perceptions towards political risks.

Table 6.18: Summary of political risks assessment criterion

No.	Evaluation	Question as stated in the questionnaire	Consequences (Variables name)	Frequency (Variables name)
1	Impact of Thailand current political situation	Overall Thailand political situation and affect to your customer's confidents	POL1C	POL1F
2	Impact of delay in approving from the related authorities	Total days of approval for project construction permitted from the relevant authorities.	POL2C	POL2F
3	Impact of the contradiction between project and local development plan (policies)	The contrast between your project and local development plan	POL3C	POL3F

Based on the results, Thai practitioners paid attention to the consequences of political risks when they managing the projects. The decision makers indicated that they intensively concerned on the risk caused by POL1C, particularly in the BMA area as its mean value was 3.39 (mean > 3), because of these influenced the customer's potential to buy a new property in the BMA area. They also perceived that the consequences of POL2C had the strongly impact to project progress as the mean value indicated at 3.23. Whereas the conflict between the project goals and the local development policies/regulation became the less concerned issue as the mean value indicated at only 2.48.

The non decision makers perceived the consequences of political risks in the same manner, as they indicated the mean value of POL1C at 3.28, POL2C at 3.00 and POL3C at 2.47, respectively. Therefore, the political situation (POL1C) became the first priority risk to be addressed while managing the construction processes of the real estate projects.

Table 6.19: Consequences of political risks

The decision making roles towards risk		(POL1C)	(POL2C)	(POL3C)
No answer	Mean	3.00	3.75	2.25
	N	4	4	4
	Std. Deviation	1.41	0.50	1.25
Yes	Mean	3.39	3.23	2.48
	N	132	132	132
	Std. Deviation	1.18	1.15	1.18
No	Mean	3.28	3.00	2.47
	N	74	74	74
	Std. Deviation	1.14	1.17	1.08
Total	Mean	3.34	3.16	2.47
	N	210	210	210
	Std. Deviation	1.16	1.15	1.14

In regard to the likelihood of these political risks, the decision makers stated that POL1F was the most likely occurrence, as the mean value indicated at 3.09, followed by the frequency of delay in the approval for construction with the mean value of 2.78, whilst they perceived the likelihood of the contradiction between their project plan and the local development plan/regulations were hardly occurred as the value was addressed at 2.00 only.

On the other hand, the non decision makers considered that the frequency of political risks in the similar trend with the decision makers. Based on the results in Table 6.20, they also highlighted that the likelihood of the instable political situation (POL1F) was likely to occur, with mean value of 2.89, POL2F mean value was 2.68 and POL3F was 2.06, respectively.

According to the results of political risks' perceptions, the respondents considered that Thailand current political situation (i.e. riot, protestants) was unstable and it had the strongest affect to their confidences in commencing the construction as well as the potential of the customers to buy new properties. This result also conformed to Hong et al., (1999) findings that the real estate developers being interrupted by the political instabilities and the delay in approving for construction, after that these would affect to the project schedule and budget.

The decision making roles towards risk		(POL1F)	(POL2F)	(POL3F)
No answer	Mean	2.50	3.25	2.00
	N	4	4	4
	Std. Deviation	1.00	0.50	0.81
Yes	Mean	3.09	2.78	2.00
	N	132	132	132
	Std. Deviation	1.16	1.17	1.00
No	Mean	2.89	2.68	2.06
	N	74	74	74
	Std. Deviation	1.14	1.09	0.99
Total	Mean	3.00	2.76	2.02
	N	210	210	210
	Std. Deviation	1.15	1.13	0.99

Summary of Thai practitioners' perceptions towards STEEP factors risks

The perceptions of STEEP factors risks had been explored, by using the descriptive statistic analysis included the mean value's computation, then two samples groups, which were the decision makers towards risks and the non-decision makers were compared to investigate the overall perception of each STEEP risk. The percentage ratio between the groups of samples was 62.85: 35.23: 1.92 (132 decision makers, 74 non decision makers and 4 missing). The mean value of all variables containing in the risk assessment criteria were computed to form the "collapsed means" (Bruin, 2006) or "computed means" (Field, 2005) as shown in Table 6.21and 6.22, respectively. These collapsed means represented mean values for the further statistic tests of this research as well as help in arranging the Thai practitioners' perceptions towards risks.

In term of STEEP factors' consequences, both samples groups prioritised the political risk as the most critical amongst the others, the collapsed mean of this risk indicated the highest at 3.03 and 2.91, following by the consequences of economic risk at 2.75 and 2.69., and there were slightly differences between the mean values of the rests.

Table 6.21: The collapsed mean of STEEP factors consequences

Category	Descriptions	The respondents' role as the decision maker toward risks	N	Mean	Std. Deviation	Std. Error Mean
1	Mean of Social risk consequence	Yes	132	2.53	0.82	0.07
		No	74	2.31	0.80	0.09
2	Mean of Technological risk consequence	Yes	132	2.47	0.64	0.05
		No	74	2.48	0.59	0.06
3	Mean of Environmental risk consequence	Yes	132	2.49	1.03	0.09
		No	74	2.51	0.88	0.10
4	Mean of Economic risk consequence	Yes	132	2.75	0.76	0.06
		No	74	2.69	0.69	0.08
5	Mean of Political risk consequence	Yes	132	3.03	0.89	0.07
		No	74	2.91	0.89	0.10

In regard to the likelihood of the STEEP factors risks, the collapsed means of these factors had been summarised and these shown that Thai practitioners considered extensively on the likelihood of the political risk as this collapsed mean represented the highest value amongst the others (2.62, 2.55), following by the likelihood of economic risk occurrences (2.46, 2.39) and the occurrences of technological risk (during the construction progress) (see Table 6.29).

Table 6.22: The collapsed mean of STEEP factors frequencies

Category	Descriptions	The respondents' role as the decision maker toward risks	N	Mean	Std. Deviation	Std. Error Mean
1	Mean of Social risk frequency	Yes	132	2.25	0.67	0.05
		No	74	2.07	0.63	0.07
2	Mean of Technological risk frequency	Yes	132	2.30	0.58	0.05
		No	74	2.33	0.70	0.08
3	Mean of Environmental risk frequency	Yes	132	2.15	0.78	0.06
		No	74	2.02	0.81	0.09
4	Mean of Economic risk frequency	Yes	132	2.46	0.72	0.06
		No	74	2.39	0.67	0.07
5	Mean of Political risk frequency	Yes	132	2.62	0.85	0.07
		No	74	2.55	0.88	0.10

According to the results of collapsed means above, Thai practitioners perceived the high impacts of political and economic risks in both terms of the consequences and likelihood on their project activities, whereas the other factors did not have the significantly concerned.

However, the simple statistical techniques were not appropriate to foresee the relationship, direction and the differences between the perceptions of risks. The advance statistical techniques such as the parametric tests were then employed to test the differences between their means, in order to test how the respondents (in the assumed categories) perceived the seriousness of risks as well as to investigate the research's hypotheses (see Chapter 4.6). These hypotheses tests are discussed in the Chapter 6.2.4 hereinafter.

6.2.4 Testings of the research's hypotheses

As earlier discussed in the Chapter 6.2.3, the differences between mean values of the research variables could not be tested by only using the simple comparisons. The advanced statistical analyses were then employed to test the reliability and validity of these variables.

Hypothesis 1

The hypothesis 1 that stated the similarity perception of Thai practitioners towards risks will be tested in the next section employing the parametric statistical tests such as Independent sample T-Test or ANOVA.

These tests were adopted to investigate the differences between mean values of the interval or scale variables against the independent nominal data. In the questionnaire set, there were 2 questions categorised as the interval level of measurement (see Table 6.23).

Table 6.23: Summary of interval data questions

Questions	To measure/test/ verify	Question as stated in the questionnaire
Q7	The satisfaction of the formal/systematic risk assessment methods	Please state your satisfaction about the formal risk assessment approach that you have ever used.
Q18	The perceptions of the practitioners towards STEEP factor risks (consequences, likelihood)	Please indicate your perceptions toward the following risks in the consequent and likelihood terms

Emphasised on question 18 which related to the risk perceptions, this question contained with 10 interval data categories which were the STEEP risks' consequences and likelihoods, the collapsed mean (summarised mean value) of each category was used as the representative mean of each factor to test the research hypotheses. In order to verify the mean's differences of the specific variables by the parametric tests, the common hypotheses were formulated as follows:

- H_o - there is no difference between the means
- H_1 - there is at least one difference between means or amongst the means.

In this regard, the Independent Sample T-Tests were employed to test the differences between the means of the dichotomous questions, whereas the Analysis of Variance (ANOVA) was used to verify the differences amongst the nominal data questions. The results of these tests are then discussed in the following sections.

Hypothesis 1.1.

This hypothesis stated that the perceptions of STEEP risks may be varied in according to the positions in the projects of the respondents. Therefore, the ANOVA technique was applied to test the equalities of mean of the respondents with several different positions in real estate projects. The respondents indicated their positions in the question 2, and their perceptions towards STEEP factors risks in question 18 .

In regard to their perceptions towards STEEP factors, the mean values of each respondent group were significant varied, as the lowest mean value was 1.87 (the facility manager/director against mean of environmental risk frequency), while the highest was 3.19 (the site managers against mean of political risk consequences). However, the results revealed that every positions in real estate projects concerned on the political risks consequences as the mean values indicated the highest amongst the other STEEP factors (see Appendix VII).

ANOVA was then applied to test the variation between means of each position of respondents, alongside with Duncan's Multiple Range test (Field, 2005) to see whether the differences between means of these STEEP factors and the respondents' posts, and to rank the mean from smallest to largest (see Table 6.24).

Table 6.24: ANOVA results of the respondents' positions against the STEEP factors perceptions

		Sum of Squares	df	Mean Square	F	Sig.
Mean of Social risk consequence	Between Groups	5.18	5	1.03	1.58	**0.16**
	Within Groups	133.70	204	0.65		
	Total	138.89	209			
Mean of Social risk frequency	Between Groups	3.67	5	0.73	1.71	**0.13**
	Within Groups	87.42	204	0.42		
	Total	91.10	209			
Mean of Technological risk consequence	Between Groups	0.64	5	0.12	0.33	**0.89**
	Within Groups	79.14	204	0.38		
	Total	79.78	209			
Mean of Technological risk frequency	Between Groups	1.00	5	0.20	0.50	**0.77**
	Within Groups	81.11	204	0.39		
	Total	82.11	209			
Mean of Environmental risk consequence	Between Groups	2.86	5	0.57	0.59	**0.70**
	Within Groups	197.81	204	0.97		
	Total	200.68	209			
Mean of Environmental risk frequency	Between Groups	3.90	5	0.78	1.24	**0.29**
	Within Groups	128.18	204	0.62		
	Total	132.08	209			
Mean of Economic risk consequence	Between Groups	0.862	5	0.17	0.31	**0.90**
	Within Groups	112.70	204	0.55		
	Total	113.56	209			
Mean of Economic risk frequency	Between Groups	1.17	5	0.23	0.47	**0.79**
	Within Groups	100.87	204	0.49		
	Total	102.04	209			
Mean of Political risk consequence	Between Groups	3.23	5	0.64	0.80	**0.55**
	Within Groups	164.65	204	0.80		
	Total	167.88	209			
Mean of Political risk frequency	Between Groups	3.13	5	0.62	0.83	**0.52**
	Within Groups	152.37	204	0.74		
	Total	155.51	209			

According to the significant values above, these P values were ranked from the lowest of 0.13 to the highest of 0.90. However, the results revealed that there was no P value, which was smaller than 0.05 ($P \geq 0.05$). It was then implied that the differences between means of STEEP factors perceptions and the respondent's position was not existed and each category of practitioners perceived STEEP factors risk in the same manners, as the political and economic risks were the most considerable issues for Thai developers (see Appendix VII). Thus, hypothesis 1.1, which stated

the non-different between the practitioners' perceptions of STEEP factor risks was accepted. The ANOVA results above revealed that Thai practitioners in the different positions perceived the criticality of risks in the similar way, and they reckoned that political risks were the highest impact risk (in terms of consequences and likelihoods) amongst the rest STEEP factors.

Hypothesis 1.2

Hypothesis 1.2 that stated the decision makers and non-decision makers perceived the impact of STEEP risks similarly (H_o- there is no difference between the means). The independent T-tests were employed in question 2 against18 to test the mean's difference of the respondents who were/were not the decision-maker and their STEEP factors perceptions. In this regard, 10 collapsed means of those STEEP factors had been computed and summarised as shown in Table 6.25.

Table 6.25: Collapsed Mean of the STEEP factors risks perception against the decision makers/non decision makers

	The decision making roles towards risks	N	Mean	Std. Deviation	Std. Error Mean
Mean of Social risk consequence	Yes	132	2.53	0.82	0.07
	No	74	2.31	0.80	0.09
Mean of Social risk frequency	Yes	132	2.25	0.67	0.05
	No	74	2.07	0.63	0.07
Mean of Technological risk consequence	Yes	132	2.47	0.64	0.05
	No	74	2.48	0.59	0.06
Mean of Technological risk frequency	Yes	132	2.30	0.58	0.05
	No	74	2.33	0.70	0.08
Mean of Environmental risk consequence	Yes	132	2.49	1.03	0.09
	No	74	2.51	0.88	0.10
Mean of Environmental risk frequency	Yes	132	2.15	0.78	0.06
	No	74	2.02	0.81	0.09
Mean of Economic risk consequence	Yes	132	2.75	0.76	0.06
	No	74	2.69	0.69	0.08
Mean of Economic risk frequency	Yes	132	2.46	0.72	0.06
	No	74	2.39	0.67	0.07
Mean of Political risk consequence	Yes	132	3.03	0.89	0.07
	No	74	2.91	0.89	0.10
Mean of Political risk frequency	Yes	132	2.62	0.85	0.07
	No	74	2.54	0.88	0.10

The research samples perceived that political risks strongly influenced to the real estate projects in term of consequences and likelihood. However, the means of each category were slightly different. The independent t-test was then conducted to verify these differences, and the test results are illustrated in Table 6.26.

This T-Test given more cleared views of the differences mean between both respondent groups, the significant level of these means were all exceeded than 0.05 ($P \geq 0.05$). This was interpreted as there were no differences between the mean of both respondents groups in regard to STEEP factors perceptions. Both groups of respondents perceived risks in the similar manners as the political and economic risks were the most considerable factors. These confirmed with Khumpaisal et al., (2010) that Thai practitioners perceived the highest impacts of economic and political risks than the others STEEP factors.

Table 6.26 : T-Test of the Thai practitioners' perceptions towards STEEP factor risks

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	
Social risk consequence	EVA*	0.43	0.50	1.89	204	0.06	0.22	0.11	-0.009	0.45	
	EVNA*			1.90	154.66	0.05	0.22	0.11	-0.008	0.45	
Social risk frequency	EVA*	0.11	0.73	1.85	204	0.06	0.17	0.09	-0.01	0.36	
	EVNA*			1.88	157.87	0.06	0.17	0.09	-0.008	0.36	
Technological risk consequence	EVA*	0.20	0.65	-0.04	204	0.96	-0.004	0.09	-0.18	0.17	
	EVNA*			-0.04	161.59	0.96	-0.004	0.08	-0.17	0.17	
Technological risk frequency	EVA*	0.25	0.61	-0.35	204	0.72	-0.03	0.09	-0.21	0.14	
	EVNA*			-0.34	130.28	0.73	-0.03	0.09	-0.22	0.15	
Environmental risk consequence	EVA*	3.58	0.06	-0.18	204	0.85	-0.02	0.14	-0.30	0.25	
	EVNA*			-0.19	172.11	0.84	-0.02	0.13	-0.29	0.24	
Environmental risk frequency	EVA*	0.02	0.87	1.15	204	0.24	0.13	0.11	-0.09	0.35	
	EVNA*			1.14	146.75	0.25	0.13	0.11	-0.09	0.36	
Economic risk consequence	EVA*	0.39	0.53	0.49	204	0.61	0.05	0.10	-0.15	0.26	
	EVNA*			.512	163.87	0.60	0.05	0.10	-0.15	0.26	
Economic risk frequency	EVA*	0.00	0.95	.701	204	0.48	0.07	0.10	-0.13	0.27	
	EVNA*			.715	160.02	0.47	0.07	0.10	-0.12	0.27	
Political risk consequence	EVA*	0.00	0.95	.913	204	0.36	0.11	0.13	-0.13	0.37	
	EVNA*			.913	151.59	0.36	0.11	0.13	-0.13	0.37	
Political risk frequency	EVA*	0.65	0.42	.628	204	0.53	0.07	0.12	-.016	0.32	
	EVNA*			.622	146.83	0.53	0.07	0.12	-0.17	0.33	

EVA* = Equal Variances Assumed
EVNA* = Equal Variances Not Assumed

According to the statements of hypothesis 1.2, it could be construed that the null hypothesis which stated the non-different between the mean of both groups of real estate projects was accepted.

Hypothesis 1.3

In order to test hypothesis 1.3, the respondents then categorised into 2 groups of "*the experienced*" and "*the non-experienced*" the STEEP factors perceptions' mean and the experience towards risk assessment of respondents were used to perform the T-Test., the means value of both groups are shown in Table 6.27 below.

Table 6.27: Group statistics of the STEEP factors risks perception of the Thai experienced and non experienced respondents in risk assessment/management

	Experience in risk assessment	N	Mean	Std. Deviation	Std. Error Mean
Mean of Social risk consequence	Yes	119	2.44	0.83	0.07
	No	88	2.44	0.79	0.08
Mean of Social risk frequency	Yes	119	2.17	0.64	0.05
	No	88	2.18	0.69	0.07
Mean of Technological risk consequence	Yes	119	2.49	0.66	0.06
	No	88	2.45	0.55	0.05
Mean of Technological risk frequency	Yes	119	2.34	0.69	0.06
	No	88	2.28	0.52	0.05
Mean of Environmental risk consequence	Yes	119	2.56	0.98	0.09
	No	88	2.42	0.97	0.10
Mean of Environmental risk frequency	Yes	119	2.21	0.83	0.07
	No	88	1.97	0.73	0.07
Mean of Economic risk consequence	Yes	119	2.84	0.67	0.06
	No	88	2.58	0.80	0.08
Mean of Economic risk frequency	Yes	119	2.52	0.66	0.06
	No	88	2.33	0.74	0.07
Mean of Political risk consequence	Yes	119	3.11	0.85	0.07
	No	88	2.84	0.94	0.10
Mean of Political risk frequency	Yes	119	2.67	0.88	0.08
	No	88	2.51	0.83	0.08

119 respondents (56.66%) experienced in risk assessment/management in the real estate projects. However, both respondents groups perceived that political risks' consequences and likelihoods influenced directly to their projects' progress, followed by the economic risks, this was similar to the previous test. T-test was re-conducted in order to verify the difference between mean of them (see Table 6.28). The significant values (P values) of each category were addressed by **bold** or underline in order to distinct them. The P values in six categories such as social risks consequences and frequencies, technological risks consequences and frequencies and environmental risks

133

consequences and frequencies were all above 0.05 ($P \geq 0.05$). These reflected that both groups of respondents had the similar perceptions towards those specific six categories.

Table 6.28: T-Test of the risk assessment experienced practitioners' perceptions towards STEEP factor risks

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Mean of Social risk consequence	EVA*	0.32	0.56	-0.06	205	**0.94**	-0.00	0.11	-0.23	0.21
	EVNA**			-0.06	192.40	**0.94**	-0.00	0.11	-0.23	0.21
Mean of Social risk frequency	EVA	0.25	0.61	-0.07	205	**0.94**	-0.00	0.09	-0.19	0.17
	EVNA			-0.07	179.69	**0.94**	-0.00	0.09	-0.19	0.17
Mean of Technological risk consequence	EVA	1.11	0.29	0.49	205	**0.62**	0.04	0.08	-0.12	0.21
	EVNA			0.50	201.57	**0.61**	0.04	0.08	-0.12	0.21
Mean of Technological risk frequency	EVA	2.96	0.08	0.69	205	**0.48**	0.06	0.08	-0.11	0.23
	EVNA			0.72	204.78	**0.46**	0.06	0.08	-0.10	0.22
Mean of Environmental risk consequence	EVA	0.54	0.46	1.06	205	**0.28**	0.14	0.13	-0.12	0.41
	EVNA			1.06	188.41	**0.28**	0.14	0.13	-0.12	0.41
Mean of Environmental risk frequency	EVA	1.30	0.25	2.21	205	<u>**0.02**</u>	0.24	0.11	0.02	0.46
	EVNA			2.26	198.35	<u>**0.02**</u>	0.24	0.10	0.03	0.46
Mean of Economic risk consequence	EVA	1.05	0.30	2.50	205	<u>**0.01**</u>	0.25	0.10	0.05	0.46
	EVNA			2.44	166.92	<u>**0.01**</u>	0.25	0.10	0.04	0.46
Mean of Economic risk frequency	EVA	0.33	0.56	1.89	205	**0.06**	0.18	0.09	-0.00	0.37
	EVNA			1.85	173.99	**0.06**	0.18	0.10	-0.01	0.38
Mean of Political risk consequence	EVA	0.53	0.46	2.15	205	<u>**0.03**</u>	0.27	0.12	0.02	0.51
	EVNA			2.12	175.69	<u>**0.03**</u>	0.27	0.12	0.01	0.52
Mean of Political risk frequency	EVA	0.18	0.66	1.35	205	**0.17**	0.16	0.12	-0.07	0.40
	EVNA			1.36	193.54	**0.17**	0.16	0.12	-0.07	0.40

134

The results also revealed that both respondents groups had the different perceptions towards STEEP factors risks, as underlined in the table above, the P values of these following categories which were the likelihood of environmental risk frequency, economic risks consequences and frequencies, and political risks consequences were all below 0.05 ($P \leq 0.05$).

According to the hypothesis 1.3 stated that the differences between the means of both respondent groups shall not be existed. It was then concluded that the null hypothesis (Ho) was rejected since there were 3 differences between the aforementioned variables existed.

A conclusion of this test was drawn as Thai practitioners considered that the political risks had importantly affected to their decision-making processes towards risk assessment/ management. This was because of Thailand political situation (2009-2010) is unstable, together with the difficulty in approval for a new project, these influenced to the customers' potential to buy a new property (REIC, 2009; Khumpaisal et al., 2010).

Summary of parametric tests

A series of hypothesis 1 had been completely tested by the parametric statistical tests, using the independent sample T-tests to test hypothesis 1.2 and 1.3 and ANOVA to test hypothesis 1.1. The results of these hypotheses testing are summarised as:

- *Hypothesis 1.1*: the null hypothesis (H_o) was accepted, the practitioners categorised by the position in real estate project perceived the STEEP factors risk in the same manner.

- *Hypothesis 1.2*: the null hypothesis (H_o) was accepted, whether the respondents had the decision making role or not, they had the similar perceptions towards risks in their projects.

- *Hypothesis 1.3*: it was failed to accept the null hypothesis (H_o), because of the differences of the mean values between the groups of experienced and non-experienced in risk assessment/management were existed.

As mentioned above, the parametric tests assisted in verifying the differences between means of the respondents groups in the aforesaid three sub-hypotheses. These informed that Thai practitioners were properly categorised into the groups of the positions in real estate projects, decision makers/non decision makers, and experienced in risk assessment/management, respectively. It also informed that Thai practitioners perceived the criticality of risks to their projects, particularly political and economic risks. However, this research additionally needed to explore the associations between the research samples in order verify a series of hypothesis 2, as well as to investigate the

relationship between STEEP factors (hypothesis 3.1 and 4), these would lead to the analysis of factors that related to the magnitude of risks and the perceptions of practitioners. Therefore, the associational tests and correlation test procedures are employed to verify these hypotheses and these will be discussed in the next section.

Hypothesis 2

Hypothesis 2 stated that there should be the association between the variables, which related to the respondents' profiles and characteristics of the organisations/projects. The associative analysis was performed to determine a consistent and systematic linkage existed between any pairs of research variables. The common hypotheses of these questions are stated as:

- o H_o there is no association between variables
- o H_1 there is an association between these variables

Confidence intervals for analysing the data was set at 95% (0.95) meant that if the result greater than 0.05 ($P > 0.05$), this shown 95% confidence that this result is not true, the H_0 shall be accepted, whereas if the result was less than 0.05 ($P < 0.05$), this indicated that there was 95% confidence, the result was true, then the H_0 was rejected.

Hypothesis 2.1

The outcomes of question 11 and 12 were combined together using the crosstab function in order to test the associations between the organisational type and their turnovers.

There was an association between these variables, as the significance value was less than 0.05 (as shown as 0.000) and the Pearson Chi-Square value was 87.937 that supported the association between them existed. A cross tabulation in Table 6.30 indicates the association between organisational business and turnovers, and also classified the type of organisations by the amount of turnovers.

136

Table 6.29: Chi-square test of organisational business and turnovers

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	87.937(a)	30	.000
Likelihood Ratio	98.161	30	.000
Linear-by-Linear Association	34.260	1	.000
N of Valid Cases	209		

a 33 cells (78.6%) have expected count less than 5. The minimum expected count is .17.

Table 6.30: Type of the participant's organisation or company and organisational turnover

		Participant's organisational turnover (million baht)							Total
		No answer	Less than 10	11-50	51-100	101-150	151-200	200 above	
PCL (in Stock Market)	Count	0	0	0	0	3	3	51	57
	% of Total	.0%	.0%	.0%	.0%	1.4%	1.4%	24.4%	27.3%
PCL (not in Stock Market)	Count	1	2	0	1	2	1	24	31
	% of Total	.5%	1.0%	.0%	.5%	1.0%	.5%	11.5%	14.8%
SME size developers	Count	4	2	9	9	10	9	24	67
	% of Total	1.9%	1.0%	4.3%	4.3%	4.8%	4.3%	11.5%	32.1%
Consultants or contractor	Count	1	6	6	4	9	3	12	41
	% of Total	.5%	2.9%	2.9%	1.9%	4.3%	1.4%	5.7%	19.6%
Real estate experts	Count	0	2	2	0	2	0	2	8
	% of Total	.0%	1.0%	1.0%	.0%	1.0%	.0%	1.0%	3.8%
No answer	Count	1	1	0	1	0	0	2	5
	% of Total	.5%	.5%	.0%	.5%	.0%	.0%	1.0%	2.4%
Total	Count	7	13	17	15	26	16	115	209
	% of Total	3.3%	6.2%	8.1%	7.2%	12.4%	7.7%	55.0%	100.0%

According to the statement of sub hypothesis 2.1, the null hypothesis was rejected as the association between the type of organisational business and the turnovers existed.

A cross tabulation was performed to test the association between the project types (question 14) and the related planning regulations (question 15). There was association between these two variables existed, as the significance value was shown as 0.000 and the Pearson Chi-Square value was 57.18 that supported the association between these two questions 14 and 15 was existed (see Table 6.31).

Table 6.31: the related regulations and type of the projects Crosstabulation

			Type of the projects						Total
			No answer	Low rise residential / housing project	High rise residential	Retail	Commercial	Others	No answer
The regulations	No answer	Count	4	11	2	0	4	1	22
		% of Total	1.9%	5.3%	1.0%	.0%	1.9%	.5%	10.5%
	BMA Development plan	Count	0	44	24	7	23	4	102
		% of Total	.0%	21.1%	11.5%	3.3%	11.0%	1.9%	48.8%
	BMA Vicinity area development plan	Count	0	46	13	1	7	3	70
		% of Total	.0%	22.0%	6.2%	.5%	3.3%	1.4%	33.5%
	Others regulations	Count	0	9	1	0	2	3	15
		% of Total	.0%	4.3%	.5%	.0%	1.0%	1.4%	7.2%
Total		Count	4	110	40	8	36	11	209
		% of Total	1.9%	52.6%	19.1%	3.8%	17.2%	5.3%	100.0%

The value of chi-square and the likelihood ratio are shown in the following table.

Table 6.32: Chi-square test of regulations and project types

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	57.180(a)	15	.000
Likelihood Ratio	40.721	15	.000
Linear-by-Linear Association	0.077	1	.782
N of Valid Cases	209		

a 15 cells (62.5%) have expected count less than 5. The minimum expected count is .29.

138

Hypothesis 2.3

This hypothesis stated that there should be one statistically association between the position of respondents and the current risk assessment practices. It aimed to test the question 1 (positions), question 2 (the decision making roles towards risks), question 6 (used of any systematic risk assessment techniques, and question 8 (the preferable risk assessment methods), respectively. Question 1 and 2 were cross-tabulated together to see the association between them (see Table 6.33).

Table 6.33: Position of the participants and the decision making roles towards risks

			Does the participant have the decision making roles towards risk?			
			No answer	Yes	No	Total
Position of the participants	Project manager/ director	Count	1	56	5	62
		% of Total	.5%	26.7%	2.4%	29.5%
	Financial manager/director	Count	1	5	4	10
		% of Total	.5%	2.4%	1.9%	4.8%
	Project coordinator	Count	1	21	8	30
		% of Total	.5%	10.0%	3.8%	14.3%
	Site manager/ superintendent	Count	0	13	6	19
		% of Total	.0%	6.2%	2.9%	9.0%
	Engineer/Architect/ Designer	Count	0	21	29	50
		% of Total	.0%	10.0%	13.8%	23.8%
	Others	Count	1	16	22	39
		% of Total	.5%	7.6%	10.5%	18.6%
Total		Count	4	132	74	210
		% of Total	1.9%	62.9%	35.2%	100.0%

There was an association between the respondents' positions and the risks decision-making role, as the significance (P value) indicated at 0.00 while the chi-square value of 45.71 supported the association between these variables (see figure 6.2).

Table 6.34: Chi-square test of Position of the participants and the decision making roles towards risk

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	45.718(a)	10	.000
Likelihood Ratio	49.248	10	.000
Linear-by-Linear Association	33.023	1	.000
N of Valid Cases	210		

a 7 cells (38.9%) have expected count less than 5. The minimum expected count is .19.

An association between the use of non-formal risk assessment methods and the respondents' positions was test by cross-tabulated question 1 and question 8 together. The results indicated that the project manager/director position was the largest group of respondents (12.9% or 27out of 210) and the panel discussion became their risk assessment preference.

Table 6.35: Risk assessment method popularly used and position of the respondents

			Position of the respondents						
			Project manager/ director	Financial manager/ director	Project coor-dinator	Site manager/ Super-intendent	Engineer /Architect /Designer	Others	Total
The current risk assessment methods.	No answer	Count	3	2	1	1	7	11	25
		% of Total	1.4%	1.0%	.5%	.5%	3.3%	5.2%	11.9%
	Background experience	Count	9	0	2	3	7	4	25
		% of Total	4.3%	.0%	1.0%	1.4%	3.3%	1.9%	11.9%
	Panel discussion	Count	27	3	13	9	21	11	84
		% of Total	12.9%	1.4%	6.2%	4.3%	10.0%	5.2%	40.0%
	Using secondary sources of information (self research)	Count	11	3	11	4	7	8	44
		% of Total	5.2%	1.4%	5.2%	1.9%	3.3%	3.8%	21.0%
	Using information from reliable sources	Count	11	2	3	2	7	4	29
		% of Total	5.2%	1.0%	1.4%	1.0%	3.3%	1.9%	13.8%
	No use of any	Count	1	0	0	0	1	1	3
		% of Total	.5%	.0%	.0%	.0%	.5%	.5%	1.4%
Total		Count	62	10	30	19	50	39	210
		% of Total	29.5%	4.8%	14.3%	9.0%	23.8%	18.6%	100.0%

The significance level was greater than 0.05 (P >0.05). Then, the null hypothesis shall be accepted, because of both variables proved that there was no association between each other (see Table 6.36).

Table 6.36: Chi-square test of Risk assessment method popularly used and position of the respondents

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	28.045(a)	25	.306
Likelihood Ratio	28.844	25	.270
Linear-by-Linear Association	4.385	1	.036
N of Valid Cases	210		

a 20 cells (55.6%) have expected count less than 5. The minimum expected count is .14.

Hypothesis 2.4

Sub-hypothesis 2.4 was set to test an association between decision makers/non decision makers and the respondents' familiarity in using the systematic risk assessment models. The cross-tabulation was performed to combine the number of the decision makers who used any formal/systematic risk assessment models (i.e. MCS, ETA), as show in Table 6.37.

Table 6.37: The decision making roles towards risk and the usage any risk assessment model

			Have they ever used of any risk assessment model?			
			No answer	Yes	No	Total
The decision making roles towards risk?	No answer	Count	1	1	2	4
		% of Total	.5%	.5%	1.0%	1.9%
	Yes	Count	5	36	91	132
		% of Total	2.4%	17.1%	43.3%	62.9%
	No	Count	9	11	54	74
		% of Total	4.3%	5.2%	25.7%	35.2%
Total		Count	15	48	147	210
		% of Total	7.1%	22.9%	70.0%	100.0%

Only 17.1% (36 out of 210) of the decision makers have ever used the formal risk assessment model, the rest of them 43.3% (91 out of 210) not used any formal risk assessment methods. The association test between these variables was then conducted to observe the chi-square significance value.

Table 6.38: Chi-square test of Position of the participants and the decision making roles towards risk

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.021(a)	4	.040
Likelihood Ratio	9.540	4	.049
Linear-by-Linear Association	.000	1	1.000
N of Valid Cases	210		

a 3 cells (33.3%) have expected count less than 5. The minimum expected count is .29.

The derived chi-square value was 0.04, which was below the significance level (P <0.05), this confirmed that the null hypothesis shall be rejected. Table 6.38 showed the results of chi-square factor with the probability level, this indicated that there is significance association between both variables where (X^2 = 10.021, p=0.040).

The association tests conclusions

In regard to verify the statements of hypothesis 2, a series of sub-hypotheses were formulated to investigate for the association between the variables, the results are summarised as:

- *Hypothesis 2.1* The association between type of business and organisational turnovers was existed, thus the null hypothesis was rejected.

- *Hypothesis 2.2* The association between the typical projects the related regulations was found, then the null hypothesis was rejected.

- *Hypothesis 2.3* There was no association between the positions of respondents and the current risk assessment practices.

- *Hypothesis 2.4* A role in decision making towards risks associated with the usage of the formal/systematic risk assessment models.

The significance (*P*) Values of these aforementioned hypotheses stated that there were the association between the presumed variables. According to the statement of hypothesis 2, indicated that at least one association shall be existed, therefore the main hypothesis 2 was accepted due to 3 associations were found. Thus, it could be implied that the mentioned research variables (Thai practitioners in any type of organisation, any positions) had the strong relationship and systematic linkage, except only the positions and the current risk assessment practices.

142

However, the Chi-square test could not interpret the difference between the mean of the respondents' biographical data, this could not define the relationship and directions of the variables, too. McClelland (2009) suggested that the chi-square tests or non-parametric tests were not strong enough to explain the relationship of these variables. Therefore, the parametric test such as independent sample T-test and Analysis of Variable (ANOVA) and the correlation test had been employed to test these issues (see hypothesis 1).

Hypothesis 3

This hypothesis was formulated in order to see whether Thai practitioners require the innovative risk assessment techniques or not. Therefore, sub-hypothesis 3.1 was made to test the relationship between Thai practitioners' satisfaction towards the ideal systematic/formal risk assessment techniques. While, sub-hypothesis 2 was formulated to see the variation of the practitioner's satisfaction towards the systematic risk assessment techniques in according to their experience in using these devices.

Hypothesis 3.1

The correlation hypotheses were formulated by concerning on the outcome of significant value (P value), the null and alternative hypotheses was found as:

- o **H$_0$** there is no relationship between variables and;
- o **H$_1$** there is at least one relationship between the variables

The correlation test was conducted to identify the relationship between the satisfactions towards risk assessment methods. The practitioners (users/non-users) indicated their level of satisfactions into the question 7, which then examined by the correlation test. The Pearson correlation was used to specify the direction of the relationship as its results shown in Table 6.39.

Table 6.39: The correlation of the satisfaction towards risk assessment methods

Risk assessment techniques attribution s (N = 210 all)		The effectiveness	The efficiency	The user-friendly, simplicity	The flexibility	Prices and value-to-money
The effectiveness	Pearson Correlation	1	.984(**)	.953(**)	.948(**)	.900(**)
	Sig. (2-tailed)		.000	.000	.000	.000
The efficiency	Pearson Correlation	.984(**)	1	.950(**)	.944(**)	.900(**)
	Sig. (2-tailed)	.000		.000	.000	.000
The user-friendly, simplicity	Pearson Correlation	.953(**)	.950(**)	1	.958(**)	.946(**)
	Sig. (2-tailed)	.000	.000		.000	.000
The flexibility	Pearson Correlation	.948(**)	.944(**)	.958(**)	1	.910(**)
	Sig. (2-tailed)	.000	.000	.000		.000
Prices and value-to-money	Pearson Correlation	.900(**)	.900(**)	.946(**)	.910(**)	1
	Sig. (2-tailed)	.000	.000	.000	.000	

The correlation matrix above given that each attribution had the relationship to each other's, as all significant values were 0.00 ($P \leq 0.05$), and all Pearson's correlations indicated the positive and strong correlation, most of these value closed to 1.00 (the lowest at 0.900 to the highest 0.984).

In term of hypothesis testing, the null hypothesis that stated no correlation between these variables was rejected, because of each variable indicated the strong linkage between each other. Thus, hypothesis 3.1 which determined the relationship between the satisfactions in using the risk assessment techniques was accepted.

According to this test, it was interpreted that the ideal risk assessment method that suit to Thailand's real estate business context shall be full in its efficiency, effective enough to assess risk in more complicated projects, provides more flexibility and shall be affordable in price and user friendly. These findings confirmed with Booth et al., (2002), that the desirable method for real estate development should allow for the synthesis of risk assessment criteria and their priorities under a structured decision-making process.

Hypothesis 3.2

One research objective was to explore Thai practitioners' satisfaction towards the formal/systematic risk assessment models in order to investigate the current risk assessment practices and the following problems of those techniques. This objective was addressed by hypothesis 3.2, which stated that the satisfactions in the current risk assessment methods are varied in according to the experience in using the systematic risk assessment techniques. The descriptive statistical techniques were used to describe the satisfaction level of the practitioners and the expected problems.

In addition, the 5-scale interval and mean were used to reflect the average of their satisfaction toward risk assessment techniques of the respondents who used the systematic risk assessment techniques (there were 48 out of 210, see Table 6.1). The satisfactory criteria were established as effectiveness of the techniques, efficiency of the techniques, user-friendliness, the technical flexibility and the affordability (prices and value to money), respectively.

The average level of the satisfaction towards the formal/systematic risk assessment techniques is presented in Table 6.40, only 48 respondents (22.85%) were the formal techniques users, all mean values were calculated at 3.02, except the satisfaction toward prices (mean = 2.85). Thus, this also meant the respondents moderately satisfied in the capabilities of their currently risk assessment models used. The mean value of 3.02 indicated that their satisfaction level was slightly above average, while they also perceived that the formal assessment techniques were unaffordable, too expensive for their projects/organisations (as the mean indicated value of 2.85). It was because of the risk assessment applications or software (i.e. Monte Carlo, Palisade) were all invented by the overseas companies, and Thai developers (particularly in SME developers) were unaffordable to purchase these software.

Table 6.40: The satisfaction level toward the formal/systematic risk assessment techniques.

The satisfactory criteria	Mean	N
Effectiveness	3.02	48
Efficiency	3.02	48
User-friendly	3.02	48
Flexibility	3.02	48
Value-to-money	2.85	48

In order to test hypothesis 3.2, the following T-test and Levene's test were conducted to test the equality of means of these respondents. The significant values in table 6.41 were all 0.00 (P Values < 0.05), which revealed that the different between two groups were existed, the null hypothesis (no differences between mean of both groups) shall be failed to accept (see Table 6.41).

145

Table 6.41: T-Test of the satisfaction towards the current risk assessment practices

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Upper	Lower
Effectiveness	EVA*	3.86	0.05	19.17	193	0.00	2.79	0.14	2.50	3.08
	EVNA*			16.97	66.94	0.00	2.79	0.16	2.46	3.12
Efficiency	EVA*	2.58	0.10	19.17	193	0.00	2.79	0.14	2.50	3.08
	EVNA*			17.22	68.23	0.00	2.79	0.16	2.47	3.12
User-friendly, simplicity	EVA*	6.26	0.01	17.25	193	0.00	2.78	0.16	2.46	3.10
	EVNA*			15.40	67.64	0.00	2.78	0.18	2.42	3.14
Flexibility	EVA*	9.34	0.003	17.82	193	0.00	2.78	0.15	2.48	3.09
	EVNA*			15.55	65.77	0.00	2.78	0.17	2.43	3.14
Price and value-to-money	EVA*	17.51	0.00	15.07	193	0.00	2.60	0.17	2.26	2.95
	EVNA*			12.46	61.77	0.00	2.60	0.20	2.19	3.02

EVA* = Equal Variances Assumed
EVNA* = Equal Variances Not Assumed

It was then interpreted that the users and non-users had the different point of view in regard to select the systematic risk assessment models and their satisfaction level were varied in accordance with their experience in using the formal risk assessment methods.

Summary of hypothesis 3

Hypothesis 3, which aimed to prove that Thai practitioners need the systematic risk assessment method had been found, it was combined with 2 sub-hypotheses 3.1 and 3.2, that used the different statistical techniques to test. Sub-hypothesis 3.1 was tested by the correlation analysis in order to find the relationship between the designated variables. On the other hand, the independent T-Test was used to test on sub-hypothesis 3.2 to see the differences between the practitioners' satisfaction of current risk assessment methods. The test results of hypothesis 3 are summarised as:

- *Hypothesis 3.1*: The null hypothesis was rejected, due to the positive relationship between the satisfaction level towards current assessment practices were existed. However, in accordance with the statement of hypothesis 3.1, itself, it could be concurred that this hypothesis was accepted. There were the positive correlations between the satisfaction levels of current risk assessment techniques.

- *Hypothesis 3.2*: The null hypothesis was rejected, as both groups of respondents (users / non-users of systematic risk assessment techniques) had the different satisfaction levels in their current risk assessment methods.

The results of hypothesis tests above revealed that there were some positive relationships between the capabilities of the current risk assessment methods as well as Thai practitioners appreciate the systematic these method differently. Thus, it could be then simply interpreted that Thai practitioners actually satisfied with the current systematic risk assessment methods, those methods are capable enough to use in the real business case and provide the reliable results to the users. However, the practitioners perceived that the methods that they currently use are not user-friendly enough as well as unaffordable. These results had been summarised and would be adopted as the guidelines to develop the further risk assessment model adhere to this research.

Hypothesis 4

The correlation analysis was used to define the relationship between groups of interval/ration variables, especially the hypothesis 4 that specified the relationship amongst the STEEP factors perceptions, and this hypothesis is the most crucial fact to be investigated of this research, due to it would lead to the foundation of the further risk assessment model. The relationship between each

STEEP factor risk including the trend of Thai real estate practitioners' perceptions towards STEEP will be analysed thoroughly in this section.

Hypothesis 4 stated that the positive correlation between the perceptions towards STEEP factors shall be existed. Therefore, the collapsed means of 10 STEEP categories had been used as the representative of the average mean value of each group (see the detailed correlation analyses in Table 6.42).

The correlation matrix in Table 6.42 indicated that most of the variables (STEEP factor) were interlinked together as the significant values were mostly below 0.05 ($P \leq 0.05$), it could be interpreted that the null hypothesis, which stated the non-correlated between variables shall be rejected. However, some non-correlation between variables were highlighted, which were a mean of social risk frequency against the means of economic consequence and frequency, the significant value of these were above 0.05 ($P \geq 0.05$). Thus, both of these variables had no correlation between each other, the Pearson correlation (r) also supported that they have very weak relationship, because of r were below 0.20 (Drea, 2009).

The strength of the relationship between the research variables was discussed using the rules of thumbs as earlier mentioned in section 5.7.4 (Burns and Bush, 2005). All of the Pearson correlations (r) were positive, but most of them had "*very weak*" or "*weak*" relationship to each other. There were only 3 "*moderate*" or "*strong*" relationships (as bolded), which were the correlation between mean of technological risk consequences and technological frequency with the r value of 0.648, economic risk consequences and economic risk frequency ($r = 0.696$) and political risk consequences and frequency ($r = 0.706$).

In addition, the relationship across the group of criteria did not show the moderate or strong level, as the rest r values were under 0.600. Thus, it could be interpreted that Thai practitioners given more concerns on risks caused by economic and political factors (in terms of consequence and likelihood) more than the other risks. The correlation test also indicated that the trend of political risks and economic risk perceptions of Thai practitioners was in the similar manner. For example, if the political risks strongly affected to the real estate projects, the economic risks would be more critical for them as well. This finding was conformed to Khumpaisal et al., (2010) and Gehner et al., (2006) that the political and economic risks portrayed some impact to overall real estate project progress.

Table 6.42: The correlation of the STEEP factors perceptions

		Mean of Social risk consequence	Mean of Social risk frequency	Mean of Technological risk consequence	Mean of Technological risk frequency	Mean of Environmental risk consequence	Mean of Environmental risk frequency	Mean of Economic risk consequence	Mean of Economic risk frequency	Mean of Political risk consequence	Mean of Political risk frequency
Mean of Social risk consequence	Pearson Correlation	1	.644(**)	.410(**)	.144(*)	.337(**)	.224(**)	.200(**)	.108	.381(**)	.266(**)
	Sig. (2-tailed)		.000	.000	.037	.000	.001	.004	.118	.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Social risk frequency	Pearson Correlation	.644(**)	1	.303(**)	.300(**)	.177(*)	.309(**)	.029	.127	.276(**)	.335(**)
	Sig. (2-tailed)	.000		.000	.000	.010	.000	.677	.066	.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Technological risk consequence	Pearson Correlation	.410(**)	.303(**)	1	.648(**)	.427(**)	.356(**)	.487(**)	.367(**)	.362(**)	.310(**)
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Technological risk frequency	Pearson Correlation	.144(*)	.300(**)	.648(**)	1	.200(**)	.409(**)	.263(**)	.425(**)	.177(*)	.319(**)
	Sig. (2-tailed)	.037	.000	.000		.004	.000	.000	.000	.010	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Environmental risk consequence	Pearson Correlation	.337(**)	.177(*)	.427(**)	.200(**)	1	.526(**)	.536(**)	.264(**)	.480(**)	.230(**)
	Sig. (2-tailed)	.000	.010	.000	.004		.000	.000	.000	.000	.001
	N	210	210	210	210	210	210	210	210	210	210

149

		Mean of Social risk consequence	Mean of Social risk frequency	Mean of Technological risk consequence	Mean of Technological risk frequency	Mean of Environmental risk consequence	Mean of Environmental risk frequency	Mean of Economic risk consequence	Mean of Economic risk frequency	Mean of Political risk consequence	Mean of Political risk frequency
Mean of Environmental risk frequency	Pearson Correlation	.224(**)	.309(**)	.356(**)	.409(**)	.526(**)	1	.374(**)	.507(**)	.363(**)	.486(**)
	Sig. (2-tailed)	.001	.000	.000	.000	.000		.000	.000	.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Economic risk consequence	Pearson Correlation	.200(**)	.029	.487(**)	.263(**)	.536(**)	.374(**)	1	.696(**)	.542(**)	.361(**)
	Sig. (2-tailed)	.004	.677	.000	.000	.000	.000		.000	.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Economic risk frequency	Pearson Correlation	.108	.127	.367(**)	.425(**)	.264(**)	.507(**)	.696(**)	1	.388(**)	.537(**)
	Sig. (2-tailed)	.118	.066	.000	.000	.000	.000	.000		.000	.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Political risk consequence	Pearson Correlation	.381(**)	.276(**)	.362(**)	.177(*)	.480(**)	.363(**)	.542(**)	.388(**)	1	.706(**)
	Sig. (2-tailed)	.000	.000	.000	.010	.000	.000	.000	.000		.000
	N	210	210	210	210	210	210	210	210	210	210
Mean of Political risk frequency	Pearson Correlation	.266(**)	.335(**)	.310(**)	.319(**)	.230(**)	.486(**)	.361(**)	.537(**)	.706(**)	1
	Sig. (2-tailed)	.000	.000	.000	.000	.001	.000	.000	.000	.000	
	N	210	210	210	210	210	210	210	210	210	210

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

150

Summary of hypothesis 4

The correlation analysis was used to test 4 in order to investigate the correlation between the perceptions of STEEP factor risks of Thai practitioners. The testing results is summarised as:

- *Hypothesis 4:* Despite some non-correlation between the perceptions of risks existed, but the rest reflected the correlations between the STEEP factors. The null hypothesis was then rejected, and it could be concluded that the hypothesis 4 was accepted consequently.

The outcomes of these correlation analyses informed an idea to establish the risk assessment models that match with Thai practitioners' requirements. As the hypothesis 4 was supported, therefore the variables related to the risk assessment criteria (see Chapter 5.6) could be clustered and ranked in accord to their magnitudes. The Explorative Factor Analysis (EFA) was adopted in order to response to hypothesis 5 as well as to structure for the further risk assessment model, the outcomes of this test are discussed in Chapter 6.2.5.

6.2.5. Explorative Factor Analysis of Thai practitioners' risk perception.

As earlier mentioned in the previous section, the hypothesis 4 was accepted and this led to an investigation of hypothesis 5 stated the criteria of risks could be clustered in order to identify the high impact risks in Thailand real estate industry.

The Explorative Factor Analysis (EFA) was undertaken to explore whether the criteria to measure the perceptions of STEEP factors risks that need to be prioritised in regard to their affects to the real estate projects. The respondents were asked to rate their perceptions of the each risks consequences and likelihood in the established assessment criteria (question 18). The factor analyses of these data were conducted by using the principal components analysis along with the varimax rotation, the Cronbach's alpha was also used to test the reliability of the questionnaire.

The STEEP factors were conducted against 5 groups of risks and their related numbers of factor were obtained by inspecting the scree-plot. In this regard, the EFA was used to recast the level of seriousness of these STEEP factors risks, the variables for analysing were the combination of risk consequences and likelihoods (see Chapter 5.6). EFA was supposed to use as the risk assessment

model, because of it presents the level of risks in the mathematical format (factor loadings) and in the hierarchical orders (from highest impact to the non-impact risks), the outcomes of this model are shown in this chapter, and this model will be explicated by the procedures as given in Chapter 7.6.

Social risks factor analysis

The Cronbach's alpha indicated value of 0.830, therefore it was reliable enough to conduct the further factor analysis. The components analysis indicated that these 8 variables could be categorised into 2 components in accordance with the rotation of the analysis. These were named as (1) the locality factors and (2) the workforce availabilities, respectively.

The locality factors combined with 6 risks, which majorly related to the impact of the local community and public (third party) during the projects progress, the factor loadings values were ranked from the lowest of 0.579 to the highest of 0.865. The rest 2 risks were related to the seriousness of lacking the qualified workers during the construction stage (or "*the workforce availabilities*" factor). The factor loadings insisted that Thai practitioners considered the workforce availabilities factor had higher impact on the projects' progress than the local community factors, this was also matched with V.T, Luu et al., (2008) findings that the major cause of delay in South East Asian real estate industry was '*contractors' inadequate experience*', as well as a shortage of qualified contractors to handle the works.

These findings supported by ONESDB, (2007) survey that there were no construction workers' good practices established in Thailand real estate sector, the labours in this industry are usually the cyclical unemployed workers.

Table 6.43: Summary of Social risks factor analysis

Risk components	Factor Loading	% Very low, never occurred	% Low, hardly	% Neutral	% High, Likely	% Very high, more likely	% Missing
Cronbach's Alpha = 0.830 **The locality factors**							
The consequence of local community do not accept the project	0.865	26.19	33.33	25.71	10.48	4.29	
The frequency of local community do not accept the project	0.719	27.14	45.71	21.90	4.29	0.95	
The consequence of local community do not participate with project	0.831	30.95	30.95	26.67	8.57	2.86	
The frequency of local community do not participate with project	0.756	33.81	45.71	16.67	2.86	0.48	0.48
The consequence of public liability compensation.	0.705	20.00	32.38	33.33	11.43	2.38	0.50
The frequency of public liability compensation.	0.579	21.90	44.29	25.71	5.71	1.90	0.48
Workforce Availabilities							
The consequence of workforce unavailability.	0.832	6.67	22.86	41.43	21.43	4.29	3.33
The frequency of workforce unavailability.	0.882	10.95	34.76	36.19	13.33	2.86	1.90

Technological risks factor analysis

This risks group consisted of 16 variables, the Alpha value was indicated at 0.798, which determined the strong relationship between each variable in this category. Table 6.44 illustrates the numbers of rotated factors and the factor loadings derived by the component analysis, these were categorised into 5 factors.

Table 6.44: Summary of Technological risks factor analysis

Risk components	Factor Loading	% Very low, never occurred	% Low, hardly	% Neutral	% High, Likely	% Very high, more likely	% Missing
Cronbach's Alpha = 0.798							
1. External Factors							
The consequence of project inaccessibility.	0.536	31.90	32.38	26.67	6.67	2.38	
The consequence of public transportation' poor quality.	0.760	27.14	30.95	27.62	10.48	2.86	0.95
The frequency of public transportation' poor quality.	0.794	31.43	34.29	24.76	5.71	1.90	1.9
The consequence of poor infrastructure/utility quality	0.793	32.86	31.90	23.81	10.48	0.95	
2. Constructability factors							
The consequence of project non-constructability.	0.848	17.14	36.19	31.43	10.48	3.33	1.43
The frequency of project non-constructability.	0.780	19.52	46.19	24.29	4.76	3.33	1.9
The consequence of the longer project development duration	0.736	10.00	29.05	39.05	15.71	5.71	0.48
The frequency of the longer project development duration	0.563	10.95	40.00	34.76	10.48	2.86	0.48
The consequence of project participants' conflicts.	0.522	11.90	26.19	44.29	15.71	1.43	0.48
3. Project planning and design factors							
The frequency of project inaccessibility.	0.636	31.90	32.38	26.67	6.67	2.38	
The consequence of project design's amendment.	0.789	9.05	23.81	40.00	23.33	3.81	
The frequency of project design's amendment.	0.854	8.10	35.71	30.00	17.14		
4. Property management							
The consequence of difficulty in facility management.	0.840	12.86	26.19	35.24	15.71	3.33	6.67
The frequency of difficulty in facility management.	0.863	13.33	42.38	25.71	10.48	0.48	7.62
5. Participants' Conflicts							
The frequency of project participants' conflicts	0.931	10.48	40.00	32.86	12.86	2.38	1.43

After the rotation, these five factors are described as:

- *The external factors*, there were 4 variables comprised in this group, which related to the external factors affected to the real estate projects in terms of the customers' basic requirements, particularly the project accessible and the public utilities/ transportation. The practitioners paid less attention to this group, because their projects were constructed in BMA area, which infrastructure had been fully provided. The highest factor loading of this group was only 0.794 which was the lowest amongst others high loading components.

- *Constructability factors*, this group was constructed based on the risks that affected to the project construction stage, especially the duration of development, in the case that any issues obstructed the construction progress, the whole project would be delayed as a result (Smiths, 2005).

- *Project planning and design factors*. This group combined with 3 relevant risks, which mostly associated with the amendment of design and project layout planning, since these would affect directly to the project schedule, budget and the customers' satisfaction towards products (Smiths, 2005).

- *Property management*. This analysis revealed that Thai practitioners also prioritised the facility managerial issues, especially during the property hand-over to customer stage. They also focused on the quality of outsources services providers, it was because of the lack of quality in property management would consequently disturb to the property value (Pitt and Brown, 2002).

- *Participants' conflicts*. Although there was only one risk consisted in this factor, but the factor loading of this risk indicated the highest value of 0.931 amongst the other rotated factors. In this regard, these conflicts also cover on the miscommunication risks between project participants. Thai practitioners perceived that the mistake in communicating between project team would cause the serious damage to overall project progress. This finding also conformed to PMBOK (2004) and JLMcDonald (2007) that the lack of media would lead to the miscommunication and dispute between project participants.

Environmental risks factor analysis

There were 8 variables contained in this risk mode, these risks mostly caused by the adverse environment surrounding the project site. The reliability of this mode was 0.827, and these variables were factorised by the component analysis to investigate the group of environmental risks that had the powerful impact to Thailand's real estate projects.

Table 6.45: Summary of Environmental risks factor analysis

Risk components	Factor Loading	% Very low, never occurred	% Low, hardly	% Neutral	% High, Likely	% Very high, more likely	% Missing
Cronbach's Alpha = 0.827							
1. External impacts							
The consequence of surrounding environment impact.	0.761	21.43	23.33	32.86	14.76	4.29	3.33
The consequence of pollution.	0.762	17.62	27.62	34.76	15.24	3.33	1.43
The consequence of the inappropriate site conditions.	0.882	27.62	27.14	34.29	7.14	2.38	1.43
2. An approval from the environmental impact assessors							
The consequence of EIA approval delay.	0.818	20.48	17.62	16.67	23.33	14.29	7.62
The frequency of EIA approval delay.	0.858	26.67	26.19	25.24	7.62	5.71	8.57
3. Environmental risks likelihood							
The frequency of surrounding environment impact.	0.670	20.48	41.43	28.10	4.76	0.48	4.76
The frequency of pollution	0.766	20.95	46.19	20.95	7.14	2.38	2.38
The frequency of the inappropriate site conditions.	0.810	30.00	38.10	24.29	4.29	1.43	1.9

These environmental risks were clustered into 3 components in accordance with their level of risk's magnitude. However, the risk caused by the delay in Environmental Impact Assessment (EIA) approving was grouped in the other specific component.

- *External impacts,* this group contained the consequences the risks of adverse environmental (atmosphere) surrounding the projects, the pollution risks, and risks caused by an inappropriateness of the project site.

- *An approval from the environmental impact assessors,* this group was distinguished from the other factors, since it emphasised on risks caused by the EIA approving delay. Thai practitioners prioritised these as the serious risks, and the average factor loading values of

this group was the highest amongst the others environmental risks. It was due to the bureaucratic delay of the relevant authorities (ONREPP) and the insincere cooperation between the developers, the environmental consultants, and authorities (Pantumsinchai and Panswad, N.D).

- *Environmental risk likelihood factors*, this group contained the likelihood of the environmental risks that occurred during the construction processes. The practitioners given less attention to this group of risks, as seen by the factor loading of each variable was the lowest while compared with the other environmental risks.

Economic risks factor analysis

As earlier discussed in the chapter 2, the real estate projects always affected by this source of risks, due to the characteristics of real estate project that is income-generated project, and economic risks are classified as the most complicated risks amongst the other source of risks (Booth et al., 2002; Huffman, 2002). These economic risk criteria were modified to cover as much as possible economic risks in the Thailand's business context, it consisted of 28 variables, which grounded on risks caused by the marketing activities, financial risks, and business risks (Huffman, 2002; Nezhad and Kathawala, 1990). These 28 variables had been merged together and then the reliability test was conducted (Alpha = 0.932), the economic risks were grouped by the components analysis into 8 factors as:

- *The competitive situation factors*, this group was the largest component and it contained with 8 variables. These variables' factor loadings were indicated from the lowest of 0.517 to the highest of 0.799. This component reflected Thai practitioners' perceptions towards the marketing competitors in the manners of competitor's size, types, selling volume, and production prices. This finding was strengthening by Porter's five forces theory (1979), that the intensity of competitive rivalry is the major determinant of the competitiveness of any industries (Porter, 1979).
- *Project income factors*, there were 4 variables in this component, which emphasised on the influence of the project sources of income. The factor loadings were ranked from the lowest of 0.616 to the highest of 0.844. It revealed that Thai practitioners given precedence to the risks caused by the illiquidity project cash-flow and the income returned after invested in real estate projects. The analysis given that the risks caused by the financial institutions

hesitate to issue the loan or did not endorse the developers' credit was the highest impact risk. It was because of the real estate project usually a big investment project that requires a large amount of invested money (Benjamin et al., 2001). If the financial institutions delaying their payment, that would consequently affect to the overall project monetary status, especially the construction stage (Lams et al., 2001).

- *Project funding factors.* This component consisted of 4 variables, it was quite similar to the project income factors, but it also included with the property depreciation risk. This risk affected to marketing strategy in term of managing the inventories and the customers' potential to buy a property, particularly the speculators' point of view. It was because of the unsold properties are less maintenance, and these reduced the value of properties in both physical and functional manners (Baum, 1991).

- *Marketing plan effectiveness factors.* This component contained the impact of the risks caused by the inaccurate estimation of the target customers' demands for the properties, and the properties' supply in the trade area. These mistakes also affected directly to the project marketing team in regard to a settle of the effective marketing plan.

- *Construction materials,* there were 2 variables contained in this component. Both of them specifically attended on the risks caused by the fluctuation of construction materials prices, particularly to the increment of reinforcement steel (re-bar). These risks influenced to the developers' pricing strategy of the properties (the ended products' prices increased) that diminished the customers' affordability. These findings supported by Khumpaisal et al., (2010) that this risk intensely influenced the developers' perceptions of economic risks.

- *Customers' potential factors.* Thai practitioners considered that risks caused by the project's customers less affordability portray the severe impact on the project cash-flow. This risk also covered on the risk initiated by the financial institutions and the ability to pay back housing-loan of the mortgagors. The customers had to mortgage their property with the financial institutions in order to purchase properties. If there were any changes in the condition of loan payments such as increment of interest rate, or the instalment terms, these events would affect directly to the customers' affordability and the developers' income accruement (Krittayanavach, 2008).

Table 6.46: Summary of Economic risks factor analysis

Risk components	Factor Loading	%Very low, never occurred	%Low ,hardly	% Neutral	%High ,Likely	% Very high, more likely	% Missing
Cronbach's Alpha = 0.932							
1. Competitive situation factors							
The frequency of the degree of competitiveness in the trade area.	0.799	9.52	29.52	30.00	20.48	8.10	2.38
The consequence of the degree of competitiveness in the trade area.	0.774	7.62	19.52	34.76	28.57	7.14	2.38
The consequence of the competitor's selling volume.	0.745	5.24	23.33	39.05	25.24	3.81	3.33
The frequency of the competitor's selling volume	0.740	7.14	35.71	34.29	17.14	2.38	3.33
The frequency of the sell records of competitors.	0.711	7.14	38.10	30.48	14.76	6.19	3.33
The consequence of the sell records of competitors.	0.622	6.67	21.43	34.76	28.10	4.76	4.29
The frequency of the selling prices of competitors.	0.615	7.62	39.05	30.00	16.19	2.38	4.76
The consequence of the selling prices of competitors.	0.517	4.76	22.86	39.52	26.19	1.90	4.76
2.Project income factors							
The consequence of the illiquidity of project cash-flow.	0.844	16.19	23.33	32.38	15.24	9.05	3.81
The consequence of the return of investment not match with expectation	0.714	8.10	26.19	36.67	20.00	5.24	3.81
The consequence of the difficulty in finding amount and sources of funding.	0.686	15.24	24.29	33.33	17.62	6.67	2.86
The consequence of the fluctuation of interest rate.	0.616	11.90	22.86	37.62	21.90	1.43	4.29
3.Project funding factors							
The frequency of the fluctuation of interest rate.	0.804	14.76	37.14	32.86	8.10	2.86	4.29
The frequency of the difficulty in finding amount and sources of funding.	0.748	18.57	40.00	26.19	8.57	3.81	2.86
The frequency of the illiquidity of project cash-flow.	0.592	19.52	36.19	27.14	8.10	4.29	4.76
The frequency of the property depreciation.	0.550	13.33	40.95	28.10	8.57	1.90	7.14

Risk components	Factor Loading	%Very low, never occurred	%Low ,hardly	% Neutral	%High ,Likely	% Very high, more likely	% Missing
4.Marketing plan effectiveness							
The frequency of the wrong estimation of demand and supply of the properties	0.809	13.33	37.14	36.19	5.24	3.33	4.76
The consequence the wrong estimation of demand and supply of the properties.	0.593	11.43	27.62	39.52	11.43	4.76	5.24
The frequency of the ineffectiveness marketing strategy plan	0.581	11.90	35.71	34.76	10.95	2.38	4.29
5. Construction materials							
The consequence of the fluctuation of construction material prices.	0.873	2.86	19.52	36.19	28.10	5.71	7.62
The frequency of the fluctuation of construction material prices.	0.816	4.76	36.19	33.81	13.33	5.71	6.19
6. Customers' potential factors							
The consequence of the customer's unaffordable to buy properties.	0.773	10.95	26.19	38.57	17.62	2.38	4.29
The frequency of the customer's unaffordable to buy properties.	0.618	12.86	40.48	31.43	9.52	1.43	4.29
7. Developers brand awareness							
The frequency of the developer's brands are not communicated to the target customers	0.794	20.95	33.81	28.57	10.48	2.86	3.33
The consequence of the developer's brand brands are not communicated to the target customers	0.658	18.57	23.33	30.48	20.95	2.38	4.29
8. The less affected factors							
The consequence of the property depreciation. The frequency the return of investment not match with expectation The consequence of the ineffectiveness marketing strategy plan							

- *The developers' brand awareness factors*. This risk mostly caused by the customers did not recognise the developers' brand. This factor was considered as a serious issue by the Thai practitioners, because of it straightforwardly affected to the developers' marketing strategy management. In Thailand context, the small or medium real estate developers always find some difficulty to build their own brand loyalty as well as hard to sell their properties as planned and within the limited budget (Sen, 1999).

- *The less-affected factors.* This component contained with 3 variables, which were the considered by Thai practitioners as the less critical to their project progress. The factor loadings of these 3 variables did not exceed 0.50, thus these criteria had been eliminated from the component analysis (McClelland, 2009)

These findings insisted that Thai real estate practitioners considered the criticality of economic risks that these influenced to their decision-making towards project management plans. They perceived that the crucial competitive situation reflected the highest impact of their projects, as the practitioners justified that risks caused by the competitors became the first priority risks that needed to be concerned. The information gained by interviewing with Thai developers also supported the criticality of marketing risks, as these are uncontrollable risks, and cannot be forecasted precisely.

Political risks factor analysis

EFA had categorised 6 variables of the political risks into 2 components, which named as the government and project compliances factors, respectively. The factor loading were valued from the lowest of 0.775 (the frequency of the approval duration) to the highest of 0.899.

The government factors consisted 4 variables, which mainly focused on the risks caused by the political unstable situation (the factor loading indicated values of 0.777 for the consequence and 0.815 for the likelihood) and the bureaucratic of Thailand government agencies in regard to a delay in construction works' permissions. It resulted that the current Thailand political situation (2009-2010) such as the anti-government protestors, or the latest coup d'état in 2006 had the critical impact on the customers' decisions to buy new properties (Khumpaisal et al., 2010). Moreover, the delay in approving for the commencement of construction was a serious issue of Thai developers, because of more time spend in this regard would consume the construction time, affected the project schedule and finally to the project budget and cash-flow (Jong et al., 2005).

Table 6.47: Summary of Political risks factor analysis

Risk components	Factor Loading	% Very low, never occurred	% Low, hardly	% Neutral	% High, Likely	% Very high, more likely	% Missing
Cronbach's Alpha = 0.814							
1.Government factors							
The consequence of Thailand political situation.	0.777	5.71	10.48	27.62	41.43	11.90	2.86
The frequency of Thailand political situation.	0.815	6.19	21.90	33.81	26.67	8.57	2.86
The consequence of the delay of approval duration from authorities.	0.795	5.24	14.29	35.71	31.90	9.52	3.33
The frequency of the delay of approval duration from authorities.	0.775	7.14	28.10	37.62	16.67	6.67	3.81
2.Project compliances factors							
The consequence of the contradiction between project objectives and local development policy	0.899	18.10	28.57	30.00	17.62	2.38	3.33
The frequency of the contradiction between project objectives and local development policy	0.893	26.19	39.52	23.81	4.76	1.43	4.29

The project compliances factors comprised 2 risks related to the contradiction between the project plan and the local development policies. The factor loadings of this group were the highest amongst the others that meant Thai practitioners given the high awareness to this issue, their project plans may contrast with the local development policies. There were several specific regulations related to the construction and property development projects, such as Construction Supervision Act, 1992 or BMA Development Plan, 2004. However, some of Thai developers may neglect and violate these regulations, as these laws' contents were not clearly identified by the related authorities (APTU, 2006).

The political risks factor loadings informed that political risks were the critical issue to Thailand's real estate sector. These findings confirmed with Khumpaisal et al., (2010) that political risks were the most considerable risks for the developers while conducting project feasibility analysis and managing the development stage.

Factor analysis summary

The Explorative Factor Analysis (EFA) was used to cluster and summarise the Thai practitioners' perceptions towards each risk's importance. These also assisted in minimising the trivial variables, in order to form the statistical model for risk assessment. Outcomes of these analyses would be used to inform the necessary risk assessment criteria for the foundation of the further statistical models.

All risks contained in the assessment criteria were analysed to identify the paramount risks that strongly influenced to the practitioners' decision making. Therefore, there were only 5 paramount risks in each STEEP category summarised to be used for the further risk assessment models. The factor loadings of each group of variables were benchmarked as the key to evaluate the seriousness of risk perception towards each risk category, the simple statistical techniques (average) was used to compare those outcomes (See Figure 6), where the top 25 risks that had the strong impact on Thailand's real estate projects progress are summarised in the Table 6.48.
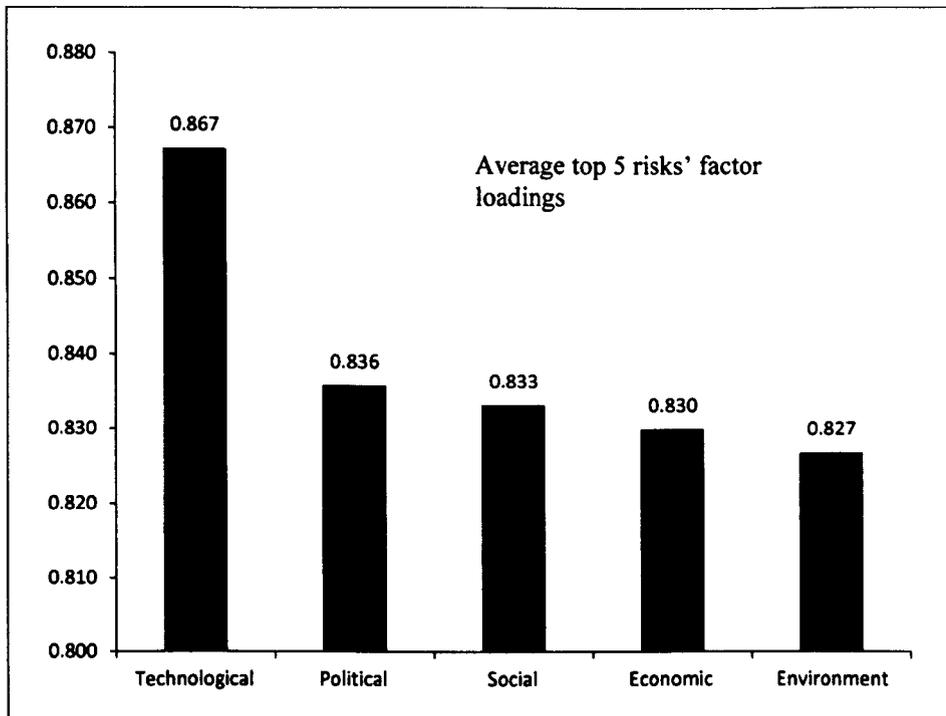
Figure 6: Comparisons of STEEP factor average (Top 5 risks)

According to the comparison of STEEP factor loadings (see Table 6.48), Thai practitioners considered that technological risks, particularly the likelihood of project stakeholders' conflicts (miscommunication) was the first priority risk to be attended while managing the real estate projects. Followed by the political risks (project compliances factor regarded to the contradiction of the project's plan/layout to the local/urban development regulations), these became the second risks that the developers shall concern while managing the real estate projects.

Table 6.48: Summary of the extractive risk assessment criteria

No	Steep Category	Component	Risk	Variable Name	Factor Loadings
			Average Factor Loadings		0.8672
1	Technological	Participants' conflicts	The frequency of project participants' conflicts	TEC5F	0.931
2		Property management	The frequency of difficulty in facility management risks	TEC6F	0.863
3		Project planning and design	The frequency of project design and amendment risks	TEC2F	0.854
4		Constructability	The consequence of project constructability risks	TEC3C	0.848
5		Property management	The consequence of difficulty in facility management risks	TEC6C	0.840
			Average Factor Loadings		0.836
6	Political	Project compliances	The consequence of the contradiction between project objectives and local development policy	POL3C	0.899
7		Project compliances	The frequency of the contradiction between project objectives and local development policy	POL3F	0.893
8		Government	The frequency of Thailand political situation affect to project.	POL1F	0.815
9		Government	The consequence of the approval duration from authorities affect to project.	POL2C	0.795
10		Government	The consequence of Thailand political situation affect to project.	POL1C	0.777
			Average Factor Loadings		0.833
11	Social	Workforce availabilities	The frequency of workforce availability affect to project	SOC4F	0.882
12		Locality	The consequence of local community acceptances affect to project.	SOC1C	0.865
13		Workforce availabilities	The consequence of workforce availability affect to project.	SOC4C	0.832
14		Locality	The consequence of local community participation affect to project.	SOC2C	0.831
15		Locality	The frequency of local community participation risk affect to project	SOC2F	0.756

No	Steep Category	Component	Risk	Variable Name	Factor Loadings
		Average Factor Loadings			0.829
16	Economic	Construction materials	The consequence of the fluctuation of construction material prices affect to project.	ECON14C	0.873
17		Project income	The consequence of the illiquidity of project cash-flow affect to project	ECON11C	0.844
18		Construction materials	The frequency of the fluctuation of construction material prices affect to project	ECON14F	0.816
19		Marketing plan effectiveness	The frequency of the demand and supply of the properties affect to project	ECON6F	0.809
20		Project funding	The frequency of the fluctuation of interest rate affect to project.	ECON10F	0.804
		Average Factor Loadings			0.827
21	Environmental	External impacts	The consequence of the appropriateness of site conditions.	ENV4C	0.882
22		An approval from the environmental impact assessors	The frequency of EIA approval delay quality risks	ENV1F	0.858
23		An approval from the environmental impact assessors	The consequence of EIA approval delay risks	ENV1C	0.818
24		External impacts	The frequency of the appropriateness of site conditions.	ENV4F	0.810
25		Environmental risks likelihood	The frequency of pollution risks affect to project.	ENV3F	0.766

The outcomes of this EFA also grounded a foundation to implement the further risk assessment model, as the 25 major risks with higher impact on the project progress were filtered and re-ordered in accord to their magnitude. The factor loadings of each filtered risk indicated the level of seriousness of each risk in the numerical format that enabled the decision makers to understand the criticality of risk. This model was furthered developed in phase 2 by adding the details of risks that actually occurred in Thailand's real estate sector and it would be validated to see its practicality to use in the real case (see Chapter 7.6).

One limitation of this EFA in regard to rank the perceptions of STEEP factor risks was that the average of factor loadings of each STEEP category (i.e. Technological VS Economic, Political VS Social) did not show significant differences between them, it could not specify that which risk has

the highest influence to Thailand's real estate projects. These led to the difficulty in sorting and assessing the STEEP risks' magnitudes. It was therefore reckoned that risks in the real estate projects are subjectively measured, it could not be ranked by using the mathematic statistical devices only and risk shall be assessed by using both quantitative and qualitative devices, in order to gather more précised outcomes.

6.3. QUANTITATIVE PHASE SUMMARY

Questionnaire sets were distributed to the samples population in the studied area (BMA) that included Thai real estate practitioners or experts with the purpose to understand this business context, and to categorise the practitioners' biographical data, their project/organisational characteristics, and their perceptions of STEEP factor risks. These information were need to fulfil the further established risk assessment model in regard to classify the users for the model developed by this thesis, as well as it informed some ideas to develop the model to be matched with their satisfactions and their current practices.

Several statistical test either the parametric or others such as cross-tabulation or correlation techniques were adopted to test a series of research's hypotheses. Summary of these hypotheses tests are shown in Appendix VIII, while the results are concluded as:

- *Hypothesis 1*, there was an existing difference between mean of STEEP risks perceptions in regard to the experience in risk assessment/management of the respondents. Therefore, this hypothesis was rejected.
- *Hypothesis 2*, there was a non-association between the position of respondents and the current risk assessment methods existed, whereas the associations were found in the rest sub-hypotheses. Therefore, this hypothesis was entirely accepted.
- *Hypothesis 3*, there was a correlation between the satisfactions of the current systematic/formal risks assessment models (hypothesis 3.1) then this sub-hypothesis was accepted. Meanwhile, the sub-hypothesis 3.2's results indicated the variation of the satisfaction level in using the systematic/formal risk assessment model, and then this hypothesis was accepted.
- *Hypothesis 4* there was a positive correlation between these variables, hence this hypothesis was accepted.

As hypothesis 4 was accepted, this led to the adaptation of EFA to found the risk assessment model, all STEEP factors risks criteria (66 variables) were clustered into 5 groups with 20 components, these component factor loadings were then compared to see which one reflected the highest consequence to the real estate. It seemed that Thai practitioners considered that technological risks were the first priority that needed to be concerned while managing the projects, followed by the political risks. Then, these criteria were summarised to the paramount 25 risks that affect critically to the Thailand's real estate sector and these from the assessment model that need some ideas from the real users to strengthen and modify the model to suit with the real business context. This approach had structured some ideas to create the risk assessment models that conform to the practitioners' requirements as this was created based on the requirements of the real users.

Conversely, this quantitative approach could not provide the in-depth information of risk such as the sources of risk, the exact degree of each risk's consequence to the project progress or the relationship between risk and other factors. The assessment criteria in questionnaire covered on the extracted risks from literature review only, but these could not portray the other important risks that actually occurred in the reality. These drawbacks insisted that risks are naturally subjective matters and could not be quantified by the statistical or mathematical devices only. Therefore, the qualitative approaches were also utilised in order to seek for the reality of risks from the practitioners to fill the gap of quantitative approaches as well as to modify the established risk assessment derived by EFA in this first phase. The qualitative data derived in second phase will explore the details of risks in this particular industry and inform the further features to the model development in order to enhance the quality of the model.

CHAPTER 7 MODEL EXPLORATION AND EXPLICATION

7.1. INTRODUCTION

A qualitative research approach was adopted to gather richer data to determine the origins of risk in real estate projects and explore more details of the ideal risk assessment practices in order to modify the model derived from the quantitative phase. Semi-structured interview techniques were selected as the most appropriate research instrument to investigate the feasibility of implementing the risk assessment model. The interview processes were conducted followed an interview framework as earlier discussed in Chapter 4.

This chapter starts with a summation of interviewees, a brief description of the qualitative content analysis and the instrument used during the processes. The results and analysis sections are divided into several sub-sections due to the amount of data gained by the interview processes as well as to provide the structured information to help in validating the purposed risk assessment model.

This chapter was structured by reporting the results of the STEEP factors risks' perceptions, any particular risks in the project development stages, the satisfaction towards the current risk assessment practices, the popular risks assessment techniques. These included the barriers or limitations of Thai practitioners in using the systematic/formal risk assessment models, and their requirements for the idealistic risk assessment models. The findings of this phase will provide the details of risks and the features of the required risk assessment methods in order to strengthen and support the applicability of the risk assessment model developed by the first phase results

Chapter 7.8 specifically denotes the validation of the purposed risk assessment model, as mentioned in Chapter 6, this model was created based on Explorative Factor Analysis (EFA) theorem and refined by the suggestions of the interviewees (Chapter 7.5.5). Hence, this model needs to be proved in its validity and reliability before used in the real business case.

7.2. THE DATA ANALYSIS PROCESS

The qualitative data analysis framework was created to ensure that the data gathered from the interviews would be thoroughly read and coded into the appropriated structures. This also helped in filtering the in-depth information to respond to the research's objectives, as well as reduced the bias caused by the researchers' own opinions and perceptions (Corbin and Strauss, 2008). This framework is illustrated in the figure 7.0 below:
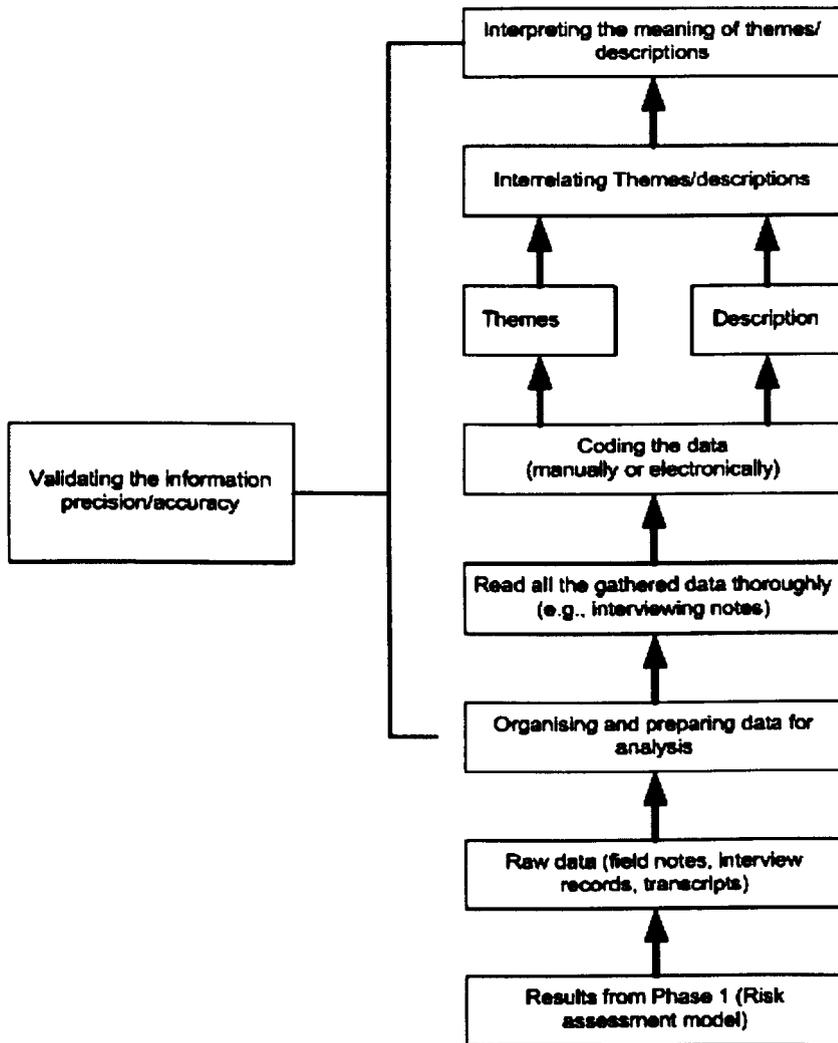
Source: adapted from Cresswell (2008)

Figure 7: Overall qualitative data analysis steps

The purposed risk assessment model was developed in phase 1, which constructed based on the Explorative Factor Analysis' theorem, would be also validated in this phase (see Chapter 7.8). The information gathered by phase 2 helped in finalising the practicality of this model as well as informing the model's features to enhance its efficiency.

The raw data gained by interviews are organised, prepared and then analysed, these involve with the necessary formatting and arrangement of material into the related categories of the sources of information. All data are thoroughly read to obtain a general sense or the meanings of the data. The detailed analysis using the coding process started, which is an allocation of collected data into the segments that assign the meaning of information. The coding system also enabled a description of each risk to be generated as well as categories or themes for analysis. Therefore, the descriptions and themes are represented in terms of the qualitative narrative statements. Creswell (2008) stated that this step shall be related to the creation of appropriate means to convey and discuss the results of the findings. The final step is to interpret the data meaning, these made based on the researcher's individual understanding and personal backgrounds. Furthermore, these data are expected to suggest new issues or ideas that not foreseen earlier in this study, which are the missing information from quantitative phase (i.e. details of risks, the ideal risk assessment methods).

One nature of the qualitative approach is that it is not subject to particular analytic techniques with prescribed tests, but this involves the studying of transcribed texts or discussions and other particular contexts (Fellows and Liu, 2008). This research utilised non-numeric understanding, words or language understandings, building upon the inductive paradigm in order to understand the subjective nature of risks. The outcomes of this approach help in examining and interpreting data in order to draw a conclusion of this study as well as to develop empirical knowledge (Corbin and Strauss, 2008; Miles and Huberman, 1994).

The content analysis was employed due to its applicability in defining the related factors of risks in Thailand's real estate projects, and the relevant topics such as current risk assessment practices or particular risk that affected to project. Fellows and Liu (2008) supported that this content analysis is simple, but the researcher shall have the excessive awareness in the meanings of word or actions of the interviewees because of these may affect to the misinterpretation of data (biases) and further analytic processes.

In order to apply this qualitative content analysis, the following points had been emphasised, which are firstly, the researcher determined on what part of the communication inferences shall be made, in order to suit with the aspects of the practitioners and their background /experience. The step-wise analyses were conducted using all materials gained by interviewed, and then assigned these into the suitable categories, which enabled for the further revision. Finally, due to the subjectivity of risks

and the qualitative study, the researcher then compared the results with the data gained by the questionnaire survey in order to triangulate these data to enhance more reliability (Mayring, 2000). The researcher also developed the qualitative content analysis framework (see Figure 7.1) in accordance with Mayring's suggestion. This framework was suited with the inductive reasoning of this data analysis' aspect and also reminded the researchers that not to judge only on potential research findings, but shall embarks on in-depth understanding in the data and research's question, then these could lead to a valid conclusion of this research (Creswell, 2008).
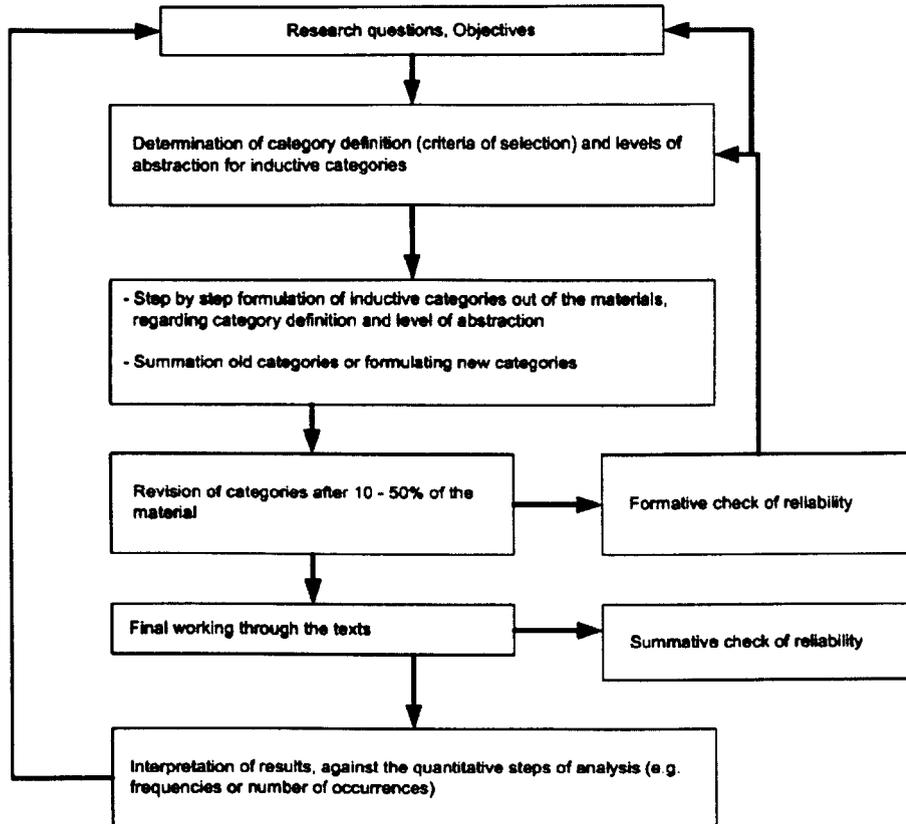
Source: adapted from Mayring (2000)

Figure 7.1: Qualitative content analysis steps

The researcher read through the related documents (i.e. interview records, transcribes) thoroughly in order to see what themes emerge from those documents and what were the judgements of the interviewees in regard to the contents of this research, and these themes would be linked to the other related themes to finally find the latent emphases (Weber, 1990).

Furthermore, the researcher had been driven by the theories of risk and risk assessment that clearly determined the research's scopes and objectives. The researcher also considered on the size of data to be analysed at a time limited, "*how big a chunk of data is analysed at a time (a line, a sentence, a phrase, a paragraph)*" (Ratcliff, 2010, pp. 4-5) as well as the units of meaning, and the categories

being used. The properties or categories of description in order to fit the data obtained from the interviewing processes had been defined in the appropriated categories or concepts (see Chapter7.4.2).

The researcher selected the appropriated qualitative content analysis approach from the following classifications, which are the *conventional analysis*, the coding of categories would be directly and inductively derived from the raw data, with main purpose to generate theories or theoretically connected explanations of the document content, or the *directed content analysis* and *summative content analysis* which were selected as the appropriate approaches (Berg, 2009). That was due to the reasons that the directed content analysis employs analytic codes and categories derived from existing theories and explanations relevant to the research focus, where the summative analysis process is simply, it uses only counting the number of existences of words or phrases from the related documents. The researcher then investigated deeply into the raw data using the emerged themes and extended the exploration to include that latent meanings and themes that are apparent in the data.

The interview processes used in this research were not only aimed to analyse the expected contents (i.e. risks and the risk assessment methods), but also investigated the interviewee reactions against the interviewing questions. This research invented the new risk assessment technique that created based on an advance statistical device, thus the researcher had to interpret the raw data gained by the interview with the selected practitioners, and then investigated into the established themes that gained from the raw data (interviews records, or field notes). These aforesaid reasons supported the combination of the directed and summative content analysis as the qualitative content analysis aspect of this research.

7.3. INTERVIEWEES SUMMARY

The interviewees were selected by their roles in making decision towards risks, their experience in risk assessment/management or by their specialty in Thailand's real estate development business (included the accessibility to the informant). The researcher conducted 13 interviews for yielding the richer data, those interviews were performed during March – May 2010. Their profiles, organisation and their involved projects are summarised in the Table 7, but their names and organisations are concealed to protect their business confidentiality, only their initials and position are given, this is to comply with the LJMU's research ethics.

Table 7: Schedule of Interviewees

Interviewees	Position	Experience	Project Type	Location	Organisation	Date
LW	Project Advisor	14	Low rise condominium	Bangkok (East)	Small developer	16 Feb 2010
TT	Managing director	6	Low rise condominium	Bangkok CBD	Small developer	18 Feb 2010
IB	Managing director	25	Housing/ land sub-divisional	Bangkok Vicinity (South-west)	Medium size developer	25 Feb 2010
POS	Financial/ budget manager	10	Housing/ land sub-divisional	Bangkok (South west)	Public company limited	4 Mar 2010
PP	Project manager (Site manager)	15	Housing/ land sub-divisional	Bangkok (South west)	Public company limited	9 Mar 2010
SP	Project director	13	Low rise condominium	Bangkok inner CBD	Small developer	14 Mar 2010
PT	Chief Executive Officer (CEO)	30	High rise condominium	Bangkok inner CBD	Public company limited	19 Mar 2010
NM	Managing director	30	Sport & Leisure complex	Bangkok rural area (East)	Medium size developer	22 Mar 2010
PW	Vice president	25	Housing/ land sub-divisional	Bangkok rural (Northwest)	Public company limited	31 Mar 2010
PC	Vice president	17	Housing/ land sub-divisional	Bangkok rural (North)	Public company limited	1 Apr 2010
PS	Managing director	30	Serviced apartment/mixed used	Bangkok inner CBD	Small developer	3 Apr 2010
NP	Vice president	10	Low rise condominium	Bangkok inner CBD	Public company limited	9 Apr 2010
BC	Budget manager	10	Housing/ land sub-divisional	Bangkok rural (East)	Public company limiter	8 Apr 2010

Each interviewee was given 30 minutes to express their judgements and provided the useful information that enabled the synchronisation with data gained by quantitative approaches (questionnaire survey) in order to inform a foundation of the appropriate risk assessment model, which suit with Thailand's real estate industry context.

7.4. INTERVIEW AND DATA ANALYSIS INSTRUMENTS

The semi-structured interview was adopted in the qualitative data collection processes, due to it provides more flexibility and conveniences to the interviewees in order to freely explain their experience, their perceptions (attitudes) of risks, including their risk mitigation methods without the limitation of time. The researcher utilised a list of questions, but allowed the interviewees the necessary room and discretion to allow freedom of inquiry (Bryman and Bell, 2007). However, the interview questions were imminently structured, these started from the respondents' biographic, the project details, followed by the risk assessment techniques. The interview processes had been divided into 3 sections; *the personal data, the project data and the risk assessment checklists*, respectively. A digital voice recorder was used during each interview to allow the researcher to transcribe these records into texts. Each interview was conducted in Thai language in order to provide more comfortable conversations, these records then translated into English to ease the analysis processes.

During the actual interview cases, 7 interviewees (out of 13) refused to conduct the section 3's calculation, because of they did not feel confident about the application of this model to assess risks in the complexity industry. They actually did not have the applicable knowledge to complete the calculations, and they did not consider on the importance of the quantitative risk assessment models. However, they had provided abundant useful and richer information that assisted in forming the ideal risk assessment models for this business.

The researcher was facilitated with by the mentioned interview records, which detailed the respondents' opinions and judgements into the summation notes, and the field notes which recorded the miscellaneous information of the real estate projects, and/or the interviewees' statements, which were not directly related to the interview questions.

7.4.1. Interview questions

The interview questions were designed to cover the research aims and objectives and provided more in-depth knowledge of the Thailand's real estate business' context and the possibility to implement the innovative risk assessment methods.

The literature review informed that Thai developers lack the systematic or mathematic/ statistic risk assessment techniques to deal with the complicacy of risks. These also described the categories and

nature of risks in this industry, but these did not given the details and consequence of each risk. The results of phase 1 underpinned that Thai practitioners preferred the panel discussion as an appropriated risk assessment method. These had indicated the seriousness and likelihood of each STEEP factors risk, but did not inform the origins or the sources of risk in this industry, and the features of the ideal risk assessment techniques. Therefore, the interview approach was adapted to fulfil the missing points of the previous research processes, because of the questions used in this phase were designed to investigate the details of risk associated in the property projects as well as to seek for the ideal to establish the risk assessment model that suit with the requirements of Thai real estate developers.

These questions were designed as the open-ended to allow the interviewees express their individual opinion, judgments, and suggestions to the research topic. These also enhanced the simplicity and effectiveness of semi-structured interviews (Lindlof and Taylor, 2002). The questions using in the interview processes followed to the frameworks as outlined in the interview records summaries (see Appendix IX), in order to maintain the research's scopes and objectives. These records were used as the guideline to help focusing on the interview topics without the limitation of the structure, and the researcher could have more benefits in modifying the questions to suit with the current context/situation and the interviewees.

The interviewing processes were split into three sections, the examples of the questions actually asked during interview processes are summarised as:

Section 1: The participants details This section aims to gather the interviewees' experience in project risk assessment/management area and their roles in making decision of risks. The questions asked were majorly informal and more verbal in order to see the participants' reacts towards each question (Corbin and Strauss, 2008). Examples of these questions were:
- According to your opinion, what kind of risk that has the strongest effect on your project?, how about the consequences of that risk
- How do you assess risks in your project/ company?
- Are you a decision-maker towards risks in your project?

These questions were not in the particular order, but depend on the situation, contexts and reactions of the interviewees. Other questions might be raised to support the interviewees to give more discussion towards the studied topics such as:
- Could you please describe your organisational types and structure?

175

- What do you think about the necessity of risk assessment plan, do you think the company' business can continue without that such kind of plan?

The details given by each interviewee helped in summarising the respondents' biographic, their personal attitudes towards risk/risk assessment methods and the current Thailand situation.

Section 2: The project details   this section sought for the interviewees' projects characteristics included the physical attributions, the functions, sources of funds, and the workforces' availability. However, this section aimed primarily to obtain the particular risks that obstruct the project progression. The questions were informal and not in order, the examples of the typical questions are:

- Could you estimate the numbers of competitors in your trade area (any size)?
- Could you please explain this project characteristic?
- Who was the major source of contractors in your project?

Moreover, some specific questions had been asked to gather the particular information of the project and risks such as:

- According to your involvement in this project, what is the most impact risk that obstructs your project progress?
- What is the major source of funds of this project? Loan or equity?

These project details, the characteristics of any specific project included the project risks had provided the in-depth information of each project. These also helped to understand the overall structure of Thailand's property industry and the particular risk that critically impact on the project progresses.

An application of new risk assessment   this section aims to investigate the possibility in introducing an innovative risk assessment technique to Thailand's real estate industry. The questions included the barriers of the practitioners in using the formal/systematic risk assessment techniques, the preferred methods and the features of idealistic assessment techniques. The interviewees were invited to range the judgements about the established risk assessment criteria against the simulated alternative development plans. The examples of those questions are:

- What was the barrier that made you do not use the formal/systematic risk assessment techniques?
- What will be the features of your expect or ideal risk assessment models?

- If the systematic risk assessment models implemented based on the complex statistical tests devices, what are your opinions about this?
- Can you give some suggestions or recommendations to the established risk assessment criteria?

These questions were adjusted to suit with the type of projects, the answers gained by this group of questions informed the attribution of the ideal risk assessment techniques such as the features, the capacity and the patterns of implementing the model. These also informed the barrier of Thai developers in using the formal risk assessment techniques, the current used methods, and help the researcher to criticise the established risk assessment criteria (the coverage, the complexity and the applicability).

All interview data had been transcribed and translated to English, that might be some error during these processes, however the researcher utilised the field note together with the interviews records to set up the appropriate coding structure for all transcriptions which led to the future analyses (see all transcriptions in Appendix X).

One important process besides the interviewing and data collection processes is the coding process, Fellows and Liu, (2008), Miles and Huberman (1994) suggested that the researchers shall emphasise on determining the meaning of the data, by giving the allocation of code based on the categories and groups of respondents and type of data obtained.

7.4.2. Coding Structure

In qualitative inquiry, coding means a word or short phrase that symbolically assigns a summative, significant or essence or evocative attribute for a portion of language-based or visual data, the data can be achieved by various media such as interview transcriptions, participant's observation field notes, or any supportive documents. Saldana (2009) indicated that the coding processes combined with two cycles, firstly the coding processes can be ranged in magnitude from a single word to a full sentence, or even a page of media. Secondly, the portions coded can be the exact same units, longer passages of text or even a reconfiguration of the codes themselves.

Bazeley (2007) suggested that codes can be named by a multiplicity of instances/issues or by a particular setting at a particular time, particular respondents including their belief system and cultural background. A coding structure shall be combined with index (labelling) system and the actions

towards collected data and organise them into the conceptual discussion formats. Coding structure is found in accordance with the conceptual code generated by sense and interpretation of the researchers, by directly derived exact words of data or by the previous experience and background understanding of relevant issues (Kok, 2009).

Hence, the coding structure adapted in this qualitative data analysis stage was developed based on the following structure. It started with coding based upon the emerging information, followed by fitting data to predetermined codes, and usage of both predetermined and emergent codes (Creswell, 2008; Kok, 2009).

The coding structure of this research also followed to the above statements, it assign the unit of meanings to the descriptive of inferential information compiled, allowed the differentiation, and combination of data with due consideration of its contexts (Miles and Huberman, 1994). It was constructed based on using the *"common sense"* codes, as it addressed the larger theoretical perspectives and unusual matters that help the researcher to form/suggest the new understandings (Cresswell, 2008). This coding structure helped to sharpen, sort, focus, discard, and organise of collected data through data reduction techniques (Miles and Huberman, 1994).

Moreover, the above suggestions were adopted as a framework to develop the coding structure as it was simply constructed in order to reduce the complexities during the data analysis processes. It followed Corbin and Strauss (2008)'s hierarchy of coding structures, which grounded on the categories, concepts and properties basis as:

- *Categories* the higher level concepts under or the themes for analysis data. Categories represented relevant phenomena and enable the analyst to reduce and combine data.

- *Concepts* stand for ideas contained in data, these are the interpretations or the products of analysis.

- *Properties and dimensions* these two words have the same meaning, as properties are the characteristics that define and describe concepts, whereas dimensions are the variations within properties that give specificity and range to concepts. The meaning of both properties and dimensions were merged together in this research phase and being defined under the category of *"Descriptions"*. Each description was assigned and coded with the numerical figures, for example "1.1.1" was the code of *"Discount rate as one of financial risk assessment tools"* or "33.1.1" was equal to *"the political situation portrays the major impact to the developers' marketing plan/strategy"*. (see Appendix XII)

The interview data were summarised into a group of transcribed documents and coded by the researcher's justifications towards the contents of each studied topic, employing the content analysis method as earlier mentioned. These codes were manually sorted with the assistance of the spread sheet application (MS Excel) and these were tabulated in the table format (see example in Table 7.1).

The transcribed documents were read thoroughly and the data which necessarily related to the studied topics were highlighted, then classified and assigned them into whether categories or concepts which the statements transcribed from interviews should be fallen into. These categories and concepts also helped in sorting and sifting through the data/materials obtained from the interviews to identify the similarities or dissimilarities between phrases, the relationship between the categories' contents and the research variables, patterns, themes, or the significant differences between subgroups and common sequences (Miles and Huberman, 1994, pp. 9).

Table 7.1: An example of the qualitative coding structure

Cat	Category Name	Concept	Concept Name	Desc.	Descriptions	Interviewee(S)
1	Current risk assessment practices	1.1	Financial risk assessment tools	1.1.1	Discount rate as one of financial risk assessment tools	BC
				1.1.2	Risk committee	BC
		1.2	Experience is one of current risk assessment tool	1.2.1	Using information from 2nd data to support decision making towards risks.	BC

There were 13 transcriptions with approximately 52,000 words, these were then divided into 6 major topics related to the research's scopes, and objectives in order to investigate the Thai practitioners' perceptions of risks, their current assessment practices, the barrier in using the formal/systematic assessment models, the particular risks that obstructs the project progression, and the ideal of risk assessment models, and risks mitigation/contingency plans currently used by the interviewees' company.

After each interviewing record was read thoroughly, each statement was assigned with the appropriated categories or concepts. There were 33 categories, which had been assigned to be in accordance with the research variables, these categories contained 147 concepts, and approximately 600 descriptions. The descriptions in this regard were similar to "*the code*" of the relevant statements gathered by the interviews to the concepts or categories. The interview transcriptions were then

manually assigned into the coding structure in order to perform the qualitative data analysed. The interviews results were then analysed in the chapter 7.5 hereinafter.

7.5. INTERVIEW RESULTS AND ANALYSIS

The interviews' results had been thoroughly read, coded into the appropriated categories and concepts. These helped in re-arranging and transforming the interviewees' transcribes into texts and then analysing of each statement. The analysis procedure of this phase followed Miles and Huberman (1994) stepwise approach to qualitative data analysis (see Figure 7.2).
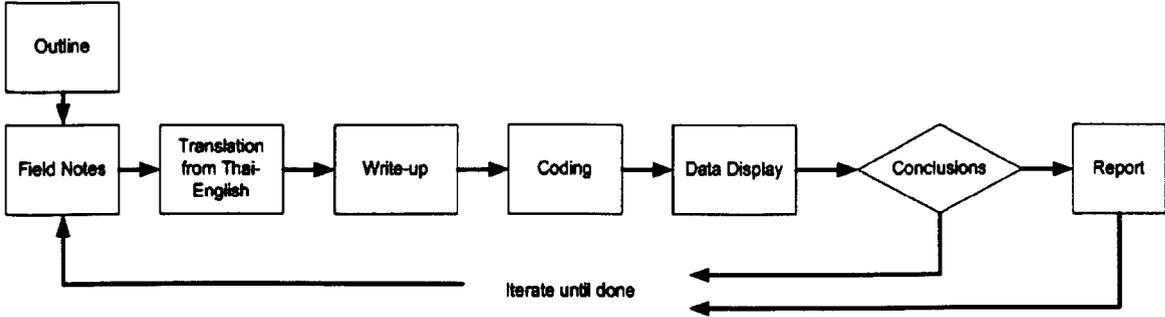
(Adapted from Miles and Huberman (1994) pp. 85)
Figure 7.2: Qualitative analysis framework

The results had been divided into seven sections in accordance with the research topics and aims of study, it started with the description of Thailand's real estate industry's characteristics, the importance of land and location and the perceptions of STEEP factors. It also reported the favourable risk assessment practices of Thai practitioners included the features of ideal risk assessment models.

All interview findings enabled in drawing the summative conclusions of qualitative data analysis, the interviewees' opinions, comments, queries or suggestions had been added to form the stronger conclusions and provide the guidelines to modify the purposed risk assessment model.

7.5.1. The presentation of qualitative data

The presentations of the data gathered by the interviews are normally combined with texts, tables and graphical figures. These aim to report the findings of the interviews in each studied topics/sections transparently and clearly. This phase adapted Chenail's strategies to present the qualitative data (Chenail, 1995) as:

- *Natural* The data are presented in a shape that similar to the phenomenon being studied, and they are presented in an order that represents the flow of each studied topic.
- *Most Simple to Most Complex* - The presentation of interview data starts with the simplest example which is the general characteristics of Thailand's real estate industry, follow by the more complexity of data. This strategy aids the readers to have more understandings about the proposal of this research.
- *Narrative Logic* – The interview data are arranged in a manner that the researcher can plot out the data which enable the transition from one research topic to another in order to link the particular finding of each topic.

According to the large size of data obtained by the interviews, the data had been divided into thirteen subsections in according to research variables and studying topics. Each subsection describes the findings, ideas or the suggestions raised by the interviewees in form of narrative statement.

The direct quotations are generally found in each subsection, these used to emphasise the statement of findings and to protect the plagiaristic quotes. Each direction quotation was quote in this manner "*statements* (the interviewee's initial)". For example, one developer perceived that the risk of the scarcity of land in Bangkok area, his statement was directly quoted as "*Because of our land selecting strategy and target market are crystal cleared.....However, the obstruction to these strategies is a scarcity of land..... that affected infeasibility to the project's cash-flow* (LW)". The interviewee's statements also appeared on the transcribed note and summarised in the interview records attached in appendices.

To provide more readable data analyses, the presentation schemes of the summary table of coding structure and the relationship between categories and concepts are utilised alongside with the analyses in each section. In this regard, the summary table of coding structure show the related categories, the concepts to support the categories and the number of descriptions contained each

concept area. The descriptions in each concept help in linking the concepts and categories and these produced the narrative statement related to the concepts. Thus, the aforesaid categories and concepts are tabulated in the following manner.

Table 7.2: An example of summary of coding

Mode	Feasibility analysis			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
1	XXXXX	1.1	Financial risk assessment tools	6
		1.2	Experience is one of current risk assessment tool	4
2	YYYY	2.1	Pre-feasibility analysis	8
		2.2	The risk assessment plan to suit with the variation of construction materials prices	1

This example illustrates that the Feasibility Analysis mode (topic of study) consisting two categories which are CAT 1: XXXXX and CAT 2: YYYY, respectively. The CAT 1 comprise 2 concepts as 1.1 equated Financial risk assessment tools, and this concept contains with 6 descriptions, whilst CAT 2 comprises 2 concepts and there are 9 descriptions in this category.

The graphical presentations also used to illustrate the relationship and flows between concepts and categories in each studied mode. The presentations are in the simple flowchart and arrow shape, these enhance the readability of each data analysis section. Figure 7.3 denotes the graphical shapes and the hierarchical relationship of the qualitative data presentation diagrams.

The research utilised the formation of these shapes to explain the framework of data synchronisation as well as provided more simplicity in discussing the qualitative data in each section.

The detailed data coding structures are appended in Appendix XII, these represent the coding structure of this qualitative analysis in a tabular format, but provided more details of each code. The following sections will report the findings gathered by the second research phase, it starts with a discussion of the Thailand's real estate industrial context and it will be ended with a discussion of the suggestions of the practitioners to modify the model derived from EFA analysis in the first phase.

Shape		Description
XXXXX (box)	=	The main research topic or the variables of thesis
XXXXX (box with side bars)	=	This figure represented the stances, considerations or wises to form the main research topics
CAT XXX (flag shape)	=	Categories (the number represents the category that the coding fallen into)
1.1 (rectangle)	=	The rectangular shape represented concept
↓ (one ended arrow)	=	This one ended arrow denoted the casual- relationship between nodes
←→ (double ended arrow)	=	The double ended means the similar level of relationship (would be the cross sectional or conceptions)
— — — → (dotted arrow)	=	The dotted arrow represented the relationship (direct or indirect) across the sections.

Figure 7.3: The legends of shape using in explanation of qualitative analysis frameworks

7.5.2. The contexts of Thailand's real estate industry

Thailand's real estate industry context is naturally produces a big size project, built on the ample land parcels by several construction materials, and these are typically labour intensive works. The productions are generally contained with the high value, but they are constrained by the construction materials and land prices. However, the most crucial factor that related to this industry was "*the location factor*", and its importance was also investigated in this phase.

Table 7.3: Summary of Thailand's real estate business

Mode		The current Thailand's real estate business		
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
15	Characteristics of real estate business.	15.1	Risks in this industry are not so complicated and only a few had strongly affect	6
		15.2	Several kind of risks affect to every project stages.	7
		15.3	This industry has a limitation in land attributions, then it doesn't have many options or alternative plans	4
		15.4	Risks in this industry are almost the subjective matters	3
		15.5	One project manager/director could response for various real estate project types	1
		15.6	Thai developers avoid or neglect the impacts of risks in their real estate projects	4
		15.7	Some developers may not need innovation construction techniques	2
		15.8	Some developers also develop various type of real estate projects	2
		15.9	It is hard to compare each real estate projects characteristics	1
		15.10	The nature of real estate business	2

Each real estate project is normally unique due to it has an individual physical attributions, and the location. It is hard to make a direct comparison between each project, because of its land characteristics are distinguished, therefore the developer may not has an option to develop mixed properties on the same land parcel. However, a developer may be able to develop various kinds of projects in the different location in regard to its speciality, and it is also a good way to distribute risks to other projects. This also supports the market positioning strategy and provides more options to the customers.

The current situation of Thailand's real estate market was overalls stable, despite this industry is currently affected by a number of severe economic and political occurrences. There were some certain demands that need to buy the new properties, which raised by the increment of population, or the expansion of new families. This section outcome confirmed with AREA (2009) that Thailand's property market is concluded as "*the buyer market*", the customers had more bargaining power in order to choose the most appropriate property.

Category 15 : The Characteristics of Thailand real estate business

This industry could be generally explained that

On the other hand,

15.10   **15.9**

According to the results of interview, it was found that

Because of

15.2   **15.3**

However,

That portrays

15.1   Location risks

Then

Moreover,

15.8

15.4

'that means

15.6   **15.5**

Therefore

15.7   Lead to the further risks of

Lead to

Workforce availability

Innovative construction technique

'as well as

Innovative construction technique

Figure 7.4: The characteristics of Thailand's real estate business

According to the labour intensive characteristics of this industry, the results portrayed that the developers may not need any new innovation construction techniques and the present techniques are actually simple. They mostly build housing units conventionally because of these provided more flexibility in modifying or extending the designs, which also matched with the Thai customers' requirements (they usually need the modification of the housing appearances).

This finding supported the literature review and phase 1 findings that Thailand's property industry is generally affected by several kinds of risks and risks in this industry can be classified with the original sources of risks whether the internal factors (i.e. business risks, financial risks) or external factors (i.e. legal impact risks, community risks, political and economic risks). These risks may be unforeseen or non-controllable, and varied in accordance with the type, size of the projects and the other relevant factors during the real estate project development stages.

The interviews results revealed that risks in Thailand's real estate sector are not seriously complicated, but there are some unpredictable risks caused by the external factors such as the political and economic instable situations, which affected to both real estate developers and the customers, in terms of their confidences to develop new projects and purchasing new properties. These also exposed that most of this industry's risks are subjective, degree of risks consequences are varied in according to the developers' attitudes and managerial styles. For example, it is hard to assess the customer behaviours in regard to buy a housing unit, or the brand awareness towards the developers' reputation, even though these said factors importantly related to the project's income. The results also confirmed that Thailand's real estate risks could not be effectively measured by the statistical/mathematical techniques, but the experience of the project managers or decision makers are required to make a decision towards risks.

Despite the fact that risks in this industry are subjective and simply identifying, but the developers avoided or neglect to assess the seriousness of risks due to their personal/individual reasons (see section 7.5.4). For instance, risks in this industry are the new aspects, there were only a few research focused on these. Moreover, Thailand's real estate industry had the different contexts from the other industries, because of it becoming more speculative, and Thai speculators only concerned on their investment return, but neglect the impacts of other relevant risks. These findings conformed to the literature review and the first phase' results in regard to the lack of risk's awareness and formal risk assessment models in this industry.

7.5.3. Location risks

Location has a crucial impact on the real estate project, because it influences the project value and it is the decisive factor to select the place for doing business whether commercial, residential or industrials. Theoretically, the best location is defined as where the business suppliers and customers could be easily accessed, it provides proximity to goods services and amenities, good transportation to public nodes and networks and environmental preferences for urban conveniences (Keeping and Shiers, 2002, pp. 3).

Table 7.4 showing the related categories and concepts to the location impacts, there are four categories and fifteen concepts consisted in this mode.

Table 7.4: Summary of the Location factors

Mode	Location risks			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
7	Project location risks	7.1	land prices and location affect	6
		7.2	Land acquisition risks are also the important risks to be concerned while developing a project.	4
		7.3	Scarcity of land	4
		7.4	Location also affect to property rental market	1
8	Land prices risks	8.1	Land price is a non-controllable factor	7
		8.2	Prices of land affect to products prices (repeated with 7.1)	4
		8.3	Buying the land in the wrong time (late bought)	6
		8.4	The fluctuation of land prices affected to the developers' marketing and investment strategy	1
10	Poor location risk	10.1	Location is fixed, and a non-controllable factor	5
		10.2	The difficulty in accessing the project site.	2
		10.4	Infrastructure and utility	4
20	Risks caused by the ample land area	20.1	The need to expand in the future	9
		20.2	To expand project land area, the company must secure in the demand and customers potential.	3
		20.3	A huge number of project outlets	1
		20.4	The large size land area is suitable for residential projects.	2

The interviewees insisted that they prioritised the location as the most important factor to their real estate projects. Hence, this location factor could be coded and categorised into three major groups of:

- *Location wise*: this combines Category 7: Project location risks and Category 10: Poor location risks. This is the foremost discussion of this mode regarding to the importance of location to the real estate projects.

- *Prices of land*: this group contains Category 8: Land prices risks, this group also links with the location wise.

- *Size of land*: there is only Category 20: risks caused by the ample land area in this group. It describes the need of the developers to expand the project land area to suit with the demand/supply forecasting.

Thai developers linked the impact of location to the prices of land, therefore, these groups are simultaneously discussed in this section (see Figure 7.5).
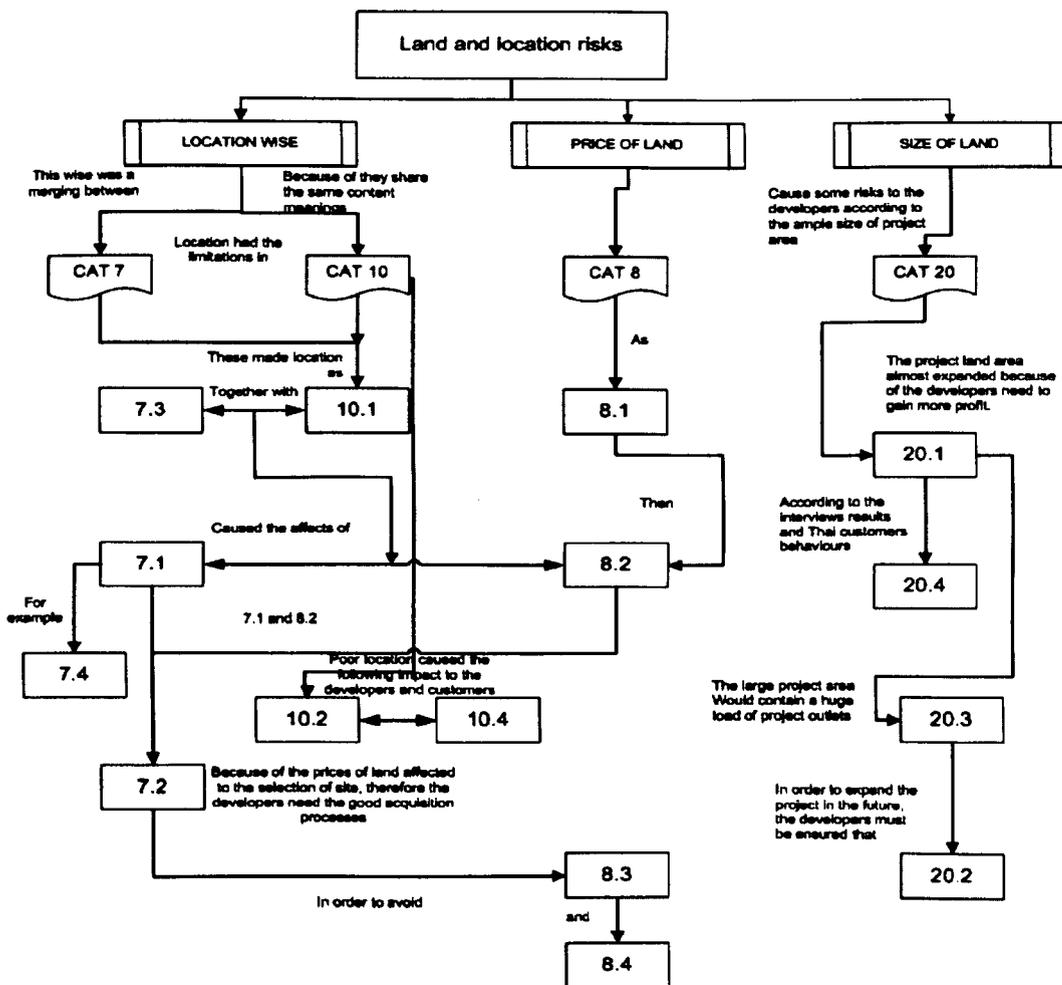
Figure 7.5: The relationship of location, prices of land and the size of land

The interview' results confirmed the literature's findings that land has the common characteristics that firstly, it is unmovable and affected directly by the surrounding environment, by any substances. Secondly, land parcel is scarce, because of raw lands still did not convert to be the urban, and the competitive speculation in the good location land pieces accelerated the land prices to be more non-reasonable expensive (The Economist, 2009). In Bangkok area, the scarcity of the good raw land caused some troubles in finding the best solution to develop the real estate projects (Armitage and Keogh, 1997). This circumstance affected to the project cash flow because of land prices in a good area are rapidly increased, one developer addressed that *"However, the obstruction to these strategies is a scarcity of land. It is difficult to find the site that matches to our criteria, because of the land prices in the similar area are increased dramatically that affected to the project's financial feasibility (LW)"*. The dearth of land conversely reflected the positive impact to the developers who had the project in the good location, because the customers willing to buy the properties with a reasonable price, as another developer stated that *"In addition, this project is located on the very busy commercial area (red-light district), the large parcel of vacant land was rarely find out, if it had, the prices would be extremely expensive. According to this scarcity of land, there is only us build the residential project in this area (SP)"*, these help him to finish his selling activities quicker.

The mentioned characteristics of location influenced the developers to select the appropriate land to ensure that their project located in the best location, then the project could be faster sold out. The poor location diminished the project's value, decelerated the selling speed as well as the developers must spend more cost to improve the physical conditions of land and the site infrastructure/utilities.

This location factor also influence the decision making process in term of products designs must be matched with the limitations of land attributions, land prices, and poor location (i.e. land in the remote area, lack infrastructures/utilities/accessibility, or situated in the flooding area). Despite the fact that land prices in poor location are cheap, but the developers must spend more cost in improving the access, the infrastructures/utilities and to promote the projects (Entrepreneur, 2010). Moreover the poor location would burden the marketing strategy, in term of the wrong purchasing of land would mismatch the customers' requirements of good location and project future expansion.

The price of land in a good location is always expensive, and these increase the land purchasing cost rapidly. If the developers bought land in the poor location, or high prices land piece in the expected location, these would affect to the project's feasibility and development cost. These led to the land acquisition's risks and the delay of schedule in negotiating and purchasing processes, the variation of

project ROI, and the project income stream. It highlighted that timing in purchasing a land is a key factor for the marketing plan/strategy, because of a late buying affected to the final products prices, project selling period and volume, including the project expense (i.e. advertisement and marketing cost).

It was argued that the higher land prices did not significantly affect the potential developers, if the site located in the good location, they would use their marketing strategy or any other efforts to sell the end products faster. POS stated that "*the land prices do not matter, because if we got the expensive land prices, we could also escalate our product prices, but the necessary thing is that that land parcel must be in a really good location, then our project could be sold out* (POS)". Moreover, these impacts yielded the rental property market, as the rental properties in a good location would receive the good rent, especially from the foreign lessees as "*The location strategy also influences the rental market, according to our findings that most of the foreigners usually staying in this area because this area is well-regenerated and full of facilities and amenities, closed to mass transit system. We also found that the rental and yield (of the condominium units) in this area are higher than the other Bangkok CBD nodes* (LW)".

Another related risk is the land size issue, as the developers foreseen the number of target customers and they want to expand their project area because of the larger project area is naturally suit with the upmarket customers. The results revealed that the large size of project area can cause the following risks. Firstly, the larger land forces the marketing team to sell the large number of property units in the time limit. Construction team has problems in stock managing as well as the difficulty to predict the certain demands of the customers, which included the construction monitoring and management processes. Secondly, there are more mandatory regulations related to the size of land, such as the land subdivision acts, which specified the ratio of the sellable area and the common area, the developers must strictly follow this rule that cost the developers to verify their land divisional correctness. Thirdly, the developers have to spend more on project infrastructures and utilities due to the large size of land.

Land and location risks were concluded as the critical risk affected to the property projects, in term of the location wise, prices and the size of land. The improper project site affects to the project marketing and financial feasibility, due to the project managers have to spend longer time in selling and managing the construction processes. To reduce these risks, the practitioners suggested that

timing to buy the land was the important key, followed by the proper negotiation methods, and the phasing strategies, these all helped in decreasing risks caused by the size of project area.

7.5.4. The perceptions of STEEP factors

Social risks

The phase one results informed that Thai developers prioritised the workforce unavailable risks more than the other social risks. In this phase, the interviews results classified the social risks into 2 categories, which are Category 19: Workforce unavailability and Category 25: Local impact; (concept 25.3: Conflicts with local community). The related categories and concepts are summarised in Table 7.5 and their relationships are illustrated in Figure 7.6.

Table 7.5: Summary of the STEEP factor (Social risks)

Mode	STEEP Factor: Social risks			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
19	Risks of workforces availability	19.1	Outsources contractors	11
		19.2	Do not build the products themselves	4
		19.3	Focus on the company strong points	1
		19.4	The company has its own designer teams.	3
		19.5	The contractors do not cause many problems to the company project manager.	4
		19.6	The quality of contractors/suppliers	7
		19.7	This risk is a beyond-controlled risk.	2
		19.8	The variety type of contractors: corporate or individual	Merged with 19.1
25	Local impact	25.3	Conflicts with local community	7

Workforce unavailability portrayed the major risk in this industry because of the developers usually hired the outsourced contractors to operate the building and finishing works due the labour intensive characteristics of this industry (see Chapter 7.5.2). The interviewees all stated that they had adequate number of skilled workers, but they needed to concern on their own competency and the organisational core business such as the marketing, selling and managing of the projects, as well as reduce the employment risks. Thus, they hired the specialists or the skilled contractors to carry out the specific trades (i.e. construction, HVAC system) then they can focus on their own business. Half of the interviewees (6 out of 13) who involved in the SME developers stated that they had some

difficulties to hire the in-house construction workers because of the fixed-cost of labours. If they employed their own construction workers, they have to pay more salary and welfare. Thus, they chose hiring the outsourcers to handle the construction works and/or other none-core business activities.

However, this risk was uncontrollable and there were some serious problems caused by the contractors, for example they could not control their workers/labours during the festive or harvesting seasons or they might not have any credit to buy materials or recruit more workers.

There was an argument about an appropriated source of the products' designers, most of them (10 out of 13) hired the outsourced designers as they judged that the outsource designers help in improving the quality of products, especially for the high value projects. They reduced the time in designing because these designers had experienced the high-end real estate project, these also help mitigating the schedule risks. Whereas two interviewees contrasted that they preferred hiring the in-house designers as it reduced the conflicts amongst the project participants (developers, contractors, customers) and decreased the time spend in design and approval. It could be concluded the selection of designers shall be regarded to the project size, schedule, value and expected quality of the real estate products.

Another social risk was the local impact aspect, this covered on community acceptability, community participations, and public liabilities. Theoretically, community aspect risks had the strong impact on the construction stage (Flyvbjerg et al., 2003). However, it seemed that Thai developers given less attention to this risk, only 2 interviewees insisted that they concern on the conflict between themselves and the local communities, since they believed that the newly developed housing projects would improve the local population's quality of life and the surrounding communities, increase the land prices in the area which provide more benefit to the local landowners.

Some participants contrasted that local community may not accept the new development because the community's interests would be diminished by the new project residents (i.e. accessibility, traffic jam), the construction process also interrupt their daily life in relation to pollutions. Moreover, the local community may protest the new project development if the project was built in the special or sensitive area such as national conservation area or reservation zone.

192
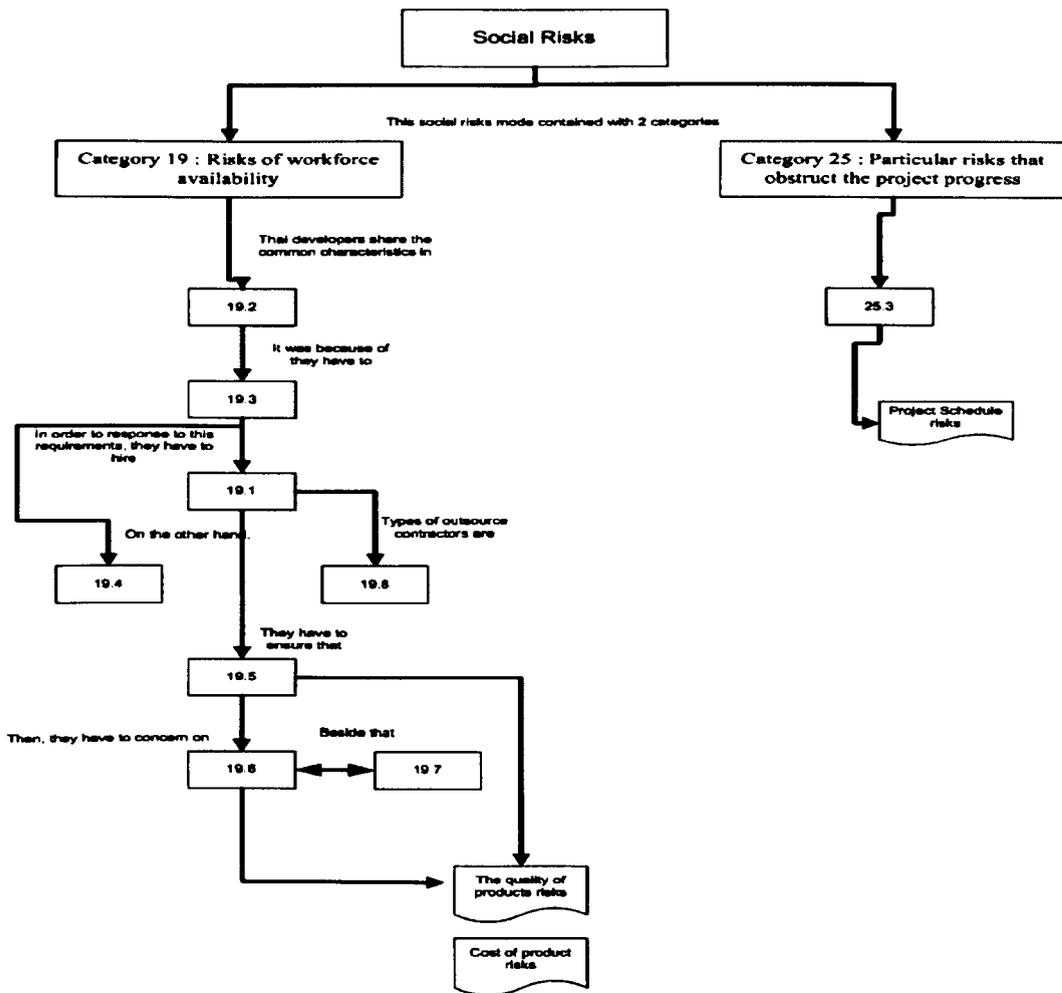
Figure 7.6: The relationship of social risks

It can be concluded that risks caused by the workforce unavailability portrayed the crucial consequences to Thai developers, these also affected the quality of products (Category 12) or cost of production (Category 3) risks. That means the outcomes of this qualitative phase confirmed with the first phase results that the workforces' unavailability was the first priority risk in this social risks mode. Meanwhile, Thai developers less prioritised the local community conflict risks because they considered these risks could be easily mitigated.

193

Technological risks

The first phase results informed that Thai practitioners addressed the high consequence of technological risks to their project progress, particularly the conflicts between project's participant aspects. Bowen et al., (2002) specified that the project managers shall consider extensively on time, cost and quality including the constructability of the project. Therefore, technological risks in this research covered only on the risks occurred during the construction stage. The second phase results split these risks into 5 considerations of time, cost, quality of products, constructability and property management (see Table 7.6) and their relationships in figure 7.7.

Time consideration

The time consideration reflected the high impact on the construction progress as it lead to the delay of construction schedule, the project life cycle and the completion of project (Smiths et al., 2006). Schedule risks are actually caused by many factor, for example, the delay of land acquisition/purchasing process and matter of project size influenced the following construction processes and the project selling period consequently.

The following factors, which are land acquisition process, the tight project schedule and the size of project all influenced to the construction progress in term of the project time may be distorted from the expected/planned, the delay of handover activities, these would then affect to the project income stream (V.T. Luu et al., 2008; Alkass et al., 1996).

The delay in the aforementioned processes affected directly to the following marketing/selling period as "*the longer duration would generally affect to the project cash income and cash-flow surely. The longer duration in construction means the less income received by selling* (PC)". The selling period affected to the project cash flow in regard to the longer time means the developers have to pay back more interest. To overcome this delay, the project managers shall consider on any constraints that block the selling period, and the marketing teams have to forecast the project selling volumes and expected returned incomes, then report the project manager to plot the appropriate project schedule. The project managers were suggested to divide their projects into a portions of sub-phases and try to finish each sub-phase before continued to other follow phases as PP suggested "*we divided this project into 2 phases, we almost sold the first phase out, and the land development progresses of land filling, infrastructure, utilities etc. are about 60-70% (PP)*" In order to handle the tighten schedule and to deal with the schedule delay, the project managers shall prepare the good construction practices, the materials delivery and storage plans. They must calculate the practical

194

products life cycle and production rate, cut off the non-productivity activities in order to minimise time. Moreover, the project progress checklists shall be strictly reported to the project managers, in order to compare the actual progress with the schedule to oversee any constraints in the projects.

The mentioned delay affected to the project plan, project budget and cost as well as it influenced the customers' confident to buy properties. The interviewees advised how the project manager dealing with these problems, in this regard, they shall inform the customers earlier about a delay in the construction stage, or clarify the actual completion date with the customers earlier in the pre-sale stage. As LW claimed "*This project was scheduled at 15 months, but the actual completion was 18 months. However, there was no affect to selling process or project cash-flow because of the marketing team has clarified the possible (actual) completion date with the customers at the pre-sale period, actually it was our normal practice to negotiate with the customers at the earlier stage in regard with this said delay* (LW)"

Cost consideration

The cost variations are normally found in the Thailand's real estate projects, these occur during the construction period and become a major cause of disruption, delay and disputes and generate significant cost impact (Akinsola, 1996). These were affected directly by the fluctuation and availability of construction materials prices (Mansfield et al., 1994) because of this industry has to import some necessary materials such as reinforcement steel bars (Khumpaisal et al., 2010), thus it could be predicted that the variation of construction materials prices pressurise the project managers in regard to the limitation of construction budget and the variation allowances. Another source of cost overrun was that the project manager neglect to monitor and frequently update the construction budget, they could not see the signs of cost overrun, then the actual progress mismatched with the planned.

In addition, the project construction cost may be varied by the size of project, gross building area, the quality of designs and construction materials. One developer stated "*if we discuss about the construction cost per m², the low rise building may spend less construction cost than the high rise building in terms of structuring works, these may be similar in term of architectural and finishing costs, but the high rise buildings may spend more cost on the mechanical & electrical (HVAC) system in accord to the requirements of the safety and security regulations* (NP)". To ease this risk, the project managers shall spare some construction budget as the allowance in the case that construction cost varied from the budget as well as frequently monitor the contractors' progress,

using the payment schedule to control the contractors, and prepared the contingency allowances (5-10% of overall construction budget or up to the situation).

Quality of products considerations

The quality of real estate products shall be a critical issue to the project success or failure as minor defects occurred during the construction process meant re-construction may be required and these increase costs and more time spending or even the personal injuries or accidents in the worst case Gilly et al. (1987). This quality consideration was indirectly affected from the quality of the workers as mentioned in the social risks discussion. However, according to the interview results, Thai practitioners only considered on the products quality because of these would impact on their public image if they could not produce and convey the good quality products to the customers.

Constructability considerations

The definition of constructability is *"a system for achieving optimum integration of construction knowledge and experience in planning, engineering, procurement and field operations in the building process and balancing the various project and environmental constraints to achieve overall objectives"* (CII, 2010). Therefore, if the project paused due to any disintegrated activities, this would cause risks to the project's progress, it also covers on risks occurred in the construction stage, design matters, and the communication and conflicts between project stakeholders.

This phase results insisted that Thai developers undertaken the constructability concepts and attempted to achieve these goals. However, there were some complications found during the construction stages as: Firstly, the construction stage is usually affected by the internal factor either financial risks (i.e. the lack of supportive funds) or the marketing risks (i.e. the forecast of selling volume) that obstructed the construction progress. The interviewees conversely perceived that the internal factors had less influence to the project progress due to these risks could be easily handled by the well-organised teams. Whereas the external factors such as the political turmoil or economic policies had more effect on the project progress because of they are actually uncontrollable and unpredictable. The consequences of current political situation affected to the customers potential or even postponed the plan to buy properties. These were highlighted as *"The external risks, caused by the current political turmoil becoming the most concern factors, because of these would affect directly to customers' confidence to buy a new property, some of our customers postponed plan to buy our products, some of them might panicking to the unforeseen chaos or riots. I just hope this situation would be somehow end* (BC)".

196

Another external factor was the contradictions between the local/government regulations and the project designs and planning schemes. There were some regulations (i.e. BMA land planning act, 2005) limited the building area such as FAR or OSR and these would not suit with the developers' requirements to maximise the gross building area, then to the project conceptual designs and detailed designs as the customers needed the best options (large units' area, better facility). The product designs must be amended to match with these regulations limitations, the constraints of location and land prices, then these also influenced the project's schedule and cost. (See also the political risk section)

Moreover, some developers preferred the sustainable or environmental design concept to promote their public images, attract the customers and reduce the energy consumptions. This was a novel concept in Thailand's real estate industry, some arguments had been raised that the key consideration of the sustainable design was a profitable or *"economy of scale"* of the developers. The developers, who select this concept shall have some competences whether the qualified designers and consultants, skilled workers or the supportive funds to support this concept effectively.

The developers may consider on hiring the qualified designers or consultants since these designers had the solid experiences to deal with the aforementioned obstacles. However, the developers have to concern on the availability of the designers/consultants (see social risks). The developers may hire in-house designers or specialists to co-ordinate the design matters as LW indicated that *"However, the company also employed some specialists as the in-house consultant in order to monitor and control the performances of the designers and consultants (LW)"*.

Furthermore, a procedure in selecting the designers may lead to the conflicts with the project suppliers or contractors, it was recommended that the detailed designs shall be modified to ease the contractors' site works. The designers may use the working or shop drawings as the communication tools between them and the contractors.

Table 7.6: Summary of the STEEP factor (Technological risks)

Mode	STEEP Factor : Technological risks				
Category			Concept		No. of Descriptions contained in this concept
No.	Name		No.	Name	
	Cost consideration				
3	Cost of production risks		3.1	the innovation construction techniques	8
			3.2	Construction cost variation	4
			3.3	Cost overrun	1
			3.4	Pressure from the limitation of construction budgets	1
	Time consideration				
5	Project life cycle (turnover risk)		5.1	Actually real estate always not finished on time and within budget	1
14	Project schedule risk		14.1	Selling period	3
			14.2	Long and tight schedule may cause risks	2
			14.3	Construction progress	6
			14.4	Land acquisition/ purchasing time also affect to the project schedule	1
22	Project completion risks		22.1	Project could not built on time	4
			22.2	The company use Just-in-time and make-to-order bases	3
	Quality of products consideration				
12	Quality of product risk		12.1	Quality management	7
			12.2	The project teams are ready to change their working system	1
			12.3	The project teams have the responsible in monitoring the product's quality	1
			12.4	Quality of the products is a major constraint to the project management scheme	2
	Constructability consideration				
25	Particular risks that obstruct the project progress		25.1	Internal risks	6
			25.2	External risks	6
28	Design risk		28.1	The limitation of Floor Area Ratio (FAR)	1
			28.2	The limitation of Open Space Ration (OSR)	1
			28.3	Detailed designs	6
			28.4	Outsources designers/consultants	1
			28.5	The designed concepts mismatch with the customers' requirements	2
	Property management consideration				
18	Property management consideration		18.1	Claimants are one of risks after project handover to customers.	1
			18.2	Some problems in the transferring of the property.	2
			18.3	Facility/property management	5
			18.4	Multifunctional or special purposed buildings	6
			18.5	The old or out of fashioned buildings	1
			18.6	Quality of the services	1
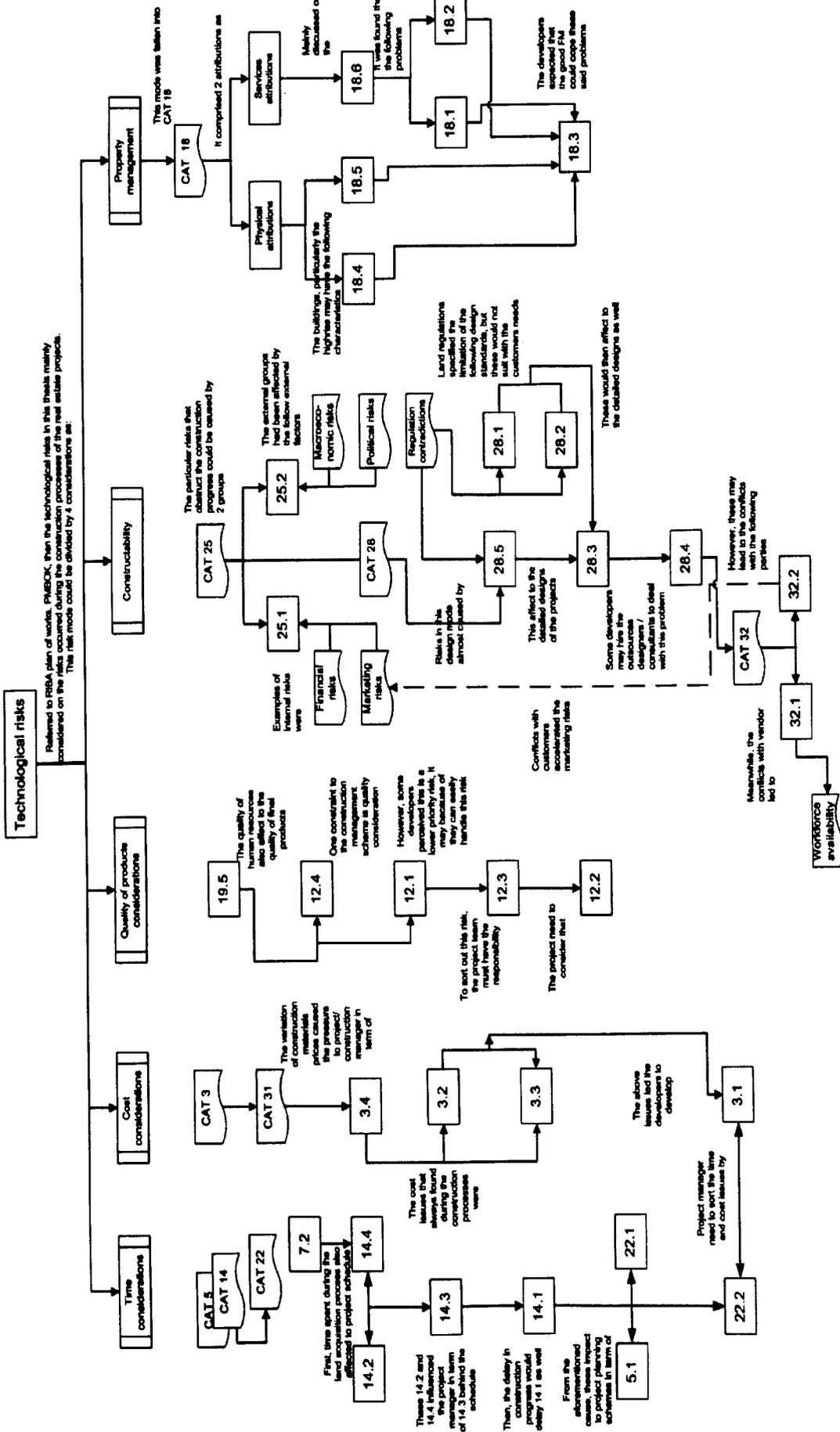
Figure 7.7: Technological risks and the related considerations.

199

The last constructability issue was the conflicts with the project's customers, this was a serious risk as it affected directly to the marketing strategy/plan of the project. These also relate to the design issues as the ended products may mismatch the customers' requirements, the project completion time, or other conflicts of interest between each party (Tidstrom, 2008), but the major cause of the conflicts was the miscommunication problem because it lead to the unclear expectation of both parties (Teambuilding Inc., 2010). This may cause the worse risks such as the company credit or image objection, or the fraudulences against the related laws. This finding also confirmed with the phase 1 result that highlighted the seriousness of the conflicts between the project participants (see Chapter 6.3).

Property management consideration

This consideration is related to the management of property after handover to customers. It was allocated in Category 18: Property management considerations, it was divided into the following attributions:

- *Physical attribution*, each property naturally deteriorated in its value by the building age, physical obsolescence, or by other depreciations (Baum, 1991). Some properties were built for the special purposes or to various requirements such as mixed used properties. According to these characteristics, there were some related problems towards the conflicts between the users in the common area because of the project customers always seek for the most privacy and security, otherwise there would be lot complaints to the services of management team. To handle with the building depreciation, the developers shall frequently redecorate or refurbish the buildings, concern on building's facade and fixtures maintenances and spare some allowances from the project budget for this matter. The developers may establish the specialty facility management team to deal with the maintenances and the quality of services (PS). The developers shall consider the size of project to design the facility and amenity as separately as possible. They shall set up the building management team by their specialty to serve each portion's customers properly.

- *Services attribution*, this mainly focused on the quality of property management services and the after sales services. The following problems always occurred after project hand-over to customers, firstly, the complaints about the developers' quality of product/services, these were the consequences of the conflicts between the customers with the project team (property management). Secondly, the customers and developers may confront by the problems during property transferring processes, due to some customers may not have

enough credit, so they could not loan or mortgage with the financial institutions. As mentioned by LW that *"there were some problems in regard to the transfer process for example, the prohibitive or non-credited customers. Then, the project has to absorb the said units (approximately 10% left) to sell to only affordable customers and we could top up the prices (LW)"*. This means the developers shall take some action to filter the non-qualified customers such as monitoring the customers' credit or spare some units to sell to the qualified customers. To manage these problems appropriately, the developers shall be equipped with the good property management practices, for example they shall inspect the property before handover to the customers, this helps in reducing complaints on the products' quality (PC).

According to the findings, Thai practitioners perceived that the good property management practices help them ease the physical and services attributions problems. The developers shall prioritise and specify the customers' requirements and set up the appropriate services strategies, these involve in maintaining the project's facility and amenity areas before hand-in the project to the property managers (University of Lethbridge, 2010). Foremost target in this property management consideration is the facility and amenities areas must be specially concerned because of the residents always seek for their own superior and privacy. The project managers shall seek for the better method such as hiring the famous property management agencies, then the cost in property management also became the considerable issue (Kishk et al., 2005), because of the maintenances cost would be varied by the gross building area, and this would cost the customers burden in paying more the common maintenance fee, but less enjoy the quality of amenities, these also led to the critical marketing risks (project promotional issues).

The results derived by both research approaches informed that Thai practitioners given more precedence to technological risks even though they are mostly controllable. The aforementioned five considerations were addressed by them during the construction stage. It could be concluded that Technological risks were complex and also critically reacted to the following activities in the projects. For example, the constructability consideration would affect to the future financial risks, or the participants' conflicts will influence to the marketing risks.

Environmental risks

Actually, there was no specific category for environmental risks in this coding structure, these risks were formed as the concepts inside the following categories; 1) Category 23: Land regulation/policy contradiction, in relation to the Environmental Impact Assessment (EIA) approval and 2) Category 10: Poor location risks, that included the condition of the construction site and the impacts on the project managers' project site selection. The related concepts and categories are tabulated in Table 7.7 below.

Table 7.7: Summary of the STEEP factor (Environmental risks)

Mode	STEEP Factor: Environmental risks			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
23	Land regulation/policy contradiction	23.6	Environmental Impact Assessment approval	4
10	Poor location	10.3	Site environmental aspects are necessary to be checked before construction commence (Site condition)	4

Thai developers underpinned that delay of EIA approval have the crucial consequences to their project progress. The more time spend in this regard equals to the increment of interest that they have to repay the banks, this delay affect to their marketing and selling time as well. However, Thailand EIA approval has covered only on the large scale projects (i.e. more than 500 for land sub-divisional projects, or more than 80 units for the condominium projects), it was not necessary for the small scale projects to acquire the EIA approval. There were some developers reckoned these gap and sought some tips to avoid the delay in EIA approving, but these also lead to the higher risks in regard to violate the environmental regulations.

The condition of site became another serious issue, some interviewees stated that the project site must be thoroughly inspected before the construction commenced in order to ensure that the project could be built, and the customers achieve the best standards of living. They shall check all related regulations, the conditions of soils, the distances to contaminated area. In this regard, the inspection shall include with the possibility flood in the rainy seasons, this is a main criterion to select a land parcel for the further development, they had to certify that the site had less flood probability or equipped with the proper drainage systems (i.e. ditches, dams). Otherwise, they had to pay more cost to build the flood protections, which cost more development budget.

According to the results from both phases, it was cleared that Thai developers given attentions to the environmental risks, but mostly considered on the delay caused by EIA approval, they also considered on the conditions of site before development, but these risks did not have the high influence comparing with the other STEEP risks.

Economic risks

The literature reviews and first phase results informed that Thai practitioners perceived the highest criticality of economic risks to their projects. The qualitative analyses were conducted to investigate these findings, and these risks had been classified into three groups of macroeconomic risks, marketing risks and financial & monetary risks, respectively.

Macroeconomic risks

These risks were not emphasised in the first phase, as it was only one criterion discussed about the variation of construction materials prices. However, this phase revealed that there are several macroeconomic risks existed in this industry and these portrayed high impact on Thailand's real estate projects.

Table 7.8: Summary of the Macroeconomic risks

Mode	STEEP factor : Economic Risks (Macroeconomic)			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
29	Economic risks	29.1	Economic situation change	5
		29.2	Regional or global economic crisis	5
		29.3	The viscosity of the financial market	2
30	The increment of fuel price	This	Category had been merged with Category 31	1
31	The variation of construction materials price	2.2	The risk assessment plan to suit with the variation of construction materials prices	4
		31.2	The variation of reinforcement steel prices.	3
		31.3	This is a beyond-controlled risk	3

The macroeconomic risks are naturally beyond-controlled risks as they are caused by the instable political situation or by the global economic crisis. For example, the global economic crisis in 1997 was ignited by the collapse of Thailand's real estate industry, which caused severe damage throughout the world's economic system (Warr, 2000). Thus, it could be presumed that the economic crises had the strong impact on the overall economic system and the real estate industry,

especially for the projects which aimed to serve the foreigners or leisure projects. One developer insisted that the global economic crisis had the severe influence to his project because of the customers postponed the plan to visit Thailand. He also gave an example of the currency exchange rate fluctuation as when Baht is stronger and re-valued, its price may remain unchanged domestically. His foreign customers has to spend more money to buy the same services, that also forced his overseas agents to subsequently increase all services prices, then his customers may suspend the plan to visit or buy properties in Thailand. Vice versa, the devaluation of Thai Baht encourages the foreigners to invest in Thailand. He stated that the current global economic crisis has encouraged more Westerners or British investors to co-investment with him (PS).

The mentioned crises rapidly caused a change in overall national economic situation, and consequently affected to Thailand's real estate sector. Especially in the present time, the instable political situation and the variation of inflation intensely influenced to the customers' potential and affordability to buy the new property. These make the customers panicked and stop spending money (Trading Economic, 2010), or buying the new property, but waiting for the better condition.

The vacillated economic situation also distresses the financial market, in term of the illiquidity of money in the economic system. The financial institutions (FI) reluctant to lend the money to the developers because of they have less confident on the developers' repayable capacities. FI would try to pressure the developers to repay back the debts. These would led to the increment of construction materials prices, as the developers have to spend more on the construction materials, but they do not have adequate cash in hand as FI did not lend them. Thai practitioners decisively concern on this risk, particularly the fluctuation of the reinforcement steels, because these are necessary for every real estate projects.

According to the interview's results, a series of macroeconomic risks had the serious impacts on this industry. These risks caused by several external factors whether the volatile economic situation, the global or regional economic crises or the illiquidity of financial market, but they are all unpredictable. The macroeconomic risk will affect strongly to the future Thailand's real estate sector due to the current instable political and global economic calamities. The developers shall monitor the consequences of these risks and prepare the management/contingency plan to respond to these impacts.
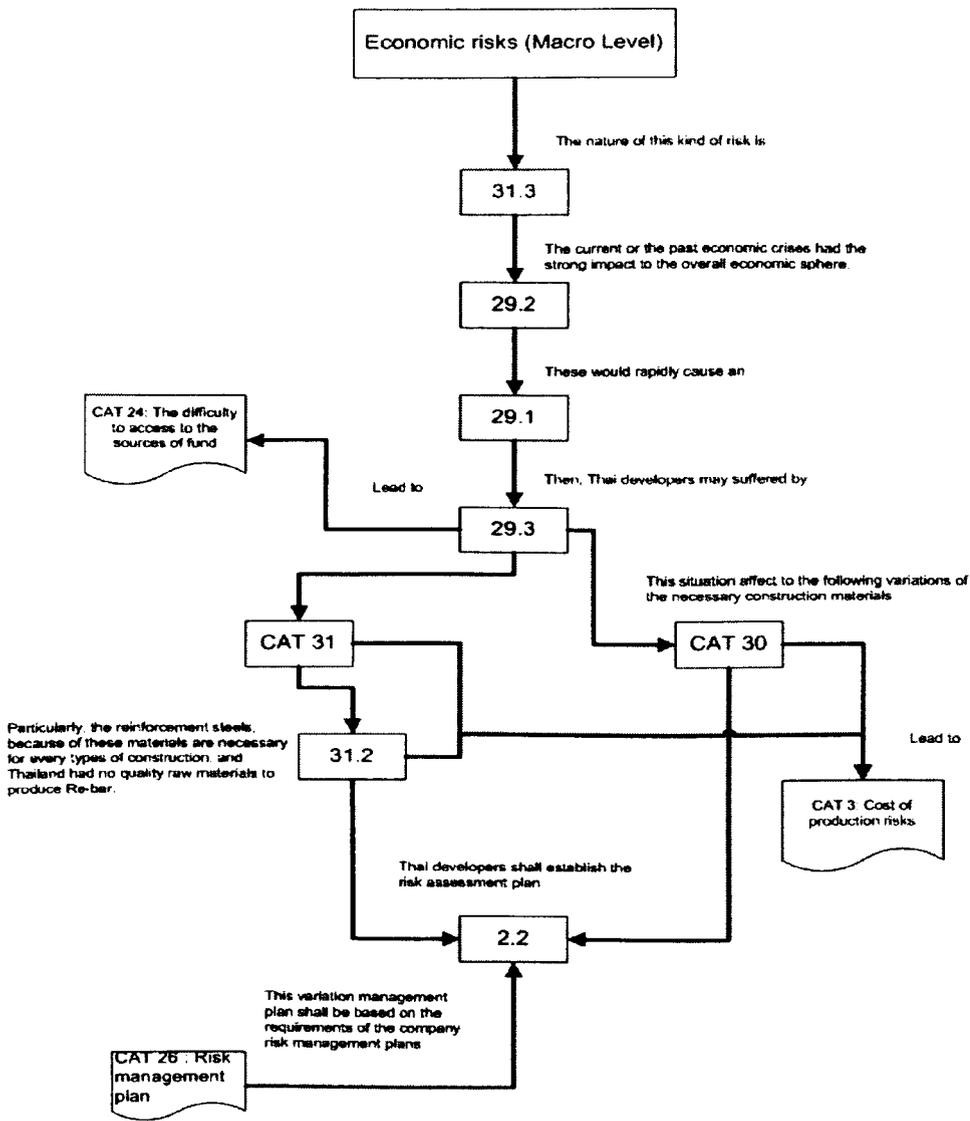
Figure7.8 : Macroeconomic risks and the related considerations

Financial/monetary risks

This section underpinned the results of first phase that the financial/monetary risks had the serious impact on this industry. These risks were clustered into three categories as Category 4: Financial investment risks; Category 21: Risks caused by the large project value; and Category 24: Risks caused by the difficulties in seeking for supportive fund and sources (see Table 7.9), and Figure 7.9, respectively.

Table 7.9: Summary of the Financial and monetary risks

Mode	STEEP factor : Economic Risks (Financial and monetary risks)			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
4	Financial Investment risks	4.1	Initial rate of return (IRR) expectation	4
		4.2	Return on investment (ROI) expectation	4
	(refer to Concept 1.1)	4.3	Net profit or Net Present Value (NPV) is one of financial indicator	2
		4.4	The contingency plan is a part of proper risk management plan	2
21	Risks caused by the large project values	21.1	Higher values project may contained a variety of unit types of units or the mixed-used	2
		21.2	The high value project may only suitable for the high class customers.	2
24	Difficulty in finding the supportive fund and sources of funding risk	24.1	The company bond is a major source of fund of this project.	3
		24.2	Real estate projects could be fund by various sources such as equity, loan or down payment	6
		24.3	Pressure from financial institutions	9
		24.4	Pressure from loan and mortgaging market	5
		24.5	Change in the payment condition would affect to the project cash-flow	Merged with 24.3
		24.6	Overseas loan is one financial supportive sources of the real estate project.	4
		24.7	Fluctuation of interest rates	2
		24.8	The large sum of money required while the developers invested in real estate projects	Merged with 24.3

With references to Concept 1.1, Thai practitioners used the following indicators to measure the financial risks and the project financial feasibility (see details in Chapter 3.4.2 and the factor analysis of economic risk)

- *The Internal rate of return (IRR)*: The developers acknowledged this IRR and use it to measure the performance of their investment and to support the decision making towards projects' feasibility. They extensively concerned on the IRR's variation, because this could affect the project cash-flow and the overall project construction cost, which lead to the success or failure of the project, as well as the following marketing activities. Thai developers always make the decision based on this IRR functions, they will terminate the project plan, or reassumed and modify the project cash-flow to conform to the current real estate market situation and their expectations.

- *Return on investment (ROI):* Four interviewees insisted that this ROI and IRR expectation could be distorted or varied from the expectations due to the impacts of external and internal factors, such as the final products' prices, the expected selling rates or the amount of project investment budget. One interviewee gave his example that *"Notwithstanding that the project sold out, however, we gained the non-satisfied expected rate or return, because of the longer time spent in selling the fourth building, because of we discounted our prices as my CEO informed you* (PT)". However, they perceived that the factor influenced ROI and IRR ratio is a price of land to construct project. They insisted that the higher land purchasing cost meant the lower revenue that lead to the lower ROI and IRR after the EBITDA calculations. Another interviewee emphasised this statement as *"If the developers had the wrong decision in buying the land on time and on the expected prices, that would affected to the project cash-flow, income and cost as a whole* (POS)".

- *Net present value (NPV) or net profit:* The DCF analysis and the NPV prediction are popularly used by Thai developers to forecast the higher NPV value while investing in the property projects. POS indicated that *"Anyway, the key to success of our project is Net present value or net profit, if these values of any project indicated high value, that mean that project is success* (POS)". This NPV must be collaborated with the other influence factor which was "the discount rate", or the rate generally derived by various sources such as the loan interest rate of the major banks, bond rate. To calculate the DCF effectively, the practitioners suggested that the discount rate shall be derived by the assumptions or the reliable information examined by themselves. The project cash-flow shall be updated to match with the business situation, in order to notify the developer about the drawbacks in the project's financial activities.

To sum up, the financial risks are caused by the project financial performance did not meet the developers' expectations. The aforementioned financial ratios help the developers to finalise their decisions towards investment in real estate projects and to forecast the financial risks. These values could be derived by the financial feasibility analysis, the realistic assumptions and the reliable DCF analysis. Moreover, the financial feasibility report is also used as the developers' guarantors to submit for loan issuing from the financial institutions. FI actually refer to all assumptions in this report and modify them as the condition to lend the initial funds to developers and used as loan repayment conditions (included interest rate).

Economic risks
(Financial/ monetary risks)

CAT 4

With reference to the usage of Financial ratio as Risk assessment tool

1.1

It was found the developers applied these ratio as the indication to measure financial risks. In the case of the following

Were less than expected, which mean the project is suffered from financial risks

4.1   4.2   4.3

These help the decision makers to acknowledge the financial risks

4.4

Thus, this required a large sum of money by various sources

CAT 21

One characteristic of real estate is that

24.8

The real estate projects, by nature are the high value projects, because of they

21.1

These may be suitable for some purposes or some customers class only

21.2

These lead to

Marketing risks

In term of market positioning and the affordability of customers

The difficulty in seeking for supportive fund

CAT 24

It was found that the developers could be supported by various sources as follows

24.2

24.1

24.6

The fluctuation of interest rate is an example of the pressure from FI

24.3

24.7

The project customers had been directly affected by the pressure from FI in term of mortgage

24.4

Macroeconomic risks

Figure 7.9: The Financial/monetary risks and the impact to real estate projects

Category 21 examined risks of the higher-value projects, these risks influenced the developers to seek for the large sum of investment money from various sources that lead to the difficulties in seeking for the supportive funds. A real estate project may contain a mixture of unit types (mixed-used properties), then it needs longer marketing/selling and property management time. Therefore, the developers shall understand the customers' requirements to specify the most suitable products types/services to meet the customers' requirements.

The results indicated that the large projects regularly suffered from this risk, because of the developers have to spend more resources and time in selling and approving from authorities. In this regard, Thai developers also set up the plan to mitigate risks such as using the phasing strategy, this also used to reduce the pressure from the financial institutions as the developers could negotiate the condition of loan repayment, interests and agreements with banks on the phase basis.

Another serious risk is the difficulty in seeking for the supportive funds, all interviewees unanimously agreed that this risk usually occurred in every project and significantly affected to the project vitality. Category 24 denoted the impacts of this risk and its mitigated solutions. Thailand's real estate projects commonly contained the high value properties (land and buildings), then the developers require a large sum of money for purchasing land, and developing the projects. Therefore, they have to assemble the working capitals from various sources, whether their own equity, debts or other ways. The results shown that the developer could gather funds from the following sources:

- *The company bonds*: This is especially suit for the large size developers or the Public Company Limited (PCL) or SET companies. 6 interviewee from large size firms stated that the company bonds, or stock exchange are the good way to gather funds to support their project development cost as "*Our major source of fund is our bond, we could issue our own bonds and sell in the Stock market, due to we have the acceptable potential to issue bond (SEC regulation)* (BC)". However, they have to qualify SET assessments and must pay the shareholders' dividends.

- *Overseas loan*: Only one interviewee used this to accumulate funds from foreign shareholders, and distribute risks in case that he was objected from Thai banks. However, this method is risky as it is influenced by the fluctuation of currency exchange rate (PS).

- *Down payment*: Down payment (or the deposit for reserving the properties), it is an important source of project income, and use as an indicator to monitor the project selling volume as "*The sources of funding could be categorised as firstly equity, secondly...and thirdly down payment. We had received around 10% of down payment from the customers, and used this amount as the project income as well* (LW)".

- *Miscellaneous sources of income*: Thai developers can gather the supportive funds from other sources such as the joint/ventures or the parent companies if they were the small/medium size companies as "*We have sought for the funding sources from Singapore partner, which had the better economic and political situation than Thailand* (SP)". They also used the working capitals remained from the previous projects as the backup funds for the construction budget (IB). For the special property such as sport complex, the developers gain income from the membership fee and rental of the retailed shops (NM).

However, the above sources of funds are used in some particular situations only, most of Thai developers usually loan from the financial institutions (FI) in order to run their project "*It is mandatory that if the project needs to obtain funds from the financial institutions, we have to*

209

conduct the feasibility analysis to show our promptness to develop the land parcel to be a housing project and generate income (PW)". As a result, they also suffered the FI pressures because of FI needs as much interest and shortest repayment time from their loan. Interest is concluded as one key factor to the developers when seeking for supportive funds, it is a tool of FI to enforce the developers to show their promptness to complete the project on time and it is varied in according to the current economic situation (see macroeconomic risks section).

The interest pressure shall be higher when the economic and political situation is becoming oscillated. FI tries to reclaim and guarantee their debts by enforcing the developers to have the appreciate down- payment income or selling volume as *"Since we have to loan some funds from the banks, the loan condition defined that we must have the 30% of selling volume, then the bank can lend us money* (PT)". FI may modify the repayment condition, and this would apparently affect to the developers' cash-flow (Investopedia, 2010). These constraints have the serious impact to the new-faced or SME developers since their credits are not well recognised as *"Moreover, for the new face developers, it would be more difficult to seek for the loan from the financial institutions. If they do not have a good credit report, banks would reluctant to lend any loan to them* (PS)". In addition, those developers may not have the good practices to control the construction works to complete on time and budget, more time spent in construction/acquisition process influence the condition of FI loan/interest. One developer stated he suffered from the fluctuation of loan in the mortgaging market, then he emphasised that the most important cost (criteria) to include in any risk assessment model is *"the financial cost"* (TT), as the SME developers extremely need a supportive fund from FI, they have to consider on impact of the interest rate and condition of loan.

The real estate customers also influenced by the FI loan and mortgaging conditions, because of they actually mortgage the properties with the FI (see figure 7.10). If FI increased the interest mortgaging rate as a result of economic situation changed, they would burden from this increment. The customers may less their capability to pay an instalment or breach the payment conditions, this was confirmed by IB as *"risks caused by the increment of interest rate. These problems reflected to the customers' potential to buy new properties, due to the decrement in their affordability and loan pay ability* (IB)". This occurrence is similar to the sub-prime crisis in USA (GHB, 2008), the customers had less affordability to buy new properties, therefore they have to mortgage with any FI, but they did not have the ability to repay the loan since they had been affected by the global economic downturn.
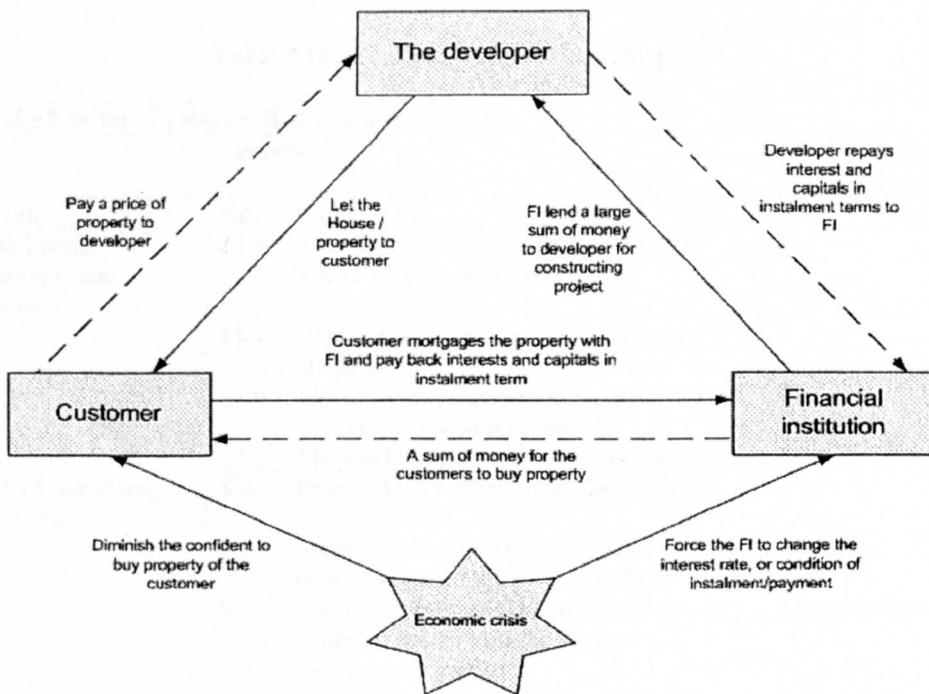
Figure 7.10: The relationship between customer, real estate developer and financial institutions

This financial/monetary risk was included in a series of the major risk that affected to Thailand's real estate industry, the highest impact risk is the difficulty to find the supportive funds. It has more serious impact if the interest rate varied according to the instability of overall economic system. This risk was addressed in the assessment criteria that equipped with the risk assessment model derived in Phase 1 (see Table 6.48).

Marketing risks

The EFA results in Phase 1 indicated that Thai developers paid attentions to the marketing risks, particular the wrong estimate of demand and supply of the properties in the trade area. The examination of marketing risks was then conducted to support these results. Marketing risks were divided into four categories, which are Category 6: Risks of customers' requirements, this would be merged with Category 11: Marketing risks, Category 9: The product prices risks and Category 13: The company's reputation.

After analysed the marketing risks in the Thailand's property industry thoroughly, the marketing risks were formed in five stances as: the marketing management and administrative, 4 P of marketing mix, competitors, customer behaviours and the developers brand awareness, respectively.

211

Table 7.10: Summary of the Marketing risks

Mode	STEEP factor : Economic Risks (Marketing risks)			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
11	Marketing management stances	11.4	The tight marketing schedule is one source of marketing risks	1
		11.7	Over-supplies situation in real estate business	3
		11.9	The market segmentation is considered as a source of marketing risks	8
		11.1	The marketing plan/strategy management	14
9	4 P of marketing mix stance	8.2	Prices of land affect to products prices	2
		9.2	Some developers are specialist in developing the high prices products.	2
		9.3	The developers may be pressured by financial institutions during the development stages	Merged with 24.3
		11.2	promotional and advertisement of products are the sub-factors of this risk	6
	Competitors stance	11.5	The competitors in the similar trade area	12
	Customers behaviours stance	11.3	The number of customers less than expected.	5
		11.8	Customers' criteria to select/buy properties	8
		12.4	Quality of the products is a major constraint to the project management scheme	2
	Developers' brand awareness	13.1	Company brand	2
		13.2	Company credit in the completion of project	2
		13.3	The perceptions of customers towards the company's image	7
		13.4	The company may launch the policies, motto to enhance their ethnic	3

Marketing management and administrative stance

According to the interview results, the management of the project marketing plans/strategies is the critical issue amongst the marketing aspects. The natures of marketing risks were given by ten interviewees that marketing risks are difficultly predicted, particularly in the instable economic/political situation, these are actually the subjective issues, and hard to measure, that confirmed with Cook and Page, (1987), these may cause by the wrong estimation of demand and supply of the similar properties type in the trade area or the marketing teams have inadequate information of the customers' behaviours and affordability (Stone and Gronhaug, 1993). Moreover, the current marketing studies rarely provide the exact figures or exact numbers, these made the project managers confront with the risky market situation, these supported by one developer as

212

"Things that we could do for the marketing feasibility were only competitors analysis, demand and supply, including the products absorption rate, but these have never provided us the exact numbers (IB)".

The marketing risk also caused by the improper marketing plans/strategies, these depressed the customers to buy the properties as "*I think marketing risks have the strongest impact, these would be caused by ill-prepared, carelessly marketing study or misestimate of the real supply/demand of the customers. .... Otherwise, our products would sell to the wrong targets, and that may be more difficult to sell* (PC)".

Another source of marketing risks was the tight marketing schedule, as LW stated that his marketing team was constrained by the tight absorption rate of units selling, his project had a limited time of selling, and his project was delayed by the designs' modifications. The mismatched of marketing positioning/segmentation must be considered as a source of marketing risks (Schewe and Hiam, 1998). Market positioning and segmentation are the fundamental concern in setting up the marketing plan, these help the project managers identifying the product type, styles, price and how to deliver these to the target customers (QuickMBA, 2010). The wrong positioning obstructs the further project development stage, for instant, the market positioning and segmentation can be affected by the location of trade area and the competitive condition of the trade area.

IB gave his project as an example of wrong market positioning, his project was failed when launched into the market. It was designed as detached houses to serve the middle to high class customers, but he had to redesign these to be townhouses to serve the lower class instead. Due to his customers had been affected by the instability of Thailand economic and political situation, and this project's prices were unaffordable.

The interviewees suggested some useful procedures to handle the marketing risks, as the appropriate marketing strategy help the developers to specify the reasonable product price, target customers, and appropriate selling time. However, the completed and thoroughly marketing studies must be conducted by the marketing team prior the developers establish the marketing strategy/plan, particularly the demand and supply of properties as SP claimed "*we had forecasted the demand & supply clearly. We found that there was a need of the residential units in that Core Commercial area, that was our certain demand* (SP)".

213

4 P' (marketing mix) stance

With reference to the marketing mixes theory (McCarthy, 1984), the 4 P' comprised product, price, place, and promotion. However, the impacts of prices and promotion would be only investigated in this section, due to the place and product mixture had been already discussed in the past chapter (see Technological risk).

As earlier discussed in the location issues, location and land's price affect to the product price directly, if the project located in a good site, the land prices would be expensive eventually. For example, AREA (2008) surveyed the land prices in Bangkok CBD, these were ranged between 120,000 to 1,000,000 Baht/4 m^2, whilst the prices of residential condominium per m^2 were approximately 70,000 – 200,000 Baht. The land buying cost is accrued in the project development cost then the prices of final products are influenced by the construction cost and margin. The expensive unit prices constrain the selling volume and promoting activities of the project, as LW stated that if the price of land increased, the developer had to increase the selling price, but this also affect to selling rate of the project and the customers' affordability.

The higher product's price affected to the customers in terms of seeking for the affordable properties and they may switch to the other competitors, the price on the other hand filtered the class and capacities of the customers as "*it also positions the class of customers to us, as we emphasise on quality, therefore, our customers type was scoped down to the middle-high class of customers* (PW)". To comfort these obstacles, the developers shall focus on their marketing segmentation and positioning in the trade area and then conducted the proper marketing research that enables the assessment of the customers' affordability, as this helps in set up the reasonable price of products.

The issues of promoting and advertising the projects became another constraint. Although the real estate projects are actually promoted by its location, designs and the functions, but the existent of projects may not be communicated or advertised to the target customers properly, PC mentioned that "*but in the real case, there were only 15 visitors and we could get only 1 or no reservation this week. These alarmed us to continuously monitor and recheck our marketing and business plans, it may because of we could not communicate to our target customers* (PC)". The project promotional plans are almost pressured by the extreme company's campaign, the marketing teams have to sell the products with all efforts and those would increase the marketing risks as PT stated as "*We did not struck ourselves with any extreme marketing campaigns such as "100% completed to move in, or the fastest developers in Thailand's real estate industry. This would help us reduce our marketing*

risks, in the case that we committed to complete a unit of house with the customer, but we cannot finish in the contractual time, we therefore have to pay damage to that customer, and we also lost our credits (PT)". In order to promote the project effectively, the conventional method such as mouth-to-mouth is a fruitful technique because it is an opinion from one customer to another and it spend less promotional cost. The developers shall maintain the marketing/promotional cost in the appropriate ratio in order to prevent any cost impact on the project cash-flow. Moreover, the transparency in conducting the business helps the developers to publicise themselves. For example, the developers may issue the new policy that enables the customers to inspect the property before transferred, this helps in communicating with the customers as the developers also receive the actual requirements from the customers directly (PW).

The findings revealed that products' price and the promotional attractiveness influence the customers' decision making to buy properties. The developers shall utilise the marketing research to help in setting up the reasonable prices and marketing campaigns that suit with the customers' affordability and requirements.

Competitors' stance

The competitors' actions and their impacts on the developers marketing plans became an important issue in the marketing risks. The five forces analysis (Porter, 2008) was adapt to classify the types of competitors for the real estate projects. The interviewees informed that the strong potential competitors judged by the developers are: firstly, the competitors who developed the similar type of products in the same trade area (the direct competitor), these pressurised the project manager in making decision towards marketing/selling. Secondly, the indirect competitors, which were categorised as the substituted products, for example the housing developers confronted with the indirect competitors such as the rental properties or second-hand houses, because their customers may consider buying the cheaper options. The second hand houses are currently shielded from the Thailand's government transferred tax policy as POS given *"Yes, the second hand houses were counted as the indirect competitor in my opinion. Since, the second hand houses are the choice of some customers who do not have the affordability... They might consider the cheaper option such as second-hand house or rental or condominiums* (POS)". Thirdly, the developers faced with the competition from their affiliated companies, who developed the similar kind of properties, the project managers and the marketing team shall work harder to distinguish their projects from the partners. For example, the project managers shall position his project in the different market segmentation from the partners or focus on their products' prices and quality (PW).

215

Both types of competitors strongly influence to the developers marketing plans because of they provided the better alternatives, and then the customers will select the best options as they had more bargaining power ("buyer market" situation). Thus, the developers shall not underrate any competitors because of each competitor has its own potential to attract the customers.

The competitive environment lead to the customer's selection of the best alternative, if they find the best options from any competitor, they would intentionally buy these. Porter (2008) supported that the increment of competitions enforcing businesses to pay much more attention to satisfying customers, as these will be extensively discussed in the customers' behaviours stances later.

Customers' behaviours stances

Customers are the most important thing in the modern business, because of they are the largest source of project's revenue, and their money will generate the developers' working capital and income (Lake, 2010). The developers must prioritise the customer's behaviours and satisfactions as the non-negligible factors.

Some Thai developers faced that their customers' rate were less than expected, it was caused by the current economic and political situation, or by the inaccurate estimation of demand and supply (see Marketing management). Thus, the developers shall clarify the target or potential customers before the project committed in order to forecast the real demand precisely, they shall utilise information from the market study to conduct the sale projection (using the real demand of the customers against the project schedule). However, it is still hard to predict the certain demand of the customers because of they have more options based on their satisfaction in the property's conveniences and location, they use their satisfactions as the criteria to buy new properties.

As mentioned above, the customers stand on their requirements to make a decision to buy properties. It could be concluded that they need the best options that they can afford as the real estate products are the life-time investment, they spend longer time in making the decisions to invest a large sum of money, or postpone the purchasing until they are ready. Then, the customer confident is a key factor to make a decision and set up their standards to buy new properties.

The findings also revealed that Thai customers prioritise the location and quality of products in regard to buy properties as IB stated that his customers decide to buy his products because of the quality or PW claimed that the quality of products became his major constraint in developing

216

housing projects. The potential customers not select the properties by the prices only, but also concern on the quality of life as PW indicated that *"The criteria of selecting the suitable property of customer may be a mixture of 1. Location, 2. Products and the satisfaction towards products (aesthetic, functional) and, 3. Reasonable prices. These 3 factors will be used by the customers to compare the products* (PW)". It could be interpreted that if the property located in a good location, and the prices were reasonably, the project was sold out accordingly. Apart from these concerns, the customers additionally use their lifestyles such as the customers' privacy, security or distance to their working places a key to select property.

Some of Thai customers hired contractors to build their own house, but they have to suffer from risks in controlling budget, time, quality, and the surrounding environment were worse than expected. They switched to buy the ready-made houses instead, because they could foresee the surrounding environment and satisfied in the products' quality before making decision, this is conformed with PW statement that *"Our projects and policy guarantee the good quality of life for our customers, then the customers who aimed to build 5-20 million baht houses had switched to buy our project instead of building the houses themselves* (PW)". In this regard, the developers' brand became the other issue in the customers' selection of property (see next section).

To recap, Thai customers established criteria to select the properties in accordance with their real requirements. The criteria comprised the quality of products, the reasonable prices, the good location and good surrounding environment. These criteria shall be addressed by the developers in order to develop their project to suit with the customers' demands.

The developers' brand awareness stance

The developers' brand awareness is defined as the extent to which a product is perceived by potential and existing customers either positively or negatively. It is the primary goal of advertising at the beginning of any product's life cycle in target markets and this influenced the customers' behaviours to buy products (Macdonald and Sharp, 2000). By this definition, it is construed that the customers' perceptions of the developers' brand or reputation were the customers' criteria to buy property and became the keys to the marketing success. PW claimed that the developers with the good brand awareness would take advantage in the instable circumstance as *"Thus, this indeed demand still boosting the real estate market..., but I think if we focus on the whole real estate market, the developers with a famous brand would get more selling volume, while the overall market drop*

(PW)". These advantages encouraged Thai developers to build their brand's awareness and communicate these to the public.

The developers' brand needs a long time to build and communicate to the customers. For example, the company's brand can be built by the developers' sincerity to provide more options to the customers or never conduct any fraudulence. Then, they can simply solve the conflicts with the customers and build their reputations. The developers' reputation can be additionally built by their obedience to the construction or related regulations. Furthermore, the developers can issue the organisation policies to uplift their business reputations to the market, especially the policies that concern on to the customers' quality of life as PW stated *"because of brand awareness affected to the customers with high potential, they have more options and they would preferred the developers who could guarantee their quality of life* (PW)". For instant, the customers need to see the progress of the purchased units, thus the developers shall consider that and issue the customers progress follow up policy such as an internet progress report (LW).

These policies pointed the good practices to the project management team (operational lines) to implement onsite. These shall be set up in accordance with the company's ethnics and the customers' requirements, the developers shall remind that the marketing or organisational policies could whether boost or rupture the company's public image. Therefore, the developers indeed need the thorough and thoughtful studies, the current situation and the impacts of that policy prior launching any new policy. PW claimed that his company modified the selling policy to *"the completed before sell"*, in order to reduce the problems that the customers' needs to extend or modify his products and this team could control budget, cost and the conditions of contract easily.

The summary of marketing risks mode was drawn as there are five stances, which stand for the marketing management (marketing strategy/plans' establishments), the marketing mixes (prices and promotional impacts), the competitors influences, the customers' behaviours and the developers' brand awareness (see Figure 7.11). It could be interpreted that these five stances strongly affect to the project's income stream as well as the company public image. In order to deal with the marketing risks, the developers shall utilise the comprehensive marketing studies that help them positioning their project in the whole market as well as setting up the appropriate promotional /advertisement campaign to suit with the customer's behaviours, to gain more revenue and to enhance the developers' public image.

The economic risks were divided into 3 groups of macroeconomic risks, financial/monetary risks and marketing risks in accordance with their sources and the degree of seriousness. These risks were the most complicated amongst the other STEEP risks, as they are associated with many sources both external and internal and their outcomes affected strongly to the project progress and the income stream.

The marketing risks portray the direct impact to the development projects rather than other economic risks since they are actually non-predictable and subjective. The interviewees stated that the marketing risks are caused by various factors such as the wrong-forecasting of demand/supply, the customer's behaviours, the competitors, the developers' brand reputation, or the non-attractive prices and promotions.

In context of the financial/monetary risks, the practitioners reckoned the risks caused by the unavailability of funds have the worst impact on the project progression, since real estate projects usually need a large sum of money to finish the project. The lack of supportive fund critically affects the income stream and the working capital of project immediately.

Macroeconomic risks shall be stressed by Thai developers, as these are influenced by the external factors. Interviewees believed that risks caused by the variation of construction materials prices have the worst impact on the project progress because of these relate to the project construction cost directly.

The completed feasibility analysis was agreed as the best risk prevention method since it provides the precise information of the marketing, the customers and competitors including the financial matters to the developers to make a decision whether continued developing or terminate the project. This feasibility analysis features will emphatically discussed in Chapter 7.5.4 hereinafter.
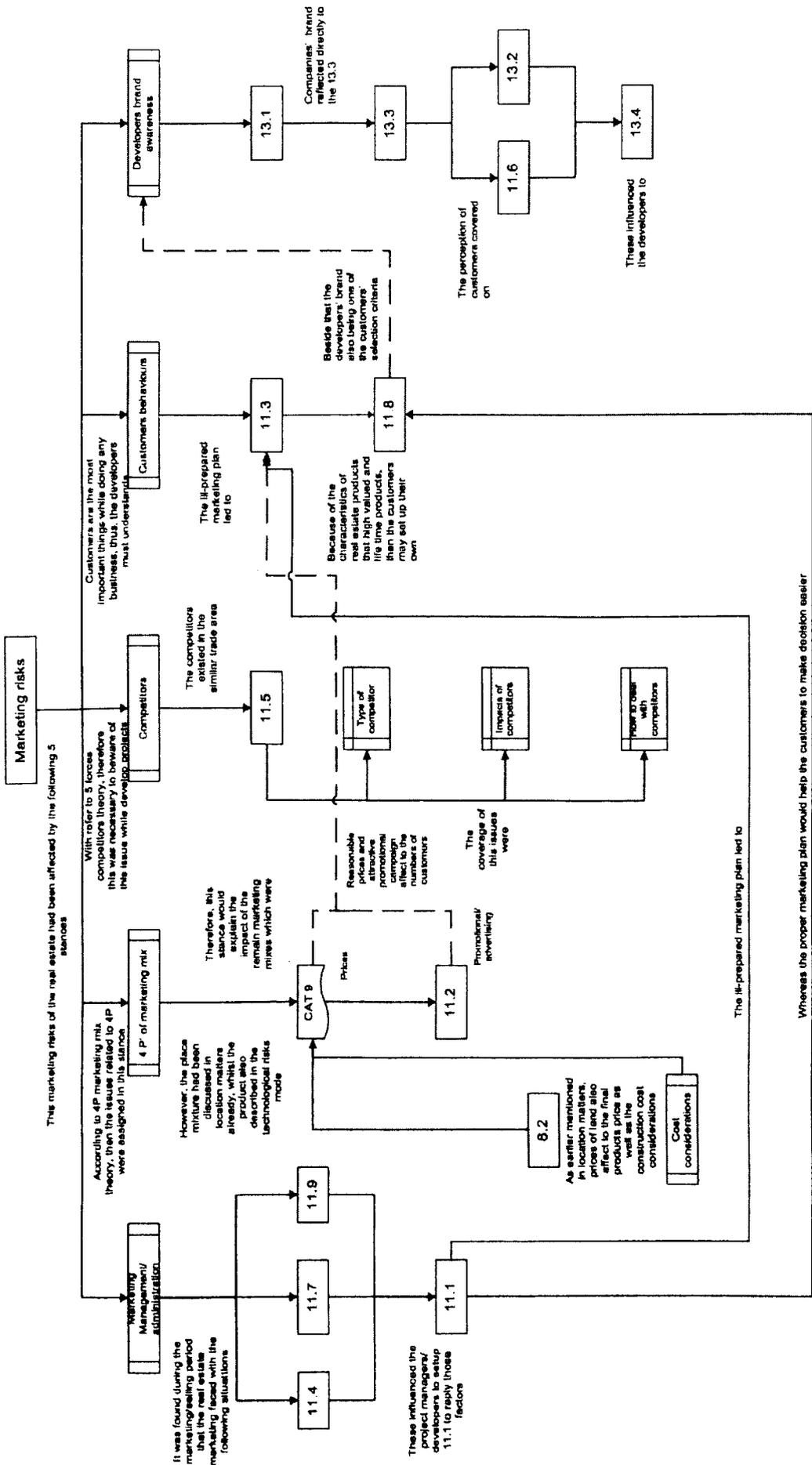
Figure 7.11: The Marketing risks and relationship between the categories and concepts.

220

Political risks

Phase 1 resulted that political risks portrayed the highest impact on the Thailand's property industry. The interviews were used to confirm this result as well to gather the richer data from the practitioners. These risks were classified into 2 major categories of; Category 23: Regulations/ Policies contradiction and; Category 33: Current Political situations, respectively.

Table 7.11: Summary of the Political risks

Mode	STEEP Factor: Political risks			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
23	Land regulation/policy contradiction	23.1	BMA Land regulation 2005 (the most updated)	8
		23.2	Construction supervisor act	3
		23.3	Local regulations	7
		23.4	The delay in approving for construction/development process	3
		23.5	Government policy has a strong impact on the real estate development industry	6
		23.7	Other related regulation	3
33	Political issues	33.1	Political turmoil	13
		33.2	Beyond forecast and hard to predict	1

This phase resulted that Thai developers were critically affected by the government policies, whether the positive or negative. The developer of the leisure complex given the example of positive impact as Thai government issued the fit-out campaign that indirectly promoted his project to the public and increase the project members. Meanwhile, the rest interviewees stated that their projects are negatively affected by the government policies, particularly the property tax-shielded policies. For example, Thai government terminated the property transferred tax-holiday campaign in May 2010 (BOT, 2010) that disturbed the transferred activities in the current market, and upset both customers and developers as they have to pay more transferred tax and these affected the developers' marketing plans. However, the government policy risks shall be foreseen by the developers by regularly follow up the new government campaign/acts issued. Moreover, it seemed that Thai government neglected risks in this industry as any risks preventives have yet announced, unlike the other industries such as financial institutions that the government paid more attention to their impacts.

Thai practitioners extended that the following regulations had the strong impacts to each development stage:

- *Bangkok Metropolitan Area (BMA) land regulation 2005*; this affects the developers in BMA area, because of it specifies the reservation area that disallow for constructing any high-rise buildings. For instance, the green area that only allows for the detached houses with 400 m^2 land area (APTU, 2006). If the developers violated this regulation, this would cost them the serious problems with the BMA agencies such as their projects may be disapproved.

- *Construction supervision acts*; these limit the building styles, designs, functions, the permissible building area, the facility or amenity areas and the maximum height of the buildings. For example, residential condominium must be attached with the common and the amenities/facilities area. Therefore, the developers have to spend more construction cost and time in order to follow to these laws strictly.

- *Local regulations*; a good example of this is the land sub-divisional act, which specify the numbers of units in one project, the ration of facilities are against sellable area, project layout including the infrastructures that must be annexed with the projects. In this regard, the local regulations also included the local district offices (LDO) laws or the related utilities/ infrastructure agencies. One interviewee given an example that his project located closed to the high-voltage electricity route. He had to redesign his project layout to conform to EGAT's requirements. He also mentioned that the LDO have a full duty to inspect his project, thus he prepared the necessary project documents and the proper site to prompt for the unexpected inspections.

- *Miscellaneous regulations;* For example, the juristic person act (1979) that specified the roles and duties of the developers to maintain the conditions of their projects' common area and rectify all defects before transferred to the customers. It forces the developers to set up of the juristic person as the mediator between the property developers and the customers. It affects the residents' privacy and security because of they have to share the project facilities with others, as well as the common fee (AREA, 2008).

The practitioners also indicated that there are some problems in interpreting the limitations and allowances of the above regulations. Firstly, due to the red-tape characteristics of the relevant authorities (i.e. PWD, LDO, EGAT), these caused some delays in approving the construction permission, that lead to the schedule and further construction management risks as the developers would be pressured by the FI in regard to pay back the loan. These delays additionally influence the

222

customers' confident and potential to buy properties, because of the properties may not be transferred to the customers on time (Hong et al., 1999).

The other pitfalls of these regulations were that the Thai construction laws are subject to the justification of authorities, each authority has its own standards to justify the contents of these laws. These cause some complexities to the developers when they have to acquire for the approval. In addition, there are several hidden-agenda in Thailand legal system and these are not transparently publicised, the developers must check the related regulations carefully before project started.

Thai developers also stated that the current political unstable situation (i.e. turmoil, riots) affect strongly to their projects and the entire industry. The political risks are usually difficult to forecast because they are typically caused by the external factors and the developers cannot mitigate these risks by themselves, they must rely on the government's actions to the political situation. Eight interviewees indicated that the current political mayhem panicking the investors or the customers as it decrease the customers' potential, especially for the serviced or high class projects located in BMA business district. The volatile political situation suspended the foreign investors and tourists to visit Thailand. One practitioner suggested that the hotels/services projects have been severely affected by this political turmoil as the hotel projects usually sell their project on the year on year basis, they need time for promoting the product overseas. The political turmoil made him modifying the marketing strategy to be reimbursed by the local customers instead and minimise risks by investing in the other stable countries. The protestant also played the major roles in this regard, as seen by the actions of Red shirts protest in April/May 2010, they blocked the BMA core business area, these obstructed a launch of new residential projects or the traffic to existed commercial/retailed buildings in that area, the construction progress then stopped and the developer postponed the selling/marketing campaigns. Thai financial institutions also monitor on this situation and reluctantly lend the loan to the new developers in the riot area, because they considered that they would not be repaid properly.
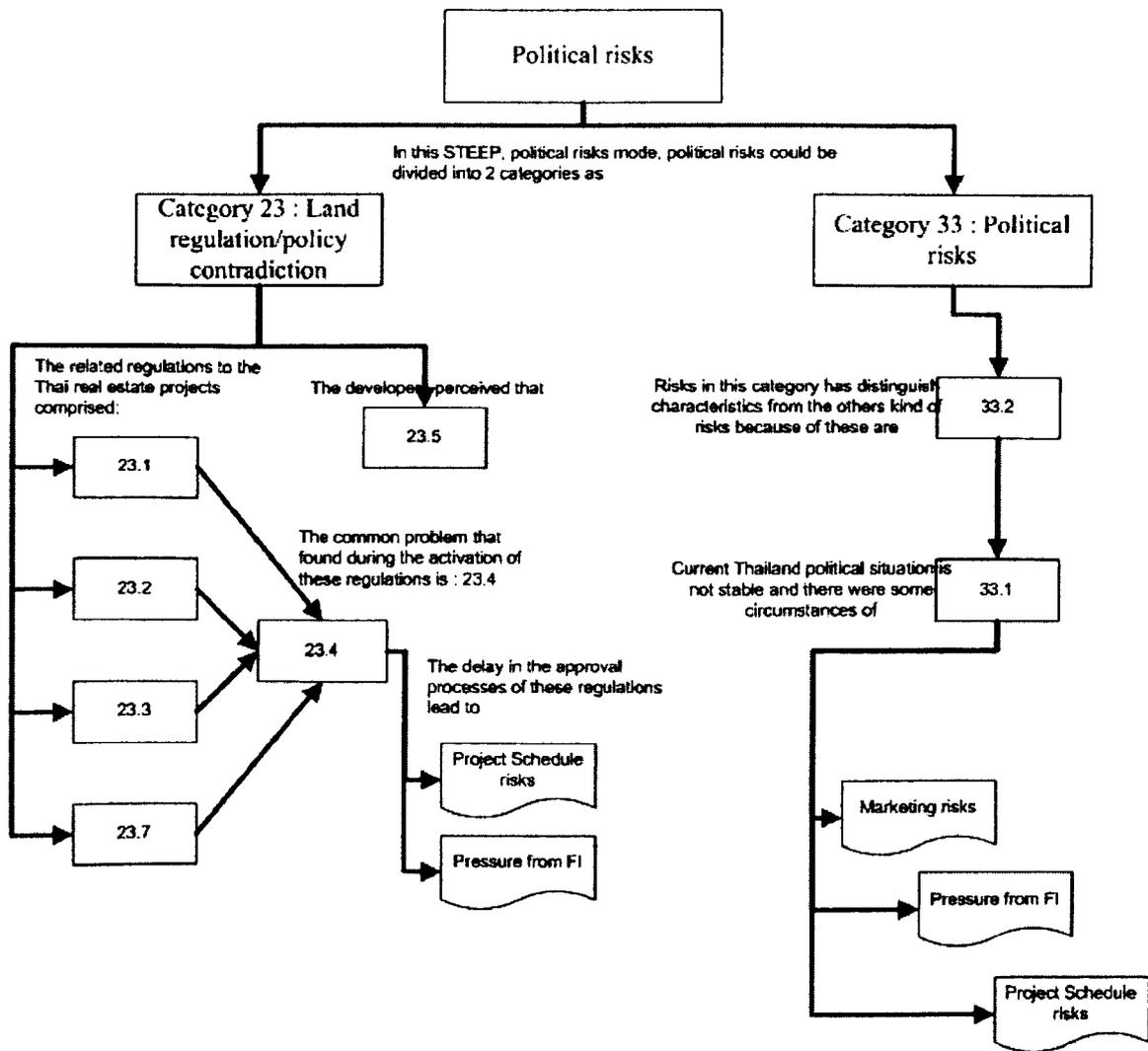
Figure 7.12: The Political risks and relationship between the categories

The political turmoil strongly affected to the developers marketing strategies establishment, this caused some risks to the construction processes as well as raised more pressure from the financial situations. In order to mitigate this political turmoil, the participants suggested that the developers shall regularly foresee and monitor the situations, particularly for the developers in the BMA core business area. They shall set up the contingency plan or mitigation plan to response in case of Thailand political situations becoming worse than the present.

7.5.4. The current risk assessment practices in Thailand's real estate industry

This section aimed to examine the practitioners' opinions and the understandings towards the current risk assessment practices. The results gathered from this part help in modifying the risk assessment model (in Phase 1) to suit with the developers' current practices. The findings were assigned in Category 1: Current risk assessment practices and Category 2: Preliminary risk assessment, respectively.

Table 7.12: Thailand current risk assessment practices

Mode	The current risk assessment practices			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
1	Current risk assessment practices	1.1	Financial risk assessment tools	6
		1.2	Experience is one of current risk assessment tool	4
		1.3	The difference in each company risk assessment models	10
		1.4	Lack of systematic risk assessment or management techniques	5
		1.5	The panel discussion to analyse risks	1
		1.6	Project feasibility analysis	16
		1.7	Using the intuition to assess risks	2
2	Preliminary Risk assessment	2.1	Pre-feasibility analysis	8
		2.2	The risk assessment plan to suit with the variation of construction materials prices	1

The interviews results confirmed with the first phase that Thai practitioners currently lack systematic risk assessment techniques and they did not have adequate knowledge in the risk assessment practices, and they also perceived that the formal risk assessment techniques are complicated (full of mathematical/statistical figures), these figures are not understandable by all project participants, particularly the laypersons. Moreover, they also have their individual reasons that obstructed them to learn the new techniques such as age or background education. As NM stated "*The barriers to learn this risk assessment model are my age and my enthusiastic to learn a new thing is reduced dramatically. I am old guy and need more time to understand one new thing, I am not special in computer using as well, and according to my duty, I do not have time to operate the software myself* (NM)". Some developers applied the instant applicants (i.e. MS Excel) to create the model for reporting or assessing the work progress, analysing the project feasibility, estimating cost, but they did not use these to assess risks in the projects.

225

The results given that each interviewee has individual understanding about risk assessment, they created up their own risk assessment models/techniques. The current used of the risk assessment techniques are summarised as:

- *Financial risk assessment tools*: Thai developers may set up the risk committee, who responsible for identifying the appropriate financial ratio such as the project discount rate, or making a decision towards the investment (see details in Financial/monetary risks). Two interviewees stated that they preferred these ratio to assess risks because of there are several supportive evidences to support their decision making such as the company financial statement or projects cash-flows. For example, the hotel or leisure project managers may use the reservation records to forecast the amount of income.

- *The decision makers' experiences and intuitions*: these aspects were arguably discussed as the effective techniques to assess risks in the property projects. Two interviewees insisted that risks in this industry are not so complicated, thus their experiences are sufficient to assess the project risks. However, seven interviewees stated that they do not use their experiences or intuitions to assess risks solely, but they also develop some tools to use alongside with their experiences. Three of them use their previous project records as the benchmark for the current/future projects. One developer conducted the simulations using the information from historical projects to assess risks in his current project (NM). The experiences of the developers help them selecting the best location for their projects, but they must be equipped with other tools, such as the accurate site inspections that reduced risks caused by the inferiority of land (PW). Two practitioners supported that the developers shall utilise the reliable information whether their own research (primary data) or the secondary data to assess real estate project risks efficiently. Moreover, the decision-makers shall have the precise visions about the current business situation and their projects, regrettably these visions or intuitions cannot be transferred or taught to the others, as PS insisted that *"I only using my own common-sense and experience, plus information by the reliable sources to assess risks in this project. I rated the common-sense was the most important thing to be equipped with the risk assessment model, because risks are mostly subjective, sometimes these could not be measured by any mathematical devices, and common-sense is an individual thing, not teachable (PS)"*.

- *The panel discussions*, this is a meeting between the project participants to identify, evaluate, analyse risks and seek for the risk treatments. Two interviewees preferred this methods since it provides the concreted outputs including the suitable solutions for the project participants, the outputs are easily understand, and up to date, ready to use in the actual projects.

226

- *Risk Matrices or risk ranking*: this method always applied by the developers in the large scale or public companies, since it is easy in using and communicating with all project participants. (see Chapter 3.3.3).

- *Individual risk assessment models/techniques* : Some developers developed their own risk assessment models based on the spread sheet application (MS Excel), one interviewee mentioned that *"We developed our own programmes to deal with risks in our projects . However, these were not used to not assess the consequences or level of risks, but to evaluated the project' feasibility and constructability* (POS)".

Most of the interviewees considered that the project feasibility analysis is the best risk assessment method for this industry. The important of feasibility analysis was not addressed by the phase 1 results, however this is a major key to the project success or failure (see Chapter 2.2), as the risk assessment processes always conduct at this project stage in order to inform the feasibility of project to the investors or project stakeholders. These interviewees stated that the feasibility analysis help in identifying risks, indicating the appropriate development plans and analysing whether the project shall be continued, or terminated. It also helps in specifying the target customers, customers' potential and affordability and decreasing the consequences of non-controllable risks such as the workforce unavailability or variation of construction costs. The completed analysis package can be used as the guarantor of the project initial funds or sometimes used as the preliminary design and construction manuals for project teams.

In order to make this feasibility analysis more effective, the data shall be obtained whether by the projects' database or others secondary data, but these data must be rechecked and clarified to ensure that they are clearly updated and applicable in the real case. The complete feasibility analysis package theoretically comprises physical, marketing and financial study, and it shall describe the external factors that influenced the project marketing aspects (i.e. customer's behaviours and competitors, economic and political situations) as these issues must be more concerned by the developers because of they are non-predictable and subjective.

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┌─────────────────────┐
│ CAT 1 : Current risk│
│ assessment practices│
└─────────────────────┘
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In this regard, there were two major
findings gathered by the interviews,
which were

One finding from the interviews was
that

Each developer had its own
understanding about risk
assessment and develop its
assessment methods

1.4

1.3

Due to the income generating characteristics of
real estate projects, then developers prioritise of
the financial aspects of each project

1.1

1.2

1.5

Most of the interviewees stated that the feasibility
study was the best risk assessment method
currently used

Pre-feasibility analysis had been employed
alongside or prior the main feasibility analysis
began

1.6 ◄───── 2.1

1.7

Figure 7.13: Thailand current risk assessment practices in real estate project

Despite the fact that the actual project performances always distorted from the expectation, the feasibility analysis is however a theoretical safeguard for the developers to consider on the continuity of the project. It shall clarify the expectations of the developers into three options, from worst case to the optimistic case, it indicates the sensitivity of the project in various alternative development plans. These help the developers to decide whether or not invest in the project and assist in creating the further risk management plans as "*when we found that the economic and political situation around our project atmosphere change, we do have the ad-hoc risk management plan to response for these changes. We prepared the scenario analysis into 3 options as worst case, medium case and most optimistic case (TT)*".

Although the feasibility analysis provides much advantages to the developers, but it need time and cost to conduct this analysis perfectly. On the other hand, the developers may select the pre-feasibility analysis because it usually takes a shorter time and lower cost, but provides some useful initial information before project start, identify the project initial risks, and sets up the project contingency

228

plans. The raw data that necessary for the preliminary project studies are such initial gross profit, estimated land prices, project layout and production concepts, construction cost per unit, condition of contract as well as the overall market conditions. This preliminary study then aids the developers to assess their own competency, the capital and marketing (Commonwealth of Australia, 2005).

The results of these interviews underpinned the data gathered from the previous research phases that Thai practitioners are currently lack of the systematic risk assessment techniques. The results also help in classifying the barriers using the formal techniques, which are Thai developers less knowledge in mathematic or statistic, their personality (the confidences), and the perceptions towards risks (neglect to the complexity of risks, or believe that real estate risks are simply handling).

However, Thai practitioners agreed that risks are actually occurring in every project stages, and then they have to develop their own risk assessment methods to deal with risks. In the Thailand's real estate development context, the popular methods are the application of financial ratio, the experiences and intuitions, and panel discussion, respectively. The interviewees unanimously agreed that the feasibility analysis is the best risk identification and assessment method as this helps in making a decision whether to build or terminate the project. The data input into the analysis processes shall be verified and validated for the validity before calculating the project feasible.

The barriers found during the interviews informed that Thai developers preferred the simple and flexible risk assessment methods, and these shall be structured on the basis of the project feasibility analysis, it shall provide as much as possible accurate information for the decision makers to select whether to invest in any project or terminate their investment. Therefore, the features of ideal risk assessment methods that suit with the Thai developers' preferences are then discussed in the following section.

7.5.5. The idealistic risk assessment models

This section was constructed based on the contents of Category 16: The new risk assessment model (RAM) and Category 17: The idealistic risk assessment techniques (see Table 7.13). The framework of ideal RAM concept is illustrated in figure 7.14.

As earlier discussed, the individual intuition and experience of one decision maker are hardly transferred or taught to the next generation. Most of the interviewees stated that the new risk

229

assessment model (RAM) would be appreciated by the new-comers in this industry, because of the new projects will confront risky and competitive situations. The systematic risk assessment models will help them assess risks in each development stage, particularly the construction stage, which is the most critical stage amongst the others (Smiths, 2002).

Table 7.13: Summary of the ideal risks assessment techniques

Mode	The ideal risk assessment techniques			
Category		Concept		No. of Descriptions contained in this concept
No.	Name	No.	Name	
16	The new risk assessment model	16.1	This model will especially help the newcomers in this industry	1
		16.2	The experience of the practitioners could not be transferred to the newcomers properly.	1
		16.3	The new model will help newcomers to focus on the higher impact risks in the real estate industry	1
		16.4	The formal risk assessment techniques	2
		16.5	Every new projects shall use the risk assessment model to assess risk before project commenced	2
		16.6	Suitability for the small or medium size developers	2
17	The idealistic risk assessment models	17.1	The reliable information could be used for the ideal model	11
		17.2	Model shall be more flexible	3
		17.3	Model shall be simple.	2
		17.4	Model shall be practical in using in the real business	9
		17.5	Model shall be equipped with the reliable risk assessment criteria	9
		17.6	Application of Analytic Network Process (ANP) or Analytical Hierarchy Process (AHP)	8

The new RAM shall however be equipped with the necessary and reliable information, for example the financial ratio that actually used for the similar kind of projects, the land value, the size of land and the related regulations, including the marketing conditions and customers' behaviours. The model programmers shall have the solid background in Thailand's property industry, or they shall be the insiders in this domain to gather as much as possible in-depth information, because of this industry has the distinct contexts from the others

The interviewees additionally depicted some concepts for developing new RAM as it shall be formed in the proper format, the outcomes shall be calculated by the mathematical figures alongside

with the decision makers' subjective judgements in order to prioritise risk's consequences. It shall be flexible enough to use whether, in the specific or general used.

Thai practitioners required that the attribution of an ideal RAM shall be predetermined to suit with Thailand's contexts. They agreed that this new RAM shall be added with the following features in order to enhance its practicality. For instant, the data accuracy, this is the most important aspect when develop any RAM, the data shall be reliable enough to validate the model's practicable, and the calculation process shall derive errorless outcomes while assessing risks in any projects, the models shall be updated frequently to provide the most précised results and most up-to-date information to the decision makers as these are necessary to support their decisions. One suggestion was that this model shall be connected with the database or other feasibility analysis programmes in order to provide more reliable information for calculating as "*In addition, the model shall be linked with the database that provided the real-time information and link to the cash-flow or feasibility analysis programmes, for example, the developers also need to know the available area left for them to develop (PT)*", this synchronisation will strengthen the effectiveness of this new RAM. Moreover, the ideal RAM shall be validated by initially testing with the practitioners in order to examine some weakness before launched to the business.

The interviewees generally agreed that they preferred the simple and flexible risk assessment models which enable every project participants to use. Thus, it was depicted that an ideal RAM shall be flexible in term of gathering the related data such as it shall be used via every computerised operational system, and shall contain some familiar functions that they used daily (i.e. MS Excel etc.). Moreover, this new RAM shall have the visualised or graphic presentations, in order to discourse and interpret to every project participants as "*I know that the statistical or mathematical figures are necessary to create the formal risk assessment model, but this model shall provide the easy to understand conclusion, may be just "Yes" or "No" only (PP)*".

In addition, this new RAM shall be fast calculating in order to provide the real-time information to the decision makers, as the developers are generally constrained by time, and they need the fast as possible information to support their decision-makings. As PS mentioned that "*Secondly, this model shall provide the real time output because of the businessmen need the just-in-time data to support their decision-making towards risks, if the programme needs too much time for analysing and interpreting, they would rather use their own techniques such as experience (PS)*".

The reliability and validity of risk assessment criteria are the critical factor to enhance RAM's trustworthiness, the criteria embedding in new RAM shall be modified to suit with the Thailand current real estate business contexts, it shall cover on all major risks in the projects. The implementation of STEEP factors as the elements of risk assessment criteria was widely accepted by the practitioners due to the STEEP factors cover on the major existed risks in Thailand's real estate industry. However, there were some recommendations in regard to apply this STEEP factor in the context of Thailand's property sector. The STEEP criteria shall be validated in order to see the validity of each criterion as well as its' consequences to the projects' progress before launching the models. Some factors were suggested to add into the assessment criteria such as the impact of related regulations, the cultural diversification, or the currency exchange rate. Moreover, the criteria shall be created by using the easy to understand language, try to avoid the confusion of words because of the researcher have to concern on the interviewees' reaction and time spending in interviewing.

In regard to the implementation of ANP as the new RAM in Thailand's property industry, 8 interviewees stated that this ANP is a new model, and there was no previous research in this business. Two of them had only the principle knowledge in ANP, whilst the other 4 interviewees indicated that they interested in this model, but they did not have enough knowledge in its functions and procedures. However, they have less confident in applying this ANP, because of they are still doubtful about the precision of data. They stated that ANP is complex, and it does not reply their requirements in regard to the model's simplicity as "*I think it was because of the complexity of the models, and you should know that Thai practitioners do not believe in mathematic/statistic figures than our experiences (IB)*". Thus, the practitioners did not require this ANP because of they also had their individual risk assessment techniques.

Other limitation in implementing this ANP as a risk assessment model in Thailand's real estate industry was that ANP needs a comparison between the weighted criteria against the assumed alternatives. However, the alternatives of development schemes are depending on the constraints and conditions of each developer, they may have no other alternative development plan in some case, (in according to the variation of land purchasing cost), this enforces the developers to develop only scheme that gained the highest and best use in that parcel of land, therefore one land parcel could be affixed with only one type of project. One interviewee highlighted that "*This criteria set, to be honest, is suitable only for some kinds of project, which could be altered to build the other project type or products*" (PC). The interviews also revealed that ANP have the well performance if the alternatives development plans are assumed with the extremely different characteristics, for example

232

the residential versus commercial. It was interpreted that ANP model cannot work properly in this particular industry due to the real estate projects did not have another alternative development scheme on the single parcel of land. These reasons supported the researcher to withdraw an ANP as the risk assessment method and put forward another model, which created based on EFA principles (as indicated in Factor analysis summary) instead, the details of this model are discussed in Chapter 7.6; the model explication hereinafter.
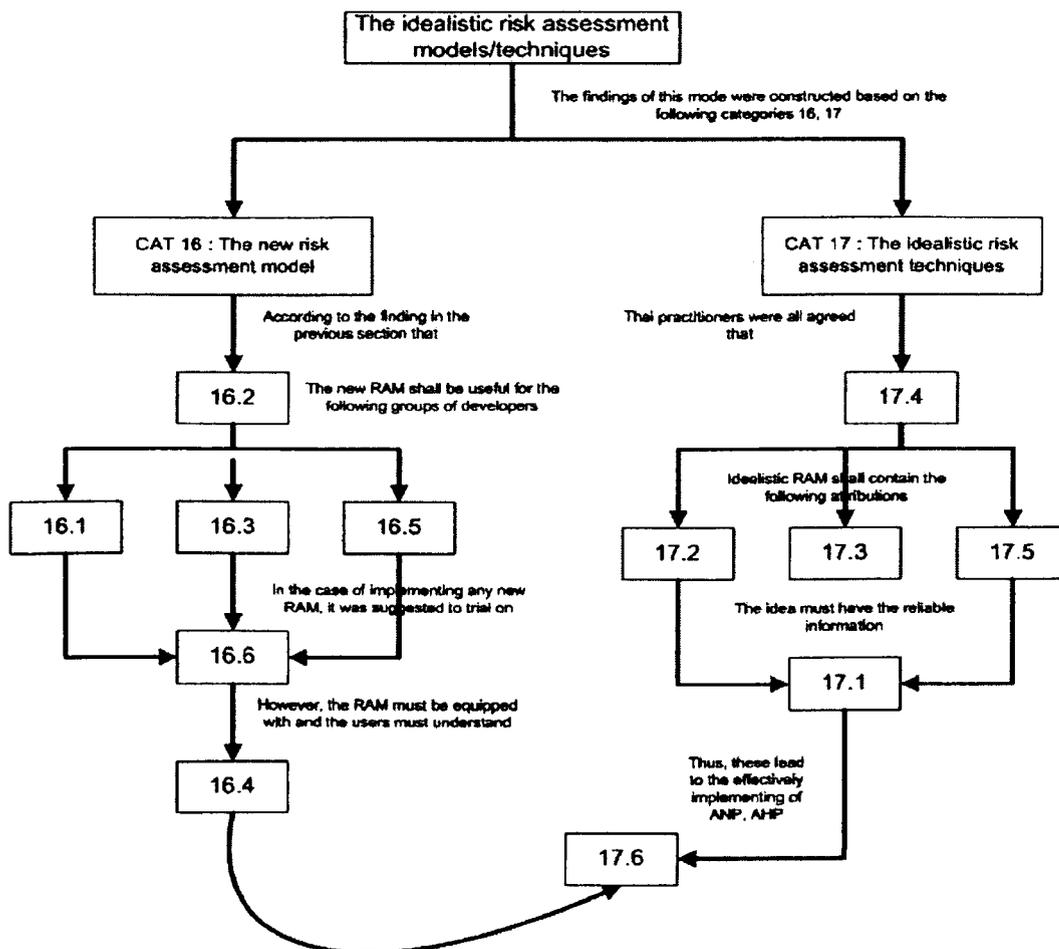
Figure 7.14: The relationship of current risk assessment practices and the ideals

Thai practitioners also required that some features to be added into the new RAM, firstly it shall provide the detailed information to support the decision making processes towards risk. For example, the decision makers may need to know the possible numbers of units to be built on the land, or it could help the project managers to estimate the certain demand/supply of the customers (PC). These features actually excluded from the scopes of this research, however these shall be reconsidered in the further development of risk assessment model.

To recap, the ideal RAM shall be equipped with the update and reliable information in order to provide the most accuracy information for the decision makers. It shall be simple in using and understanding by every project participants, the results can be presented in figures or graphical formats, and shall be embedded with the reliable assessment criteria that cover on the major existed risks in Thailand's property projects. The suggestions of these interviewees were summarised to inform the modification of the established risk assessment model invented in the first phase. These also provide the frameworks and cores of the model, which is suit with the requirements of the practitioners in the particular industry.

7.6. MODEL EXPLICATION

As this research aimed to develop the risk assessment model (RAM) that conforms to Thai real estate practitioners' requirements, this RAM was developed by employed the components analysis of factor loadings embedded in the explorative factor analysis (EFA). This EFA was conducted in order to explore whether the STEEP factors risks criteria being grouped and their seriousness to the real estate projects can be statistically prioritised. 66 risk variables had been clustered into 5 groups with 20 components, these component factor loadings were then compared to see which risk reflects the highest consequence to the real estate project. Therefore, there were only 25 risks that had the higher impact on the real estate project development process included in this model (see Table 6.48).

With reference to the Table 6.48, the EFA analysis helped in creating the risk assessment model, it represented degree of each risk in the mathematic figure (i.e. 0.931, 0.863), and these risks were reorganised in an ascending orders. STEEP factors were rearranged by using the average value of factor loading and their orders were: technological, political, social, economic and environmental respectively. This model revealed that Thai practitioners prioritised the technological risks, particularly the personal or organisational conflicts as the most critical risk occurring in their projects. The aforementioned rank or risks shall be verified in the model explication phase in order to test its validity and practicality.

The attributions of this model were adjusted and improved in accordance with the suggestions gathered from the second research phase as well as to suit with the practitioners' requirements. This model featured the mathematic figures that enabled more understandings to the users, it also reduced the complicacy of statistical techniques by adding the graphical presentation (see Figure 7.15) in order to enhance the simplicity and readability of the model. This RAM contained with the clusters

of risk variables, components of risks and the factor loadings as presented in the Table 6.48. While, the hierarchical relationship between each risk, their related components and the factor loadings are illustrated in Figure 7.15.

As illustrated in the Table 6.48 and Figure 7.15, this RAM was created based on the results of phase 1 together with the features of the ideal model gathered from the results of phase 2 (see Chapter 7.5.5). The factor loadings indicated the seriousness of each risk and these were grouped in their related components. These risks had been extracted from the assessment criteria (see Chapter 5) in order to indicate the high impact risks to the perception of Thai real estate developers.

This model however needed to be justified in its quality, ensure its validity and practicality before launching in the real business as well as to guarantee that the risk assessment criteria are intensively satisfied (Miles and Huberman, 1994).

Trochim (2006) defined that validity is the strength of conclusions, inferences or propositions that provide a useful scheme for assessing the quality of research conclusions, the research theorems are placed in its scope and applicability, well-articulated in its philosophical suppositions. Moreover, Yin (2003) suggested the criteria to verify the case study validity in order to form the correct operational measures for the criteria embedded in the statistical model as shown in Table 7.15 below.

Table 7.15: Criteria for case study design

Tests	Assumptions / Definitions (Trochim, 2006)	Case study tactic	Research phase
Construct validity	There is a causal relationship in the study, then how can these construct being generalised?	Use multiple sources of evidence Establish chain of evidence	Data collection Data collection
Internal validity	Is the relationship causal?	Use multiple sources of evidence Establish chain of evidence	Data analysis Data analysis
External validity	Assuming that there is a causal relationship in this study between the constructs of the cause and the effect, can this effect being generalised to other persons, places or times?	Use replication logic in multiple case studies	Research design
Reliability	The consistency of the measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects.	Use case study protocol Develop case study data base	Data collection Data collection

Source: Adopted from Ross (2005)

235
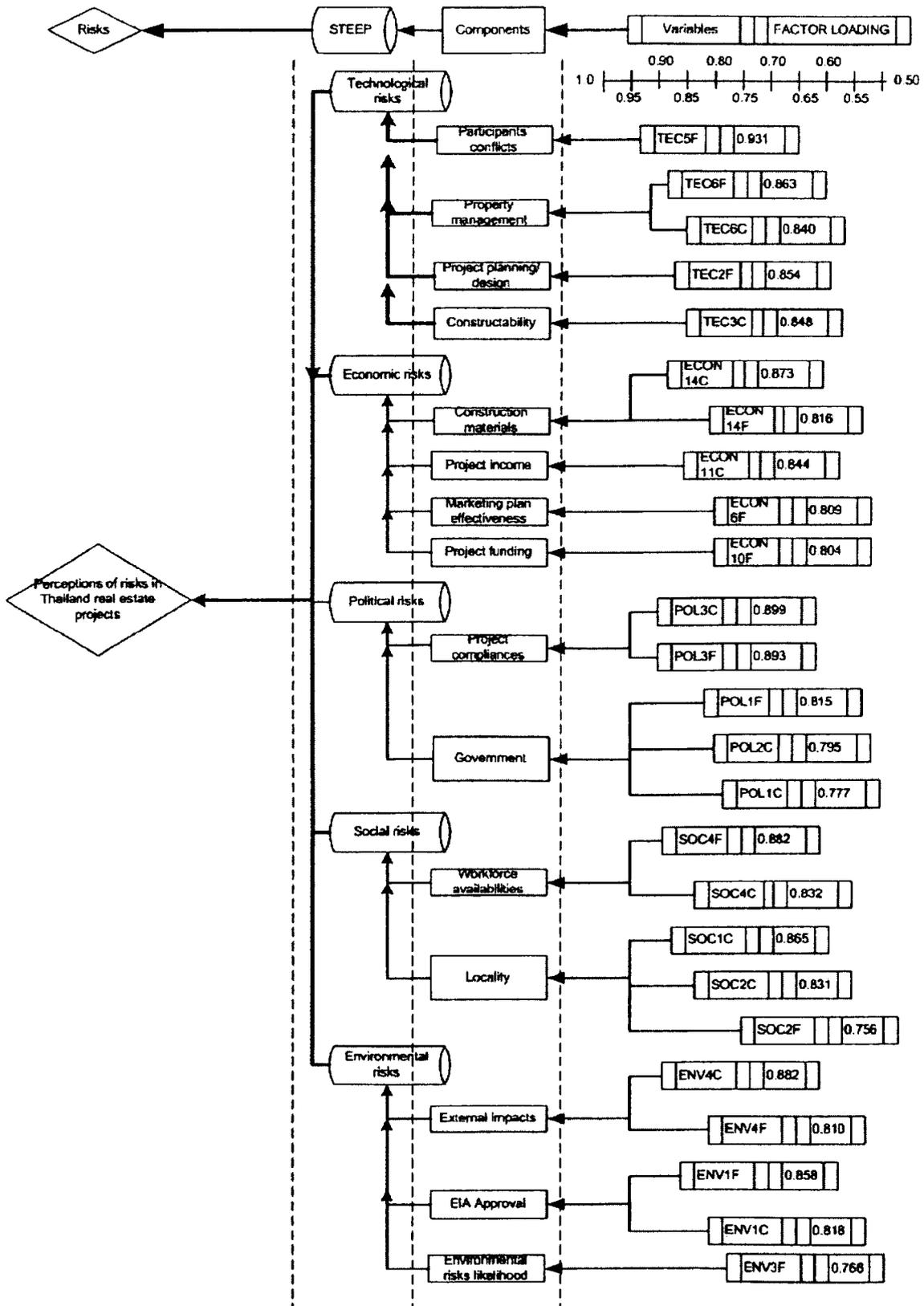
Figure 7.15: The risk assessment model based on Exploratory Factor Analysis

236

Ross (2005) gave an idea that the researcher shall use multiple sources of evidence to support the convergent enquiry as well as to establish a chain of evidence. Kumar, (2005) supported that construct validity of the research instrument (in this research, it was the risk assessment model) shall be tested based upon the statistical procedures, or it shall be determined by ascertaining the contribution of each construct to the total variance observed in the specific phenomenon.

The interviews were adopted with a group of real estate experts as the evidence for data analysis and then compared these responses with the results of the first phase (EFA's degree of risk seriousness). This aimed to investigate the details of the risk assessment scheme within Thailand's real estate business. The case study approach was selected as it help in studying on the particularity and complexity of a single case in order to have the better understanding about the risk assessment procedures in this industry (Stake, 1995). These above reasons supported an adaption of the case studies approach (Yin, 2003) to examine the model's validity and the validating procedures as described in the next section.

7.6.1. Model Validation Strategy

In order to improve the practicality of the purposed risk assessment model, this model shall be validated by comparing this with the real estate experts' judgement. Thus, the researcher adopted the case study approach (Yin, 2003) to test the model's reliability, validity and applicability.

To ensure construct validity and reliability (Trochim, 2006; Yin, 2003) the case studies shall be selected from the external observers to trace from the research conclusions back to the central research questions. Four real estate experts had been selected in order to provide their opinions in regard to the purposed risk assessment mode to avoid the insider biases (Trochim, 2006) these respondents participated in academic institutions or consultant firms, and they were requested to use their individual logics in order to implement the logical approach for validating the risk assessment model. They would produce whether the similar results (literal replication) or the contrasting results (theoretical replication) (Ross, 2005).

The structured interview was considered as the appropriate interview technique for the case study, as it helped in reducing the trivial information and minimising the time constraint (Lindlof & Taylor, 2002). The questions used in the interviews had been prepared to straightforwardly on how to validate the bespoke model. The case studies were requested to indicate their opinions towards the

degree of risk as shown in the aforementioned factor analysis model and then also overseen the factor loadings, rankings of risks (according to their perceptions), they gave some suggestions to develop this model, and they had to consider on the level of agreement/ disagreement towards Thai practitioners' perceptions of risks.

This model was developed by the factor analysis in the quantitative phase. The results had categorised the risks that had the strong impact on Thailand's real estate development industry into the appropriated components, also gave the level of risks and indicated the highest impact risks (see Figure 7.15).

As the structured-interviews were adopted to collect the appropriate data for the case study approach, the case studies' information were then filtered, extracted and summarised into the related questions. The interview processes were equipped with the interview records (see Appendix XI), that contained with 4 sections, 25 questions and an assessment checklist.

- *Section 1: The Participant's details.* This section contained 15 questions, which aimed to gather the interviewees' profiles (i.e. an educational background, working experience, the risk assessment /management experience). It also sought for the cases' attitudes towards risks and the current risk assessment practices (i.e. names and their satisfactions).

- *Section 2: The participants' opinions towards the phase 1 risk assessment model.* This section consisted of 6 questions that requested the case studies to express their opinions towards the purposed risk assessment model, the model's practicality and flexibility, including their suggestions to develop this model to enhance its suitability and adaptability in the real business.

- *Section 3: The perceptions towards STEEP factor risks.* All case studies' attitudes and perceptions towards the consequence of STEEP factors were collected in this section. Furthermore, they provided risk assessment/management experience including the information that necessary for evaluating risk in the property projects. This section contained 5 questions, which regarded to the opinions towards each STEEP factor, the assessing techniques for each factor and the information that used to support their decision makings.

- *Section 4: The model validation assessment checklists* The case studies were requested to indicate their agreement towards the degree of each STEEP risk against the EFA's risk assessment model, 5-points Likert scale was used by the participants to tick (X) in the appropriate boxes (see Figure 7.16).

The case studies' interviews were translated, transcribed, manually coded using the same procedure as the qualitative phase data analysis. However, according to the structured interviews' characteristics (Lindlof & Taylor, 2002) and limitation of time, the data was straightforwardly extracted for the important part and these were summarised into the aforesaid interview records.

These interviews' results had been compared against the EFA risk assessment model, the results of phase 2 and the results of other case studies in order to form "*the cross case comparisons*" (Yin, 2003). These comparisons allowed the researcher to search for the particularity and the general ideas within the extensive qualitative data. The summative discussion of case studies results are extracted and described in the following section.

| Mode | Component | Risk | Please indicate your agreement towards the degree of the following risks affected to real estate projects (see the established model) | | | | |
			Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Economic	Construction materials	Consequence of construction materials' price fluctuation					
	Project income	Consequence of project cash-flow illiquidity					
	Construction materials	Frequency of construction materials' price fluctuation					
	Marketing plan effectiveness	Frequency of demand and supply mis-estimation					
	Project funding	Frequency of interest rate fluctuation					

Figure 7.16: An example of risk assessment model validation checklists

7.6.2. Case studies data analysis

As earlier discussed in Chapter 4 and 6 in regard to the formulation of hypotheses 4 and 5, those results supported that some of STEEP factors were positively correlated. It enabled an EFA analysis to be conducted with the aims to cluster and minimise the purposed risk assessment criteria. According to these results, risks embedded in STEEP category were clustered into 20 components with 25 higher impact risks in Thailand's real estate industry, it was re-ordered in according to the Thai developers' perceptions towards risks.

Case studies Profiles

A case study approach (Yin, 2003) was adopted to verify the applicability and practicality of this risk assessment model. The real estate experts were selected by their qualification, experience, and their roles in real estate projects. In order to avoid *"insider biases"* (Trochim, 2006), 2 Thai experts were not directly involved with the Thai developers' organisations, but they had some risk assessment/ management experience. Others 2 experts were British academicians, they had solid experience in risk assessment/management in the public and private enterprise sectors. All of them had around 10 to 30 years of working experience in the property industry. Case D has never used any risk assessment model, but he could explain the theory of risk assessment and the related factors to this industry (see summary of their profiles in Table 7.16).

Table 7.16: Case Studies' characteristics summary

Case Study	A	B	C	D
Nationality	Thai	Thai	British	Algerian
Organisation	Academic/ consultant firm	Academic/ consultant firm	Academic	Academic
Position	Managing director	Managing director	Senior lecturer in real estate management	Senior lecturer in construction economic
Background educations	Architecture / Finance	PhD in Land Use Economic	Chartered surveyor	MSc. in construction economic
Decision maker role in risk assessment/ management	Yes	Yes	Yes	No (in the industry, but he was able to give information about risk management)
Working experience (Years)	14	30	25	30
The highest risks in their opinions	Economic risks (Marketing risks)	Financial risks	Time constraints in project operation	The economic risks which related to the government action/ political dimension because of these directly affect to the income stream and project cash-flow.
Used of risk assessment model	The risk ranking method	Sensitivity analysis	Sensitivity analysis, time-period analysis, cost/benefit analysis and Monte Carlo simulation	Sensitivity analysis, scenario analysis, as well as discussion with experts in the particular area of development area.

Case Study	A	B	C	D
Risk attributions	- Subjective and the quantitative method or statistic alone could not assess risk effectively - The experience and intuition are necessary for the decision makers to assess risks	- Some risks formed in the tangible or quantitative format, so that sometimes risks could be assessed by statistical/ mathematical techniques - However, risks could be assessed by experience/ intuition as well, but the decision makers shall realise the actual consequence of risks	- Risks had the subjective meanings. In order to assess risks, the decision makers shall use both qualitative and quantitative together. - The decision makers shall have solid knowledge in real estate development processes, market cycles etc. Then they can use their experience to assess risks.	Some kinds of risk contain with the qualitative or subjective characteristics that were not able to quantify such as political or social risks. The decision makers could use his experience or supportive information to form the decision-making towards risks.
Opinions of the current risk assessment methods	-His currently used method helps in identifying risks easily as well as explaining all project risks, including controllable or avoidable risks. - The formal risk assessment methods contained with many statistical figure, that not encourage in using by the laypersons	- His method was flexible and easy to understand by his colleagues, but it needs a solid research or information to support this model. - Although the formal risk assessment model are created based on complicated mathematic figures, but the developers are only the users, they are needless to know the calculation process. They can apply the simple statistical techniques as well as adopt some instant models to assess risks	-She was quite satisfied with the bespoke risk assessment models, since they provided necessary ideas for decision making towards risks. -Most developers though that there is not necessary to apply statistic techniques for assess risks, and most of them also do not have the mathematical/statistical backgrounds	- He mentioned 3 risk assessment methods that the decision makers or developers preferred, which were sensitivity analysis, scenario analysis and simple residual valuation methods respectively. - Sensitivity analysis was conducted based on "what if" analysis, if the important variable changed, this analysis could help in predicting the outcomes of that change. - The statistic techniques normally helpful, but these could not ensure that risks would be precisely assessed. The decision makers have to combine both quantitative and qualitative method to enhance the effectiveness of risk assessment model.

According to these results, the economic risks portrayed the highest impact on the real estate projects as they are actually formed by many sources either marketing or financial factors, these risks were actually uncontrollable and being influenced by the external factors, but these directly impact on the project's income stream and the project value. Case C stated that time constraint (schedule) risks also had the significant magnitude to project, since these affect to the concept of *"time value of money"*, the longer spend for develop the project, the less income the investor receive (Carther, 2010).

The subjectivity of risks had been insisted by all case studies, they stated that risks are unquantifiable and each of decision maker or developer has his/own attitude towards risk, whether the risk taker, neutral or risk averters (Raftery, 1994; Penning and Smidts, 2000). However, there were some risks contained the quantitative meaning and these can be mathematical or statistical analysed, but they are mostly related to the financial aspects (Phyrr, 1973).

In regard to the current risk assessment practices in this industry, they replied that the existing formal assessment models always contain with the complicated mathematic/statistic techniques, although these models are helpful and provide the precise data to support the decision making processes, but they discourage the laypersons who lack statistical/mathematical knowledge to use. The case studies also given that these techniques are complicated and improper used in the real business case.

According to the nature of risks and the existing assessment methods, all case studies informed that the real estate risks can be assessed by the quantitative (e.g. Monte Carlo, advance statistics) or qualitative (e.g. experience, intuitions) techniques, but these methods must be supported by the reliable information in order to make decisions towards risks. They also mentioned that *"sensitivity analysis"* shall be employed as the risk assessment tool, this analysis normally used to determine the impact of changes in project variables on the base-case (most probable outcome scenario) and to investigate how different values of an independent variable will impact on any dependent variables under a group of assumptions (ADB, 1999). This shall be applied to see whether the developers invest in this project or withdraw, by changing the important variables (either the quantitative variables such as construction cost, interest rate; or the qualitative as the impact of government actions, and its delay) these identify the difference outcomes of each different circumstance and support the decision making process of the developers/investors (Jovanovic, 1999). Meanwhile, the changing of project outcomes (i.e. net income, cash flow) reflected the degree of riskiness of the variables input to the sensitivity analysis's calculation processes. This analysis can be conducted alongside with project feasibility analysis in order to provide the solid supportive information

whether the developer shall invest in this real estate project or terminate his investment (Matson, 2000).

The case studies results supported this research assumption about the subjectivity of risks as well as revealed the complexity of the current risk assessment models. These also insisted that risk had both quantitative and qualitative dimension, therefore, the decision makers shall use both approaches to assess risks. The sensitivity analysis was recommended to assess risks in real estate projects, because of this provides the solid and supportive data for the further decision making.

The model practicality

The practicality and applicability of the risk assessment model were validated in this section, the following criteria were employed to justify the quality of the model:

- *Model effectiveness.* Generally speaking, effectiveness means a measurement of the match between stated goals and their achievement, or a degree to which objectives are achieved and the extent to which targeted problems are resolved (Fraser, 1994). However, for the effectiveness of this model, Todinov (2005) defined that the risk assessment model shall provide the reliable and consistent information to users when use this model to assess risks under the same situation or with the same subjects. The model and its risk assessment criteria must be effective enough to provide the reliable data for the decision-makers or project managers.

- *Model efficiency.* French and French (1997) clarified that the efficient model shall be clearly understood, précised and accepted by the users. Moreover, this model shall be ensured that the risk assessment criteria had been formulated correctly and the assessment procedures also being properly implemented, it shall contain at least as possible errors while using in the real case (Macal, 2005).

- *Model flexibility and compatibility.* This attribution is necessary for any decision-making supporting models or risk assessment models. The researcher applied French and French (1997) requirements to extend that the purposed risk assessment model shall be fit with the decision maker's perception and experience, and the analysis method used within this model shall be meaningful and provide as much transparency to the decision makers.

Questions 16 to 21 were designed to collect the case studies' judgements about the model's attributions and usefulness. The case studies additionally contributed some informative suggestions

243

to develop this model to suit with the practitioners' requirements and the business contexts, included their perceptions towards this model. These are summarised in the Table 7.17.

Thai experts perceived that this model was complicatedly created, because it confused the users in regard to the figures (e.g. 0.899, 0.799) in this model cannot clearly identify the degree of risks, and also did not significantly distinguish each risk's seriousness. Moreover, the technological risks' scope shall be narrowing down to the exact definition, since technological risks have the wider meanings, whether they relate to risks in the project construction processes (time, cost and quality of works constraints) or risks caused by the technology innovation (i.e. information, construction methods).

Conversely, the UK case studies both stated that this model is quite satisfied as it contained the major risks actually occur in the real estate projects. However, some major risk factors shall be stated in the assessment criteria such as social risks and their affects to the local community's acceptance, and political risks caused by government's intervention to this business, because of these risks in the westerners' contexts had the impact on the project's development, the project cannot be processed without an approval from the planning permission committees. Furthermore, this model shall be more generalised in order to apply for the other kinds of project, rather the property development. Some risk assessment criteria can be adjusted to suit with the project environment as well as to enhance the effectiveness of this model.

All case studies agreed that economic risks had the highest impact on the development schemes because of these risks directly influence the project's net profit and cash-flow liquidity. Social and political risks also portrayed high impact on the project's activities, as these relate to the acceptance of the local community and the approval of the government/local offices. The delay caused by the social or political issues seriously affects to the project time/schedule and revenue receiving (Hong et al., 1999). Moreover, the political activities (riot, mayhem) also influence the investors' confidence and panic the customers' potential to buy new property (Khumpaisal et al., 2010).

Thai case studies perceived that environmental and technological risks shall be also considered while managing the construction stage. However, these risks had the lower impact to the development scheme as the developers can transfer these risks to their contractors, since they have the full responsible to manage the project site during construction stage. The workforce unavailability risks also became the serious risk in Thailand's property industry because of this industry presently lack of skilled workers and labour forces, but this risk can be transferred to the contractors as well.

244

Table 7.17: Summary of case studies perceptions towards the purpose risk assessment model

Case Study	A	B	C	D
The model effectiveness	The degree of risks as indicated in the model did not specify any differences between the high and the low impact risks.	The degree of risks as indicated in the model did not specify any differences between the high and the low impact risks.	Some necessary risks for the UK real estate context shall be added into this model. For example, financial risks (interest rate fluctuation, sources of funding). Then, this model shall add more concern on availability of fund as this would cause the crucial risk to the development scheme.\n\nMoreover, it was necessary to include the social risks caused by the public opinion into this model.	The case study perceived that this model was interest and applicable to use in the real business case. He also stated that this model would be applied to assess risks in the other kind of project (i.e. energy related, agriculture etc.)
The model efficiency	Technological risks as contained in the STEEP factors shall be clearly identified, whether these risks are affected by the construction technology changes, or risks caused by constructional activities (i.e. contractors, time-schedule, cost)			
The model flexibility	The figures of factor loadings were not clearly understood.	The figures of factor loadings were complicated to be understood by project participants.		
The magnitudes of risks	Risks in Thailand's real estate industry shall be reordered as:\n\n-Economic, particularly marketing risks because these risks are totally uncontrollable)\n\n-Social, the developers need to concern on the locality factors.\n\n- Political, the contrast between the local development plan and project's objectives must be addressed by the developers prior the project start.\n\n-Technological, these risks were mostly controllable and transferable.	According to his opinion, risks shall be reorganised in the following manners:\n\n-Economic, the financial risks had the highest impact to overall real estate development process, (sources of fund and cash-flow illiquidity were the serious issue to this kind of risk)\n\n-Social, workforce unavailability also being the other factor to be concerned in the development process, but this risk can be shared with the contractors.	In the UK or European context, social risks have a huge impact on the development scheme, especially risks caused by the public opinions, social attitude or public outcry.\n\nHowever, risks caused by the workforce unavailability had a little influence to UK development industry, because of there are plenty of workforce available, but this industry are lacking of skilled workers.	According to his response in assessment checklist (see Appendix XI). He stated that the political risks contributed the high impact to the development industry, particularly the risks caused by the change of government' policies. Since these would affect to the economic status and then to the development business, respectively.

245

	Constructability risk shall be prioritised as the first amongst the other technological risks - Environmental, these risks have only little impact on the project activities, since the developers can transfer these risks to contractors.	Technological or construction risks shall be the burden of project contractors/designers. - Political, the contrast between the local development plan and project's plan/designs. - Environmental, the pollution during the construction process shall be realised in the case that these would cause some damage to neighbour.	This model was considered as the useful model for the real business case as it given the wider aspect of risks in term of STEEP factor. However, this model shall be more generalised to use in other kinds of project and some criteria such as the quality of works (technological risks, since these affect to the customers' potential to buy properties and the income stream of project).
Suggestions	-The scale of risk measurement shall be improved to indicate the level of risk clearer. - There are several types of real estate projects, thus it was recommend to create the risk assessment model to suit with each type of projects. - The scope of technological risks shall be narrowed down in order to reduce the respondents' confusion.	- As the figures were so complicated to use, then it was recommended to use some multiplier (percentage, weighted quality score) to distinct these figures.	The model developer shall address the importance of social risks, particularly the locality acceptance to the new project.

Conversely, case C and D stated that technological and social risks had the critically impact on the development scheme in the UK's context, these risks directly related to the planning permission or approval of the local authorities. In the present time, the workforces' unavailability has less consequence to the developers, there are a plenty of workforce available in job market, but UK's construction industry are currently lack of skilled workers (these are imported from the other countries)

The case studies' perceptions towards risks insisted that risk had the subjective and individual meaning, as both groups perceived the different degree of risk seriousness. Therefore, the level of STEEP risk's criticality shall be re-ordered by the case studies' judgements (high to low) as Economic, Political, Social, Technological and Environmental respectively.

Thai case studies suggested that this RAM shall feature the multipliers or any coefficients to distinguish the magnitude of risk significantly, and to quantify each risk in the systematic manners, these will enhance this model's effectiveness, efficiency and flexibility and also minimise the users' confusion towards the degree of risks' figures. In order to generalise the model, the assessment criteria were suggested that these shall be synchronised with the real situation, and address the importance of social and technological risks to this industry, too.

The case studies perceptions towards STEEP factor risks

The perceptions towards STEEP factor risks of Thai practitioners were separated into 2 manners as the EFA model indicated that Thai practitioners perceived that the Technological risks critically affect to the real estate projects (see Chapter 6), it also informed the hierarchy of risks in Thailand's property projects. Whilst the qualitative results in phase 2 did not point out the priority of real estate risks, but these provided the details and the origin of risks. Therefore, this phase aimed to validate the purposed risk assessment model (EFA), and then it requested the case studies to indicate their perceptions towards each of STEEP factor, the current risk assessment practices including the information to support their decision-making towards risks.

The seriousness of STEEP risks had been re-ordered in accord to the case studies' perceptions, where the case studies perceptions of STEEP risk are summarised in Table 7.17, which also explains their currently use risk assessment methods.

Thai case studies (A, B) indicated that technological risks are mostly controllable, and can be transferred to the project's contractors; therefore they do not have a high impact on the development activities. Whereas Case B and D informed that the conflicts between project's stakeholders (i.e. property management team and developers or designers) shall be concerned by the decision makers.

To assess the consequences of the technological risks effectively, the case studies suggested that the assessors shall utilise the vendor information or the procurement contract to foresee risks caused by the contractors' substandard performances. Meanwhile, the risk related to the non-constructability issues can be assessed by adopting the planning permission frameworks or the urban development planning's requirements. Furthermore, to evaluate the risks caused be the conflicts between stakeholders, case D had suggested the stakeholder analysis, which is qualitatively created supposed to identify and assess the importance of key people, groups of participants, or institutions (both inside and outside the project environment) that significantly influence the project success (both positively and negatively), and then the decision makers are able to develop strategies to gather the most effective support possible for their projects (MSH and UNICEF, 1998).

In the context of economic risks, all case studies stated that economic risks have the critical consequence to the development scheme as they are directly related the projects' income stream. The economic risks were formed in various types and sources, either the internal sources (financial risks, marketing management risks) or the external sources such as demand/supply misestimate, the customers' lifestyles, the government's policy and the fluctuation of materials/fuel prices (see Chapter 7.5.3). Case C and D also emphasised that the economic risks in the UK context are actually related to the government's activities (policy changes). For example, if the interest rate changed, the cost of project funds would increase drastically. Moreover, the increment of taxation seriously affect the project earnings and cash flow liquidity, while the increment of property holding tax also influence the customer's decision to buy property (NAR, 2003).

Some economic risks were quantifiable such as the financial risks or impact of the construction materials/price variation on the project cost, or rental rate which could be mathematically evaluated. However, the other economic risks such as marketing risks, or the macroeconomic risks were difficultly quantified. Case A suggested that the secondary data from reliable sources such as Consumer Price Index (CPI) or number of house registered/absorbed in the market shall be used as the supportive information for assessing marketing risks. Meanwhile case C and D recommended that the developers shall consider the regulations that related to a change of interest or tax rate in

order to predict these outcomes to the project cash flow. Whereas, marketing risks shall be addressed by the developers as the current UK property market is volatile and suffer from several factors such as the VAT rate increased.

Case D suggested that the sensitivity analysis shall be used to deal with the quantifiable data, by obtaining the calculation's outcome while changing the mathematic variables. Meanwhile the "*scenario analysis*" shall be another option to assess the unquantifiable data, and the qualitative economic risks shall be better assessed by the discussion with the experts in the particular area.

According to the results of this phase, it could be interpreted that the economic risks have the highest impact on the real estate projects. These findings supported the perceptions of Thai practitioners towards economic risks' magnitude, which gathered from both phase 1 and 2. The economic risks were concluded as the first risk to be prioritised during the project feasibility analysis processes in order to safeguard the projects from the severe market condition.

In this phase, the perceptions towards political risks were divided into 2 aspects, which are the government's regulation impacts and the political situation, respectively. Thai case studies insisted that the developers shall concern on the risks caused by the breach of local/government regulations rather than the current political situation. The violation of regulations lead to the project termination by the related/approval authorities and that affected the project marketing and selling activities. Therefore, the developers shall give more precedence to the regulations issued by central or local government. For the UK context, political risks had the strong linkage with the economic risks as the change in government regulations influence the following economic risks such as the change of interest rate or tax rate etc. Case D insisted that the political dimensions (mayhem, riot) convey high impact on development, in case of the developers/investors may withdraw their investment from the affected area.

All case studies pointed that these political risks could be analysed by using a discussion with the experts to obtain the judgements about the impact of political risks. The discussion shall be used alongside with the self-observation (the developers/decision makers) to the change of government regulations or policies.

Thai case studies perceived that social risks had a little impact on the project progress, as these only occurred when the project locate closed to the sensitive areas such as the natural conservation areas,

religious/spiritual places or the historical communities. Case D supported that the developers always lack of consideration on these social risks although the project activities may indulge the surrounding environment. Whilst case C contrasted that these risks strongly influence to the development industry as the public outcry or non-acceptance would direct or even terminate the project design and planning scheme, as the local community may remonstrate the new project development.

However, these social risks were unanimously agreed that they are not quantitatively assessed according to their subjective meanings. The developers can only apply a local community survey and collect the secondary data (e.g. demographic data) from the reliable sources to assess these social risks (Danter, 2007).

Thai developers always neglected on the impact of the environmental risks, case D contrasted that these risks also impact on the project's surrounding environment in term of the pollution produced during the construction process. Those affect to the changing of materials if the project located in the poor environmental conditions area. The project's design must conform to the environmental regulations' requirements. Furthermore, case A and B stated that the environmental risks would have less affect unless the developers violated the regulations, therefore the risks caused by violation of environmental regulations shall be added into the risk assessment criteria as well.

The economic risks had been underpinned as the first priority risk to be concerned while managing the property projects. These persistently supported the findings of the qualitative phase, and the results also revealed that STEEP factor risks have the potential impact throughout every stages of project development. The decision makers shall adopt both quantitative and qualitative methods to assess risks, but any decision maker's supporting methods must be supported by the reliable and validated data to enhance the quality of the model.

Table 7.18: Summary of case studies perceptions of STEEP factor risks

Case study	A	B	C	D
Technological risks	The technological risks are controllable, they had little impact to the overall project progression. The developers could transfer risk to contractors or vendors The suppliers/vendors information (database) and the variance between actual and planned works/budget could be used to assess technological risks	The technological risks are controllable, however they also had high impact to the overall project progression (time and cost). The developers could transfer risk to contractors or vendors as well. Moreover, the conflict between property management team and developers became the specific issue for Thai development industry. The suppliers/vendors information including procurement contract and contractors' performance reports could be used to assess technological risks	It was recommended to specify the scope of Technological risks in this model clearer (either construction processes or technology change). For the UK context, the planning permission shall be the biggest issue. The constructability risks could be assessed by using the planning regulations' frameworks or Urban development planning knowledge. The developers could also gather their contractors' qualifications and use these as the database to assess the construction' risks. The experience of project managers could be adopted as the risk assessment tools to assess the communication & conflict risks as well.	He agreed with Thai developers' perception towards risks caused by the participants' conflicts, as each project stakeholder has his/her own objective. The stakeholder analysis could be to analyse the stakeholder's affects. This analysis was purely qualitative method and could wider assess the impact (positive & negative) to project stakeholders, both inside and outside project.
Economic risks	The economic risks, particularly, the marketing risks (demand/supply forecasting) must be ultimately concerned, since these affect directly to the project's income stream. Marketing risks could be assessed using the available indices (i.e. Consumer Potential Index, Properties absorption rate or number of housing registered). While the financial risks could be analysed by interest rate and project cash-flow.	In normal situation, the financial risks shall be emphasised by the developers and decision-makers, but in the irregular situation, the perception of risks may be varied by the developers' attitude to risks. Financial risks could be assessed by project cash-flow, bank interest rate (both loan and mortgage rate).	Economic risks are tending to be the external influences and these have an interlink with political risks (policy changes). For example, if the policy related to interest rate change, the cost of funds would increase. Economic risks are extremely affect to the development industry, thus the developers shall assess risk in order to safeguard themselves from the severe market situation. The developers could check the regulations that related to the economic policies. For marketing risks, the developers could use rental rate, yield, vacancy/occupancy rate, etc.	The economic risks had the highest impact on the development process, since these directly related to project's income. However, there were some external economic factors that had the strong linkage with political risks (taxation, interest rate change). Both sensitivity and scenario analysis could be used for assessing economic risks, these were based on the changing of important variables and foresee the final outcomes.

251

Case study	A	B	C	D
Political risks	Political risks affected to real estate projects in 2 manners, the violation of the related regulations and the political situation. If the developers developed their project followed the requirements of regulations, these risk would absolutely controllable and easy to mitigate. However, Thai regulations were complicated in interpretation that disables the developers to follow these rules strictly. These made the developers and customers panic on the changing of government's policies. The political turmoil may have a little impact to the developers and customers' potential to buy properties. Political risks could be assessed by observing the frequency of the regulations issued.	Thai customers may over-panic about the current political situation, therefore they would postpone their decision making in buying new properties. In the developers' point of view, they shall concern on the impact of regulations on the project's design and planning scheme.	Political risks tended to be long time risk, since these risks mostly related to the change in government legislations such as VAT or tax rate rather than political unrest situation. In UK context, political risk seemed to be a slow process and related to the government policies change. Political and economic had a strong relationship together, since the economic system would follow the politic. When the government policy change, these would affect to economic system.	The responses of government had the potential impact on the development as these influenced the planning process of project, but this factor mainly need the qualitative method to assess political risks. Government actions also affected the economic risks such as the raise of taxation, interest rate. Moreover, the political dimension (mayhem, riot) had the impact on development, in case of the developers/investors may withdraw their investment from the chaos area. There was no statistical method to assess political risks unless discussion with the experts who had solid background in the particular area.
Social risks	This risk was hard to assess, particularly the locality risks which caused in a situation that the project located closed to the local community interests, the residents may resist the project construction process. The developers shall observe the local community's characteristics by conducting survey themselves or use the secondary from the reliable sources.	These risks had a little affect on project progress, unless the project located on the sensitive area such as conservation area, religious etc. The survey methods would be the best way to assess social risks.	In UK, social risks had the strong influence to the development industry. The public opinion, outcry or acceptance would direct or even terminate the project design and planning scheme, in the case that the local community protests the new project development.	The developers actually did not take these social factors into their consideration, although these affected to the community around the project environment. These risks also non-quantifiable, the assessors could use only the discussion with experts or use the demographic data for supporting their decision-making process only.

252

| Environmental risks | This kind of risk did not have serious impact on the project progression unless the developers violate the Environmental regulations.

The delay in Environmental Impact Approving (EIA) was not a risk, but it should be the mandatory assessment criteria for the developers to follow, in case that the developers followed the EIA requirements, they would not bear any environmental risks.

Environmental risks could be assessed by EIA reports and self-observation. | The inappropriate conditions of project site shall be another environmental risk that need to be focused by the developers. For example, some area in BMA had the poor soil condition and needed the special construction methods, these would affect the project budget/time and quality of project.

An environment impact study shall be put into the planning permission approval in every project. The pollution risks as shown in this model indicated the high level of seriousness that the developers have to concern while managing the projects. | These also being the important factors because of the project may have environmental damage, that needed an allowance to modify or change the project designs or materials, and then these would influence to the project income.

To assess these risks, the assessors had to elicit the opinions from the environmental specialists to collect their judgement |

253

Model validation

In order to validate the RAM derived by phase 1, all case studies were requested to indicate their agreements against the seriousness of risk gathered by EFA analysis. Each case study was free to give the opinions and suggestions toward the model's validation. Their judgements are summarised in the Tables 7.19 to 7.23, the case study is represented by 4 block alphabets (A to D), whilst the underlined and shaded (A) indicate the level of agreement that a case study fallen into. The simply counting was applied to summarise their level of agreements towards the perception of STEEP factors of Thai practitioners. Their suggestions and comments are concluded and explained at the end of each risk analysis section.

Technological risks

This mode contained with 5 risks in 4 components. The levels of agreement were heterogeneously distributed, but these tend to be agreed with the phase 1 results.

Table 7.19: The summary of case studies agreement towards the practitioners' perceptions of Technological risks

Component	Risk	Variable Name	Factor loading	The case studies level of agreement against the practitioners' perceptions of STEEP factors				
				Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Participants' conflict	Frequency of project participants' conflicts	TEC5F	0.931	A	B		C	D
Property management	Frequency of difficulty in property management	TEC6F	0.863		B, C	A	D	
Project planning and design	Frequency in project design and amendment	TEC2F	0.854	A	B,C		D	
Constructability	Consequence of project in-constructability	TEC2C	0.848			D	A, B, C	
Property management	Consequence of difficulty in property management	TEC6C	0.840		C	B, D	A	

Each case study had a different view about the seriousness of the stakeholders' conflicts, although this risk had been addressed by Thai developers as the highest impact risk. Case D stated that conflicts of the stakeholders (inside of outside project environment)' directly affect to the project schedule, cost and project's direction (Ohlendorf, 2001). However, case A and C contrasted that

these conflicts can be easily handled by hiring the experienced project manager to act as the negotiator amongst the party of stakeholders (PMBOK, 2004: Ohlendorf, 2001).

According to the consequence and frequency of the property management's difficulty indicated in the model, the case studies given the neutral agreement against Thai practitioners' perceptions. Case B stated that the conflicts between the developers and the property management team become the specific issue to Thailand's real estate business, but this risk also easily solved by the experience project managers.

Most of them (3 out of 4) disagreed with Thai practitioners perceptions in regard to the likelihood of project design/planning amendments, as this issue shall be the wholly responsibility of project designers, contractors and the experienced project managers. However, they agreed that the non-constructability risk had the serious consequence on the project's activities, especially during the construction stage. As the delay in project schedule or improper products' quality shall affect to the customers' willing to buy property and the further project's income stream.

The case studies only emphasised on the consequence of risk caused by project non-constructability. Whereas the rest of them were perceived as the low impact, transferrable and simple mitigated risks.

Economic risks

The phase 1 resulted that the economic risks were the second high impact risks in this industry, phase 2 supported the causes of economic risks and their significances to the real estate projects. To finalise these, the case studies were requested to indicate their level of agreement/disagreement against the extracted 5 economic risks (see Table 7.20).

The case studies perceived the criticality of economic risks in the same manner with the phase 1 results. In this regard, the illiquidity of project cash flow was agreed as the highest impact economic risks, followed by the frequency of interest rate fluctuation as these factors are directly related to the income generating characteristics of real estate project (Blundell et al. 2005). The fluctuation of construction materials prices had been concerned by the case studies because of these influence to project construction cost eventually. The findings supported the phase 2 results that Thai developers suffer from the higher construction cost and they have to modify their project plan/schedule and construction budget to suit with the market's situation.

Table 7.20: The summary of case studies agreement towards the practitioners' perceptions of Economic risks

Component	Risk	Variable Name	Factor loading	The case studies level of agreement against the practitioners' perceptions of STEEP factors				
				Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Construction materials	Consequence of construction materials' price fluctuation	ECON14C	0.873			B, C		A, D
Project income	Consequence of project cash-flow illiquidity	ECON11C	0.844				B, C	A, D
Construction materials	Frequency of construction materials' price fluctuation	ECON14F	0.816		B	C	A	D
Marketing plan effectiveness	Frequency of demand and supply mis-estimation	ECON6F	0.809			C, D		A, B
Project funding	Frequency of interest rate fluctuation	ECON10F	0.804			C	B	A, D

The marketing management risk, particularly the wrong estimation of the property demand/supply also being addressed by the case studies, case A affirmed that this shall be the significant risk in the economic risk mode. As the demand/supply of property are actually uncontrollable and hardly forecast, and these cost the lost in income receiving from sell of properties (Cook and Page, 1987; Stone and Gronhaug, 1993).

The case studies strongly agreed that economic risks are the highest impact risks amongst the rest of STEEP factors, because of these risks were caused by various sources, whether marketing, macroeconomic or financial (see Chapter 7.5.3). They have both subjective and quantitative meanings, therefore it was difficult to assess economic risks by using only statistical/mathematical approaches. The findings of this phase conformed to the results of the second phase, and also underpinned the importance of the economic risks in real estate economy.

Results of phase 2 divided political risks into 2 groups of the regulations' contradiction and the current political situation. In this phase, 5 political risks that influenced strongly on Thailand's real estate projects were presented to the case studies in order to obtain their judgements.

Table 7.21: The summary of case studies agreement against the practitioners' perceptions of Political risks

Component	Risk	Variable Name	Factor loading	The case studies level of agreement against the practitioners' perceptions of STEEP factors				
				Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Project compliances	The consequence of contradiction between project plan objectives and local development policy	POL3C	0.899		A		B, C, D	
Project compliances	The frequency of contradiction between project plan objectives and local development policy	POL3F	0.893		A, B		C	D
Government	The frequency of political situation.	POL1F	0.815		C	A, B	D	
Government	Consequences of the approval duration from the relevant authorities	POL2C	0.795		C, D		B	A
Government	The consequence of Thailand political situation.	POL1C	0.777		C	A, B	D	

The case studies clearly paid more attentions to the risks caused by the project compliances issues, as mentioned in Chapter 7.6 that the contradiction between the local/government policies and the project objectives denotes significant impact on the approving or terminating of project. Whereas the unstable political situation had less influence on the developers' decision making, but these would panic the customers' intentions to buy property. To mitigate the political risks, Thai case studies recommended that the developers shall prepare the contingency plan that suit with every political circumstance to prevent damages caused by political dimension (mayhem, riot).

257

Phase 1 results informed that Thai developers neglect to assess the consequences of social risks, and they only concerned on the shortage of workers, but less on the impact of the projects to the local communities. The significance of workforce unavailability was extended in phase 2 by the interviewees who addressed this factors' importance. Therefore, these perceptions of social risks were validated in this phase.

Table 7.22: The summary of case studies agreement against the practitioners' perceptions of Social risks

Component	Risk	Variable Name	Factor loading	The case studies level of agreement against the practitioners' perceptions of STEEP factors				
				Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Workforce availability	Frequency of workforce unavailable	SOC4F	0.882		C, D	B	A	
Locality	Consequence of the local community do not accept the project	SOC1F	0.865		B	C, D	A	
Workforce availability	Consequence of workforce unavailable	SOC4C	0.832		C		A, B, D	
Locality	Consequence of the local community do not participate in the project	SOC2C	0.831			B, C, D		A
Locality	Frequency of the local community do not participate in the project	SOC2F	0.756		B	A, C, D		

The case studies given the neutral agreements against the phase 1 results, and they also perceived these risks in the similar manner with Thai developers. Case A stated that the consequence of SOC2C had strong impact to the project progress because the local community may protest the newly developed project. Whereas case C stated that UK did not confront with the workforce unavailability situation, therefore this risk had less impact on UK real estate industry.

Environmental risks

The results of phase 1 and 2 identified that Thai developers paid the least attention to the environmental risks, they only concerned on the delay of EIA approval, but neglected to the

pollution produced by their project affect to the surrounding environment. In this phase, the case studies gave neutral agreements against the practitioners' perceptions, 3 case studies addressed the seriousness of site inappropriateness (soil condition, contaminated land) as these affect to the further designs, construction progress and customers' intention to buy properties.

Table 7.23: The summary of case studies agreement against the practitioners' perceptions of Environmental risks

Component	Risk	Variable Name	Factor loading	The case studies level of agreement against the practitioners' perceptions of STEEP factors				
				Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
External Impacts	Consequence of site inappropriateness	ENV4C	0.882		B		A, C, D	
Approval from EIA	Frequency of delay in EIA Approval	ENV1F	0.858		A, C	B	D	
Approval from EIA	Consequence of delay in EIA Approval	ENV1C	0.818		A, C	B, D		
External Impacts	Frequency of site inappropriateness	ENV4F	0.810			A, B	C, D	
Environmental risks likelihood	Frequency of pollution risks	ENV3F	0.766		B	A, C	D	

The delay of EIA approving had been stressed by both phases' results, however, the case studies did not agree with these results, as they stated that EIA is a mandatory requirement that the developers shall achieve before commence the construction process, the delay would be occurred in the case of the developers violated the EIA's regulations. If they followed EIA requirements accordingly, there would be a less risk. Moreover, case D agreed that the developers shall concern on the pollution risks and their impact on environment.

To sum up, the case studies agreed with the practitioners' perceptions towards environmental risks, however they did not agree with the influences of delay in EIA approval process. They also pointed that the site inappropriateness and pollution risks shall be prioritised while assessing the project's environmental risks.

7.7. SUMMARY OF PHASE 2 FINDINGS

The research approach of phase 2 was conducted in accordance with the interpretivism epistemology and inductive reasoning, the interview technique was then selected as the data collection method to gather richer data to respond to the practicality of the model (phase 1 EFA results). This phase was divided into 2 phases as the interview with Thai practitioners and case studies. The summative findings of both phases were drawn from the analysed of the respondents' texts, manuscripts, and interview records.

7.7.1. Interviewing summary

Thirteen interviewees were selected from the different positions, organisations and working experience. They were all the decision-makers towards risks in their projects, six of them involved in SME developers, while the rest were in the public company (registered in SET). The interviews questions were designed as the open-ended, informal organised in order to encourage the interviewees to provide as much related information to the studied topics. The findings of this phase are described as:

Thailand's real estate industry: this industry is not seriously complicated, but it affected from some un-predictable risks, particularly the current political and economic volatile situations. The interview also informed that risk assessment and identification activities were neglected by Thai developers due to some reasons, it was however related to the reason that the comprehensive risk assessment techniques or the proper assessment criteria were not established, and there were only a few research focused on risks in this industry. Furthermore, Thai developers are currently lack of the systematic risk assessment techniques, as there are several obstacles for them to use the formal techniques such as knowledge, cost and time. However, the practitioners concerned on the existence of risks in every project stages, and they have created and implemented their project risk assessment models in order to deal with the complicacy of risks.

The interview processes have filled the drawbacks of questionnaire survey because it addressed the criticality of location factors. The interviewees addressed that location and land prices reflected the crucial risks to their project progresses because of the improper site would affect the project marketing and financial feasibility, these lead to longer time in selling and managing the construction processes. The proper timing, systematic negotiations, and the phasing strategies were suggested as the keys to minimise risks caused by the location factors. The interviews extended the

details of in-depth information in Thailand's real estate industry, because these emphasised on some missing points in the first phase such as location, and feasibility analysis.

The STEEP factor risks, the interviews informed the origin and details of each risk in this industry as:

- *Social risks* the workforce unavailability reflected the high consequences to Thai developers in term of the impact on the quality of products or production cost risks. Whereas the risks caused by the locality aspects have less priority as the developers believe that these risks are easily mitigated. These findings confirmed with the phase one results in regard to the criticality of the workforce unavailability.

- *Technological risks* this mode was divided into the considerations of time, cost, quality of products, constructability (design and planning), and property management respectively. Thai practitioners also given precedence to Technological risks and these considerations were addressed while managing the construction stage. These considerations were complex and also influenced to the following risks such as financial risks, or the marketing risks.

- *Environmental risks* the interviews supported the phase 1 results that Thai developers concerned especially on the delay caused by EIA approving, because it affects to the project duration and cost of construction. However, the second phase contrasted from the first phase in a regard that the developers shall consider on the risks caused by in appropriate conditions of site.

- *Economic risks* these risks were divided into 3 stances of macroeconomic risks, financial/monetary risks and marketing risks. The economic risks are the most complicated amongst the other STEEP risks, as they associated with much originality and their consequences affect strongly to the progress and the income stream of the projects. The marketing risks are actually non-predictable and subjective matters, as these caused by various factors such as the wrong estimation of demand/supply, the competitors, or products' prices do not attract the customers. The marketing risks influence directly to the following selling and marketing activities. The interviewees also perceived that risk caused by the shortage of funds is the most severe risk to the project progress because of the real estate projects naturally need large sum of investment money. Therefore, the inadequate supportive funds affect strongly the income stream and the working capital of project immediately. Moreover, macroeconomic risks shall be concerned by Thai developers, particularly the risk caused by the variation of construction materials prices, because of this

risk influence to the project progress, the developers have to spend more cost to purchase the good materials.

- *Political risks* the interviewees stated that the current political turmoil and instable situations affected strongly to their marketing strategies, as these raised more pressure from the financial situations. In addition, the developers shall study the limitations and allowances of the related planning/construction regulations and follow these strictly in order to reduce risks caused by the contradiction between the regulations and project plans.

The differences of the STEEP risks perceptions between both phases' results were existed, as seen in the EFA results, Thai practitioners perceived that the risk caused by the miscommunication amongst project participants had the highest impact to the project's progress, followed by the project compliances with the regulations. While the interviewees given much precedence to the marketing risks (marketing management), followed by the difficulty to seek for supportive funds and workforce unavailability, respectively. Therefore, it could be concluded that the seriousness of risk is individually varied in according to the decision makers' attitudes and experience. It also responded to the assumption that there is no measurement standard to rank or prioritise risks in this industry.

The current risk assessment practices, all interviewees unanimously agreed that risks in this industry were subjective and their seriousness are varied, then risks cannot be effectively assessed by the statistical or mathematical techniques only, but the appropriate RAM shall be equipped with the practitioners' experiences as well.

The project feasibility analysis was agreed as the best risk assessment method, because it helps identifying risks in a project and inform the appropriate project plans/strategies before the construction stage commence. This is because of this analysis provide the necessary information to the developers such as the marketing data, the financial and project cash-flow prediction.

Finally, the interviewees given more details about the required RAM that the ideal RAM shall provide the reliable data to support the decision making processes. This must be equipped with the reliable assessment criteria that covered on the major risks in Thailand's real estate projects. These findings helped in modifying the EFA model derived in phase 1. The information gathered by the qualitative approaches has been synchronised with the phase one data and the model derived from EFA analysis to form the appropriate risk assessment model. .

262

7.7.2. Model explication summary

The model explication was conducted in order to validate the risk assessment model before implement in Thailand's property sector. The case study approach (Yin, 2003) was selected as it triangulates the results derived from phase 1 and 2 as well as it enhances the validity (see Chatper 7.6.1) and reliability of this model. There were 4 case studies involved in this phase, all of them did not directly involved with Thai developers, but they had solid experience in risk assessment /management in this industry. This process was instrumented with the validation interview records and manually coded/analysed. It was divided into 3 agendas as the practicality of model, the case studies perceptions towards STEEP factors and the model validation which testified the level of risks against the phase 1 results.

All cases studies agreed that the real estate's risks are subjective, they are mostly non-quantifiable and unpredictable. In order to assess these risks, they suggested that the assessor shall combine the precise data collected from reliable sources, the proper statistical/mathematical techniques and the experience of assessor. On the other hand, the qualitative assessment methods such as discussion panel, risk ranking etc., were recommended to use alongside with the aforementioned approaches.

In regard to the risks' magnitude, the case studies contrasted their perceptions against Thai developers' perceptions, as they paid more attention to the seriousness of economic risks. Therefore, the order of the real estate's risks shall be rearranged as Economic, Social, Political, Technological and Environmental, respectively. It was because of economic risks (internal and external) are all directly influence the project's income stream, the development cost and, to the marketing/selling activities.

This validation phase then depicted that this EFA risk assessment model is pragmatically used in the business as this covering on the major existing risks in the real estate projects. However, this model need some modification before use as it contained with the complicated figures (i.e. factor loadings), some important criteria such as social and political dimension shall be added into the risk assessment criteria.

Based on this validation phase's results, the RAM was suggested to be generalised to assess risks in various project types, in any circumstance, and it shall provide the most accurate data. The supposed

model was quite satisfy, but it needs some modifications such as the Technological risks' scope shall be narrowing down, and the figures used in model shall be simplified to reduce their complicacy.

The final conclusion was drawn as there is no universal risk assessment model that covers on every real estate risks, it was because of the subjective and complexity nature of risk. Each decision maker has individual belief or judgement towards the seriousness of risks and need the specific suitable risk assessment method to deal with the project risks. However, both research approaches informed the importance of each risk in the STEEP factor criteria and also specified the risks that need to be included in the assessment criteria in order to enhance the reliability and validity of the further risk assessment models for this industry.

CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

8.1. INTRODUCTION

This research was conducted in order to introduce an innovative risk assessment method to the Thailand's real estate industry and to investigate the Thai practitioners' perceptions towards risks in the property projects. It also explored the current risk assessment practices including the features of the ideal risk assessment techniques in regard to develop the risk assessment model that suit with this industry's context and the practitioners' requirements.

The risk assessment criteria equipped with this model were created based on the STEEP factors' requirements that the practitioners shall considerably concern while managing the real estate projects.

This chapter starts with the summary of the research philosophies and methodologies, the findings from both research phases and the risk assessment model explication and this finalised by the recommendations and suggestions for the further researches.

8.2. RESEARCH PHILOSOPHY AND METHODOLOGY

The research stances were developed based on the philosophical, ontological, epistemological, reasoning paradigms, included the practical considerations and the accessibility to informants. It stood on the constructivism ontological paradigms as this research emphasised on the assessment of risk, which considered as the phenomenon in Thailand's real estate projects. In term of epistemological stance, interprevism was selected because of risks are truthfully subjective aspects, and these require the interpretation of the risks' magnitudes (consequences and likelihood). The inductive reasoning was adapted alongside with these aforesaid research paradigms, because of the research's information were gathered and determined by the assessment criteria within the non-controllable environment with less structured data collection processes.

The mix method was adopted in the data collection process, as it provides more triangulation and reliability of research data. This process was a mixture between the questionnaire survey distributed to the developers in the studied area and the interviews with the practitioners in order to maintain this research philosophy, which addressed more precedence to the qualitative paradigm.

The research process was designed as the *two phases approach* (Creswell, 2008), the first phase was the combination of secondary data research gathered by the literature reviews, the trial studies and the empirical data gained by the questionnaire survey. These aimed to investigate the Thailand's real estate business context, the respondents' biographic data, their perceptions towards STEEP included the attitudes of the current risk assessment practices. In the second phase, the analyses of qualitative data gathered by the interviewing with Thai practitioners were adopted as these data provided richer and fruitful information. These also informed the details of risks and other concern factors for assessing risks in this industry. The model validation phase, which was designed to validate the purposed risk assessment model gathered from the advance statistics analysis in phase 1 was also included in the second phase. The model was created based on EFA techniques it was validated to see its practicality in this model validation phase. The case studies' interviews were employed in this validation phase in order to see the outcomes, which was the validated risk assessment model that was proved in its efficiency, effectiveness and flexibility before launching into the business.

The summative conclusion of this research was drawn by the findings of both research phases that included the establishment of the risk assessment model and the validation of its practicality.

8.3. SUMMARY OF FINDINGS

As mentioned above, the data collection processes of this research had been divided into 2 phases, the findings of each phase are therefore summarised as follows.

8.3.1. Phase 1 findings (Secondary data)

The related documents included the secondary data information from various sources such as academic journals, website, or agencies' data had been extensively reviewed through Chapter 1, 2 and 3, respectively. These informed that Thailand's real estate sector is in the contraction period due to the global economic crises, the increment of construction materials prices and the government's policies towards real estate sector. These affect to the developers' decision-making process towards risks and the project management activities. However, the formal risk assessment technique has not been developed in Thailand's real estate industry, this lead to the lack of systematic risk assessment techniques and the developers' negligence of the risk's impact. The popular risk assessment technique employed in this industry is the panel discussion, which provides less precise data to support the decision making practices.

In regard to the risk classification, it was summed that risk has a variety of impacts to the real estate project, whether in term of the project schedule delaying, cost overrun or the ROI not match with the developers' expectation. Risk was underpinned in this phase as the subjective matter and exists in various manners, for instant, systematic VS unsystematic, subjective VS objective or its originality. However, the research classified the real estate risks by the STEEP factors definitions as it covers on the existed major risks in the real estate projects, and this is simply in using or communicating to the practitioners. Therefore, risks in this industry are concluded as subjective, non-controllable, they had the directed impacts on the project progress.

The literature reviews also informed that the new established model shall facilitate the users in estimating the subjective real estate risks, and interpret them into mathematical figures. It also notified that the measurement criteria used in the survey may be varied in according to number of respondents, limitation of time and resources, the number of assessment criteria, the different of real estate business environment and the decision makers' attitudes towards risks.

Phase 1 findings (Empirical data)

The questionnaire survey technique was adopted to gather the empirical data from the respondents, those questionnaires were sent to Thai practitioners and experts in the studied area. Most of the samples were the decision making role towards risks, more than a half of them have the solid risk assessment/management experiences.

Thai practitioners did not familiar with the formal/systematic risk assessment models and only a few of them used the formal models to assess risks. The results revealed that formal RAM were moderately satisfied in the models' effectiveness, efficiency, user-friendliness and flexibility, but they stated that the RAM were too expensive if using in the SME organisations. The results indicated that Thai practitioners popularly use the panel discussion or brainstorming techniques with the risk experts, following by using the self-research secondary sources of information (i.e. survey of competitors or the benchmarking technique) to support their decision making.

The research hypotheses were formulated in order to verify the differences between the respondents' perceptions towards risks and the current risk assessment practices, as well as to forecast the trend and relationship of the research variables. Several statistical techniques whether parametric (i.e.

Independence T-Test and ANOVA), Correlation tests or non-parametric tests (Chi-square) were employed to verify a series of research's hypotheses (See Table 8).

Table 8: Summary of hypotheses testing

Hypotheses	Descriptions	Tested by	Results
1	It is expected that there is no significantly difference between the Thai practitioners' perceptions toward risks in the real estate projects		
1.1	The positions of the respondents	ANOVA	The null hypothesis (Ho) was accepted
1.2	A decision making role toward risk management/ assessment	Independence T-Test	The null hypothesis (Ho) was accepted
1.3	An experience in project risk assessment/ management	ANOVA	the null hypothesis (Ho) was rejected, the differences existed
2	Real estate projects in the studied area are impacted by the consequences of risks caused Social, Technological, Environmental, Economic and Political (STEEP) factors. Thus the association between the following shall be found (the main hypothesis was accepted due to three associations were existed)		
2.1	The organisational type of business and organisational turnovers in million Baht	Cross-tabulation	Associations were found, the null hypothesis was rejected
2.2	The typical projects that respondents participated and the related regulations	Cross-tabulation	Associations were found, the null hypothesis was rejected
2.3	The position of respondents and the current risk assessment methods.	Cross-tabulation	No association between these two groups, this hypothesis was accepted
2.4	A role in decision-making towards risk and experience in using the systematic risk assessment model	Cross-tabulation	Associations were found, the null hypothesis was rejected
3	It is necessary to implement and adapt the systematic risk assessment methods (techniques) as tools for the practitioners to assess risks in the real estate projects.		
3.1	There was a correlation between the satisfaction of the systematic/formal risk assessment models employed by the respondents	Correlation	The null hypothesis was rejected, there was a relationship between these variables.
3.2	The satisfaction in the current risk assessment methods might be varied in according to the experience in using the systematic risk assessment techniques of the respondents	T-Test	The null hypothesis was rejected, there was a difference of the satisfaction level.
4	It was expected that statistically significant and positive correlation amongst the risk factors (STEEP factors) shall be existed	Correlation	The null hypothesis was rejected, there was a relationship between these variables.

The results of these hypotheses tests are summarised as firstly the hypothesis 1 was rejected as a whole. While hypothesis 2 and 3 were accepted as the null hypotheses stated the non-differ between group of variables were all rejected. Hypothesis 4 stated the correlation between the designed variable was accepted, which informed that risks contained in the assessment criteria could be categorised in an order of their magnitudes, and these led to the foundation of the risk assessment model (see Chapter 7.6).

The conclusions of these hypotheses tests were drawn as the samples had been categorised into 3 groups, which were the decision makers towards risk, the positions in the real estate project, and the experiences in assessing and managing risks, respectively. These tests also supported the premises formulated in the Chapter 4.6 that the Thai practitioners in the studied area perceived the existence of STEEP factors risks as well as their consequences to the project's progress. The seriousness of STEEP risks were varied in according to the experience and attitudes of the decision makers, type of projects and the location. These risks affected to the project progress in terms of cost overrun, construction delays, and the quality of products mismatched the customers' requirements. However, the practitioners perceived that the external factor risks (political, legislations, economic) have the critical impact on their projects' progress more than the internal factors because of the externals are natural non-controllable and unforeseen, and there is no model to predict and assess the consequences of these external risks precisely. In this regard, the technological risks, particularly the conflicts of the project stakeholders had been addressed as the highest impact risks amongst the others. The correlation test also insisted that the STEEP factors risks had the positive correlation between them, the practitioners perceived the seriousness of those risks similarly (i.e. the political mayhem influences the marketing risks).

Furthermore, these tests underpinned the initiation of the innovative risk assessment methods, as Thai practitioners currently employed the panel discussion or their own experience (intuition) to assess risks, these would provide the inaccurate data to them because of risk is naturally complex and multi-dimensional, the informal assessment methods may not adequately assess risk in every dimensions as well as cannot provide the tangible supportive data (in mathematic or statistic) to the assessors.

Then, the explorative factor analysis (EFA) was conducted to test hypothesis 5 and explore whether the STEEP factors risks criteria can be rearranged in accord to their degrees of seriousness. Sixty six risks had been clustered into 5 groups with 20 components, the factor loading of these components were then listed to see which component portrayed the highest effect to real estate projects. This analysis results defined that the technological risks were the highest consequence risks, followed by economic, political, social and environmental risks respectively. These findings were adopted to form the initial risk assessment model (see Figure 7.15).

However, the quantitative approach did not provide the in-depth information of risk such as the sources of risk, the exact degree of each risk's consequence to the project progress or the relationship

between risk and other factors as well as the reasons or the barriers in using the systematic/formal risk assessment techniques. Then, the qualitative approaches were adopted to fulfil these disadvantages.

8.3.2. Phase 2 findings (Qualitative data)

The semi-structured interviews with Thai practitioners had been conducted to explore the in-depth information such as the source of each STEEP risk, the current risk assessment practices, the particular risk affects to their projects and how to mitigate risks. These information were then collaborated with the EFA model derived in the first phase to form the appropriate risk assessment model that conform to Thailand's real estate industry context and the developers' requirements.

It was revealed in this phase that Thailand's real estate industry is currently affected by the political and economic instable situations. The findings of this phase also insisted the subjectivity of real estate risks as these cannot be quantified by the statistical/ mathematical techniques only, but these also need some qualitative methods (i.e. experience, common sense) to evaluate risks efficiently.

The details of each STEEP factors risk such as the origins and their affect, the classifications of these risks were explored in this research phase, and the results are summarised as:
- *Social risks* Thai interviewees emphasised the significance of workforce unavailability risk as it affects to the following project activities such as delay in schedule, labour cost.
- *Technological risks* The scope of technological risks was narrowed down to the risks existing in the project construction stage, these risks are originated from five major sources which are time, cost, quality of products, constructability, and property management respectively.
- *Environmental risks* Delay in EIA approving became the highest impact risk in this mode because it affects to the further construction stages. Moreover, the developers shall concern on the impact of site's inappropriateness because of this also affect to the project budget.
- *Economic risks* These were divided into macroeconomic risks, financial/monetary risks and marketing risks stances in accordance with their degree of risks and their origins. The interviewees stated that economic risks are the most critical and complicated in this industry because they are associated with many sources and their outcomes affected directly to the income generating nature of real estate projects.

270

- *Political risks* Thailand instable political situation became the highest political risk amongst the other political aspects (i.e. policy change, local regulations) as Thai practitioners perceived that this panics their customers' confidence to buy new property.

The findings of this phase also provide some ideas to develop the risk assessment model that suit with Thailand's real estate contexts. The model shall be combined with the features that suggested by the real estate practitioners because of the practitioners are the end-user of the model and they know the exact contexts of the industry.

In addition, Analytic Network Process (ANP) was proved that it is not suitable to implement to be a risk assessment model for this industry since there are several theoretical and methodological limitations in using in the real business. One limitation is that ANP requires the comparison between two or more alternatives/solutions, but the real estate projects actually developed or built upon one solution that is accepted as the best development alternative by the project feasibility analysis.

The subjectivity of risks have been again supported by the findings of this phase, the degrees of risk are varied by the assessors' attitudes and their experience. It is then construed that there is no universal risk assessment model that analyse every risks in every type of project. The creation of risk assessment models are actually depended on the characteristics of project, the project environment and the coverage and effectiveness of risk assessment criteria that embedded into the model.

The interview results also given some features to develop the RAM, these were synthesised with EFA model from phase 1. In order to enhance the quality of the model, it was validated by the case study approach as this validation is discussed in the next section.

8.3.3. The model validation's results

This phase was subjected as a confirmatory phase (Tukey, 1980) for the data achieved by both research phases. It was used to validate the established risk assessment model derived from EFA analysis. The case study approach (Yin, 2003; Stake, 2005) was adopted as the data collection process to verify the practicality of the model before using in the industry and to confirm the perceptions of Thai practitioners towards the consequences of STEEP factors.

271

This phase resulted that the developers shall prioritise the economic risks as these risks strongly influence to the project's income stream and related cost as well as these were formed by various causes (whether inside or outside project environment). Moreover, most of the economic risks were agreed as the unquantifiable risks such as the marketing risks (demand/supply estimation, customers' behaviours etc). Therefore these risks shall be predicted and evaluated by combining both quantitative and qualitative assessment methods to assess these risks precisely. The case study approach helped in arranging the seriousness of risks in this industry, these risks shall be ordered by their magnitudes in the following manners: economic, social, political, technological and environmental, respectively (see Figure 8.1).

Furthermore, the real estate's risks were confirmed in every research phase on their subjectivity, the case study approach also emphasised that the best risk assessment method shall be synchronised with both quantitative and qualitative techniques, but it must be supported by the reliable and accurate information. For example, to assess the risks of the customers' lifestyles change, the developers may use the demographic data obtained from the consultancy firms, then they may apply the explorative data collection techniques such as questionnaire survey (Ader, 2006) to investigate the population in the trade area, followed by discuss the consequences and likelihood of this risk with the experts. Then, they can set up the risks assessment criteria and methods that suitable for this situation.

According to this phase results, the purposed risk assessment model was concluded as the effective and reliable model to be used in this industry since it covers on the major existing risks and it can be generalised for the other industries as well. However, this model shall add some important criteria focusing on the social and political dimension into the risk assessment criteria. The researcher shall reduce some complexities in the model and the figures presentations (i.e. using the multipliers or weight quality score to indicate the degree of risks).

Phase 1 results	→	Phase 2 results	→	Phase 3 results

Thai practitioners' perceptions towards degree of STEEP	Inform the sources of risks and feature of RAM	Validation of the model, Real estate risks shall be re-ordered as follows:
Technological risks	- Time - Cost - Quality - Constructability (design, planning) - Property management	Economic risks
Economic risks	- Macroeconomic risks - Marketing related risks (management, competitors, marketing mixed) - Financial and monetary risks	Social risks
Political risks	- Regulations/policies contradiction - Other political issues (mayhem, outcry)	Political risks
Social risks	- Workforces availability - Locality factors (acceptances and participations)	Technological risks
Environmental risks	- Regulations contradiction - Poor location	Environmental risks

The developers mainly used the qualitative methods to assess risks such as panel discussion, exeperience.	Ideal risk assessment model features: - Simply used and understood - Flexible and could be generally used - Less complicated figures	The case studies insisted that risks in this industry had the subjective meanings. Both qualitative and quantitative (with reliable data) shall be used together to enhance the quality of model

The purposed risk assessment model was created based on the theorem of Explorative Factor Analysis (EFA) and extracted only the high impact 25 risks out of 66 criteria.	The explorations above had been featured into the established risk assessment model developed by EFA in phase 1, the surfaces of the model were developed based on the idealistic RAM given by the interviewees.	The EFA model was quite satisfy, and could be generally used. However, this needs some modifications such as the figures shall be more clarified, Technological risks' scope shall be narrowed down.

Figure 8: Summary of research findings

8.4. CONTRIBUTION TO KNOWLEDGE

This research was positioned in the built environmental area which related to the management of risks in the real estate business. It aimed to deliver the new knowledge of risk assessment technique to Thailand real estate industry, where the systematic risk assessment methods were too remote from the existing industry. The findings from both research phases revealed that Thai real estate practitioners still lacking the systematic risk assessment methods to evaluate the risks' consequences

in their projects. These also informed that the practical risk assessment model equipped the proper risks assessment criteria, and emphasised on the existing risks in this industry, shall be established in order to help the developers dealing with the real estate risks. This research contributed the new knowledge of risk assessment into the real estate's body of knowledge, since the academic research focused on the risks and the analysis methods have never been conducted in Thailand's real estate sector. The contributions of this research are summarised as:

- *The research' originality.* This research focused intensively on the phenomenon of risks occurring in Thailand's real estate development projects. It studied the origins of risks, the practitioners' perceptions towards risks, and the current risk assessment practices. This research only publicised the risk assessment dimension as stated in the research scopes. According to the literature reviews, there was no previous academic research attended to the risk assessment in this particular sector. The most related research to this issue was done by Khumpaisal et al., (2010), they examined Thai practitioners' perceptions towards STEEP factor risks, but that study conducted with the smaller group of samples and it did not introduce any risk assessment model. This research is proclaimed as the pioneer research devoted to risk assessment issue, sought for the empirical data, and conducted in the particular area. Therefore, it contributed the originality to Thailand's real estate sector, suggested the direction to establish the further risk assessment methods and initiated the risk assessment model.

- *The risk assessment model.* The theoretical frameworks of Exploratory Factor Analysis (EFA) were adopted as the purposed risk assessment model. This factor analysis is normally used to reduce the number of variable and to structure the relationship between variables (DeCoster, 1998). However, the EFA theorem was applied in this case as it helped in grouping the high impact risks and excluding the trivial risks (low impact) off the risk assessment criteria. It also allowed for the factors, components and the factor loadings to emerge from the data set. The achieved risk criteria had been minimised to small numbers in order to focus on the risks with the serious consequences. Moreover, this model also replied to the requirements of the developers because it quantifies risk in numerical format and also simply presents to the users. It enabled the decision making process towards risk in real estate project, by facilitate the users in estimating the subjective real estate risks, and interpret them into the mathematic figures. It was also modified to cover on the features suggested by Thai practitioners as well as the regular risks in Thailand's real estate industry.

- *The practical risk assessment criteria.* The risk assessment criteria were established and introduced to Thailand's real estate sector in this research. These were set up based on the requirements of STEEP factors, as these factors usually used in the general business, but these have never been implemented as the assessment criteria to measure risks in the real estate industry. This research is the first academic research that adopts the coverage of STEEP factors to evaluate risks in the real estate industry, and it was proved that STEEP factors covering on the major existing risks in Thailand real estate industry.

- *The revelation of risk in Thailand's real estate industry.* The data analysis processes were also aimed to explore risks in Thailand's real estate sector. The quantitative phase's results revealed the perceptions of practitioners towards risks caused by STEEP factors and the magnitude of each risk, the satisfaction of the current risk assessment methods, included the preferable risk analysis techniques. Whilst the qualitative phase informed the details of risks (i.e. an origin of each risk, risk impact on the project development stages), and the mitigation techniques to deal with the real estate risks. Moreover, the case study approach helped in testifies the model validity and reliability, and it also suggested the useful comments to develop an appropriated risk assessment model to suit with the requirements of this industry.

- *Directions to the future research*: Although this research was not perfectly conducted as it contained some pitfalls and limitations. However, it provided some directions to the future researchers to understand the nature of risks and the real estate development sector, the research methodologies which provide richer data, and the real requirements of the practitioners. These helped the further researcher establish the appropriate risk assessment models that matched with the context of any property development industry.

To recap, this research contributed its originality as it is the pioneer research, which intensively emphasised on risks in Thailand's real estate sector. It introduced the practical risk assessment model and assessment criteria that summarised only risks with the higher impact on the projects' progression. The bespoke risk assessment model created based on an understandable statistical techniques and it was featured by the real requirements of the practitioner in this industry. Finally, this model was third party validated by the case studies to ensure its validity and reliability, it produced some prolific results and it can be applied in the real business case. However, there were some unforeseen errors occurred during the research processes, these pitfalls had been addressed by the researcher, in order to provide directions for the further research in this particular area. These limitations are therefore summarised in the following sections.

8.5. THEORETICAL LIMITATIONS

According to the extensive literatures review, risk contains with many definitions, it caused by various sources and the perceptions towards risk are varied according to the personal judgements. However, it was interpreted that risk consists of the subjective and individual meanings, each decision maker perceive risk differently in relation to their personal attitudes to risks (Raftery, 1994).

Due to the difficulties in clarifying risks as mentioned above, therefore this research had narrowed the scope of risk in Thailand's real estate into the systematic risks (Brown and Matysiak, 2002 ; Baum and Crosby, 2008), subjective risk (Spaulding, 2008) and caused by 5 sources of STEEP factors (Morrison, 2007; Nezhad and Kathawala, 1990).

The findings of each research phase insisted the subjectivity of risks in this industry, risks were originated from several sources and each of them affected individually to the decision making processes. However, the scope of this research did not address several risks that existed in Thailand real estate projects although these risks denoted the higher impacts on the project progress. For example, the literature review did not highlight the significant of location risks and the related factors such as land prices, conditions of land, or the sociological factors such as the impact of sensitive area (i.e. religious, conservation area). Despite the fact that these factors shall be considered while developing the risk assessment model for the real estate industry.

The degree of risk is naturally varied in according to the decision makers' attitudes towards risks. Thus, there is no assessment method that can quantify these attitudes towards risks numerically, risks can be assessed by applying both qualitative and quantitative methods in order to provide more accurate data to the decision makers. Therefore, this research introduced the statistical technique to evaluate real estate risks, but it was limited by the assessment criteria, which did not specify every risks existing in the real estate projects. Then, this model was not able to rank the level of risks' seriousness in the manner of risks' magnitude accordingly, it only presented the types and origin of risks in a hierarchical orders.

The qualitative phase also underpinned the nature of real estate project that each project manager may have only one choice to develop property on the specific location, as the development plan is constrained by the project budget, project site contributions, the feasibility study results and the organisational policies towards new development.

276

The theoretical limitations of this research insisted the subjectivity of risks, and the consequences of risk are varied in according to the decision makers' attitudes. It could be concluded that there is no approach to evaluate risks quantitatively, the assessors shall combine both qualitative approach and quantitative techniques included the supportive information to assess risks in this industry precisely.

8.6. METHODOLOGICAL LIMITATIONS

Three (3) data collection methods were adopted to collect the rich and meaningful data from the selected samples in the studied area. These methods were naive approaches, the definitions and terms of risks were controlled (NLM, 2010) in order to deal with the risks' complexity in the real estate projects. The limitations of research methodologies included the data approach and analyses are summarised as follow:

- As risks are naturally subjective, the quantitative research approaches (i.e. questionnaire survey) as used in the first research phase might not be appropriately responded to these features. The analyses in this phase could not specify or prioritise risk seriousness as well as they did not inform the origin or details of each risk. It was recommended to adjust this model by adding more qualitative approach to investigate risks in this business (Kiddinger and Darby, 2000) as well as to assess the magnitude of each risk.

- The risk assessment criteria was created based on the coverage of STEEP factors only, however risks in the real estate industry are caused by various affects outside STEEP' scopes. It was because of the assessment criteria included the evaluation methods were academically developed based on the literature review and the researcher experience in this field, but these criteria mostly relied on the United Kingdom's business contexts, which is not absolutely matched with Thailand contexts.

- The questionnaire surveys did not address the seriousness of location factors. Even though the location is actually the most important factor to be considered while developed any kinds of real estate project. The improper project location/site would affect to the project marketing and financial feasibility, in term of more cost spending in selling and managing the construction processes (i.e. build the project infrastructures and utilities). Moreover, high prices of land caused the increment of the final price of products that influenced directly to the customer's affordability.

- Although the EFA was innovated as the purposed risk assessment model in this industry, because of its simplicity in representing risks in hierarchical, graphical and mathematical presentations. However, the previous research or empirical studies that adopted EFA as the

industrial models were not yet conducted. Therefore, there was no benchmark or standard to measure the validity of this technique. Moreover, this model only clustered the top five high factor loadings risks from the rest of criteria, the emerged components may not cover the actual high influenced risks in this industry. The components' names were labelled by an interpretation of the nature and relationship of the components based on the literature review, these may not conform to the nature of risks in this industry. This model was then validated with the third party and found that some necessary assessment criteria were excluded from the model such as the location impact, public outcry or social protestant.

- Although the response rate was quite satisfied (210 out of 400 or 55%) and several statistical techniques such as Chi-square, T-Test and ANOVA were well performed. However, this response rate could not reply to the minimum requirement of factor analysis as Tabachnick and Fidell (2001) suggested that the number of population shall be at least 300 in order to yield a meaningful data. This supported by Norusis (2005)'s rule of 300 that the minimum number of cases shall be 300 regardless to the number of variables (in Garson, 2008). Therefore, it could be concluded that the response rate is too low to produce the accurate factor analysis, which then affect to the model's reliability.

- As this research was constrained by time, budget and informant accessibility, the data collection processes were undertaken in the studied area (BMA) only. The achieved risk assessment model was specifically created based on data gathered from the population in a bespoke area, it will be inconsistent and limit to use in the different trade area whether Thailand or other countries. Moreover, the results of the qualitative phase might be varied if the interviews were conducted with the developers in the different contexts.

- Language limitation, as the data collection processes were bilingual conducted (English and Thai), there were some errors in translation between two languages. The translated questions or criteria might not well understand by the respondents, these caused some missing values in questionnaire analysis as some respondents might avoid answering the complicated questions.

8.7. RECOMMENDATIONS FOR FURTHER RESEARCH

As earlier discussed in Chapter 8.4, this research produced some new knowledge in the real estate sector body of knowledge, it also introduced the proper risk assessment model that developed based on the statistic techniques that featured with some suggestions of the practitioners. In this regard, the risk assessment criteria that covered on the possible risks in this industry were established, and used as a framework for the whole data collection process.

This research was completely undertaken to investigate the risks and their consequences to Thailand's real estate industry. The research phase was divided into two phases research design (Cresswell, 2007), the first phase mainly adopted the quantitative approach by using the questionnaire survey and statistic analysis. The second phase was qualitatively applied the semi-structured interview techniques to collect richer data from Thai practitioners. Then the case study approach was adopted in order to validate the model derived from the first phase and added some informative suggestions to develop the future risk assessment model.

However, due to some limitations found during the research processes (see Chapter 8.5 and 8.6), this research results cannot be used as the benchmark or measurement standards for the whole Thailand's real estate industry. It was undertaken in the particular area and was constrained by time, budget and number of samples and interviewees. In order to produce the better results, it is recommend that further research should be carried out in several geographical areas rather than only in the BMA Area. The sample selection method shall be formal, using reliable sampling techniques and carefully verified before conduct the large scale data collection processes. The questions used in the research shall be designed by using the clear questions, less number of questions and provide more blank space for the respondents to state their own opinions, comments or queries.

According to the subjective and interpretive characteristics of risks, it was recommended that the qualitative approaches shall be applied to yield the richer and meaningful data rather than relied on the quantitative only. This research had identified the appropriate methodology to gain more details of risks (i.e. the origin of risks, the consequences and likelihood of each risk) as discussed in Chapter 8.4.

The extensive literature review revealed that there was little empirical work focused on the risk assessment aspects in real estate development sector, despite the fact that risks (economic) had the strongly influences to the project activities, and project's income stream. It was concluded that the research now needs to be undertaken to investigate the impact of risks on the real estate projects' vitality as well as to seek for the innovative risk assessment model, which is able to deal with both subjective and quantifiable risks. The research in this case shall be established within the scope of development industry and other related professions such as financial institutions, consultants, valuation agency, brokerage, or academic, in order to provide the precise and up-to-date information to the further researchers. The contributions and limitations of this research may assist the further researchers to develop the framework for risk assessment aspects in this industry.

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2006 — US Housing Bubble Burst
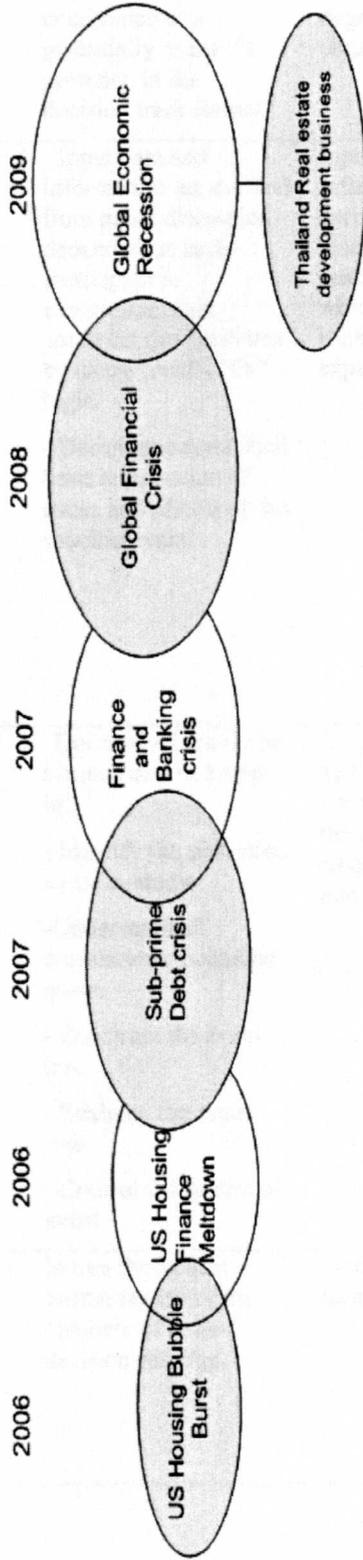
- House price appreciation
- More investments in construction
- High profit
- More speculations
- Real estate boom
- Over supply
- Real estate bubble

2006 — US Housing Finance Meltdown

- Low interest rate
- High mortgage demand
- Sub-prime mortgages
- Mortgage securitisation
- Mortgage market boom

2007 — Sub-prime Debt crisis

- Simple securitised debt
- High yield/ favourable security
- Sophisticated / complex innovative debt instrument
- High credit rating
- Credit default swap
- Massive value of debt
- Large amount of debt instrument (US600 tril.)

2007 — Finance and Banking crisis

- High profit/ performance
- High growth/expansion of business worldwide
- High leverage/ratio
- High risk taking
- Massive debts of big banks

2008 — Global Financial Crisis

- Globalised financial world
- Global expansion of debt instruments
- Stock market boom worldwide
- International investment / cross-border capital flows

2009 — Global Economic Recession / Thailand Real estate development business

- High economic growth
- Investment expansion
- Strong export/import
- High employment
- High consumption/ purchase
- High fuel price
- Inflation increased
- Interest rate increased
- Business boom

Lack of risk assessment methods- Over confidence - over optimism - Misconception of prices - High speculation - Lack of transparency and good government- Psychological factors

- House value depreciation
- Less demand-selling rate reduced
- Real estate inventory increase
- Real estate investment decrease
- Poor performance / less profit
- Real estate recession/ burst
- Real estate bubble/ burst

- Interest rate increase
- Mortgage rate increase
- Mortgage foreclosure
- Mortgage lending tightening
- Mortgage market burst
- Real estate prices start to fall

- Increase credit default
- Price depreciation
- Lower credit rating
- Lower yield value
- Less demand
- Less investment
- Illiquidity / credit crunch
- Failure of sub-prime mortgage lenders

- Sub-prime crisis
- Financial and banking crisis
- Poor performance of profit /loss
- Big banks, global investment banks bankruptcy
- Capital inject for boosting liquidity
- Merging of companies

- Financial and banking crisis
- Large banks or financial institution collapse
- Stock market globally collapse
- Severe liquidity/ credit crunch
- Panic in monetary activities (ie. withdrawal)
- Government policies to boost economic
- Interest rate drop worldwide

- Global financial crisis
- Less export/ import
- Lower consumptions/ spending
- Interest rate fall
- Higher unemployment rate
- Economic recession
- Economic depression
- Global economic recession

Thailand real estate sector current situation

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APPENDIX II

Assessment Methods	Event Tree Analysis (ETA)	Risk Assessment Matrix (RAM)	Financial Ratio	Monte Carlo Simulation (MC)
Definitions	General technique to identify the consequences of each occurrence or a potentially event. It presents in the decision trees format	Simple matrix represents the likelihood and the degree of each risks consequences	The financial based figures to represent the expected return and risks of the real estate investments	The simulation method employs a repeat computation and randomisation of algorithm and mathematic figures.
Requirements	- Input data and information are derived from panel discussion depended on each participant's experience, then construct the event tree by using "And", "Or" logic. - Decision makers shall have information of cause and affects of the specific event.	Input data and information are derived from panel discussion or ranking method, which depended on each participants experience	-A set of financial assumptions based on the past real estate investment information. - Economic data such as marketing, or interest rate etc. - Current data of project's financial status such as debt, equity, project investment duration, expected rate of return of developers etc.	-A set of unconditional variables - Alternative options of "what if scenario" (Best, Normal, and Worst case) - The table of random number - Sequence of numbers which are random, independent, real and uniformly distributed in the range zero to one.
Procedure	This analysis could be summarised in 5 steps as: - Identify the undesired event to study. -Understand all correlations to studied event. - Construct the event tree - Evaluate the event tree - Control the hazard of event	Ranks the priority and likelihood of risks, then levelling the consequence of risks in the "risk matrix"	Adopting the discounted cash flow (DCF) analysis to forecast project value and the expected return of investment in term of Internal Rate of Return (IRR).	-MC considers random sampling of probability distribution - MC may consider deterministic modelling using single-point estimates - Then, MC will assign uncertain variable as "best guess" estimates
Outcome, results	In tree (branches) format represent the outcome of each decision-making	In simply graphic format (matrix)	In the DCF format. Risks are forecasted by IRR, which based on fact "high risks equal to high return"	The likelihood of risks in projects. Results are presented in probability distributions graphs (or histograms)

Assessment Methods	Event Tree Analysis (ETA)	Risk Assessment Matrix (RAM)	Financial Ratio	Monte Carlo Simulation (MC)
Advantages	- This analysis helps decision maker to address on the specific risk, which will cause severe lost to project - Simply and easy to understand by the lay persons	Simply and easy to understand by the lay persons	Suitable for income generating properties or complicated real estate project investment.	- Produces mathematic, statistic results which are liable enough to invest in real estate projects. -There are lot of supportive software, which are embedded in everyday applications such as Palisade (Risk 5.0) for MS Excel etc.
Limitation or disadvantages	- ETA focuses especially on a single event of failure, not provide solution for common risks. - ETA does not allow for the propagation of uncertainties in primary inputs - It did not ensure a sufficient degree of the systems definition's comprehensiveness - Lack of how to specify bounds to the tree to make each problem numerically traceable; -It does not provide the form and parameters of probability distributions to incorporate in the failure-data inputs.	- The data are highly depending on personal perceptions, very subjective and hard to measure. - Do not allow the comparison between each risk criteria - Results in each matrix calculation could be varied due to human's limitation	- Mostly depends on the historical data and much subjective information which are inaccurate to predict the future risks and the value of the real estate projects. - It only emphasise on risks caused by financial factors, but not concern on affect of risks caused by others factors - Not suitable for non-financial background persons	- MC requires comprehensive knowledge in mathematic statistic in order to perform the simulation - MC analysis is based on randomised processes. Results may not be precise, inadequacy to forecast the risk in real complicated business - Difficult to assess the subjective risks Complicated to lay persons - Software cost is unaffordable for small or medium size developers

APPENDIX III: DETAILS OF PILOT STUDIES

Pilot Questionnaire survey. The pilot questionnaire was designed as similar as possible to the large scale survey and distributed to the similar type of participants. It was aimed to verify all key aspects of the main survey questionnaire including an information accessible, design of the research instruments, validity and reliability of the gathered data. Fifty (50) sets of questionnaires were randomly distributed to the sample in the particular studied area. This process was started at 20 June, 2009 and completed at 10 July, 2009. Thirty nine (78% or 39 out of 50) were return and those data have been analysed with the aid of SPSS package. The questionnaire set is therefore consisted of 29 questions in 4 sections, as summarised in the table below;

Section	Questions No.	Descriptions
1. Participants' details	1-10	Position, educational, experience, the decision maker roles, satisfaction toward risk assessment model
2. Project Details	11 – 22	Project information, any particular impact to project
3. Project risks and the assessment	23-27	The perception of the participants towards likelihood and consequences of STEEP
4. Project risk management	28-29	To verify that whether the risk /contingency plan being established in participants' project.

Interviews with the real estate practitioners the interviews processes were designed to investigate the in-depth information from the practitioners in regard to their current risk assessment practice, and their opinions toward risks. The interviewees were selected from the respondents who completed the questionnaire surveys by considering on their working experiences in real estate project, their positions and the decision-maker role within their projects. However, the researcher also specified that the interviewees shall have solid background experience of the risk assessment and management in the real estate project (10 or more than years working experience) as well as have an authority to reveal some information of their company projects (see table 4.2) . The interviews were conducted in each of the practitioners' offices and lasted approximately half an hour each. The consent forms issued by Liverpool John Moores University were sent to the selected interviewees to ask for their permission to interview and tape record for further analysis, as well as to provide them some confidentiality to reveal information. However, the interviewees did not object and request that their transcripts remained confidential. All interviews were conducted in Thai language and these were facilitated by the interview record form, which was consequentially designed to gather at most intensive information and also reduce the time spending while interviewing. These records were manually transcribed and interpreted by the researcher, these combined with both open-ended questions, two-tailed questions (Yes /No), in

order to encourage the interviewees to provided as much as possible information to the research (Kumar, 2005; Fellow and Liu, 2008). The interview records were copied to the interviewees for comment on their accuracy.

Interviewee (initial only)	Position	Organisation type	Experience	Background education
KT	Project Manager (Construction)	Public Company developer	13 yrs	PhD in construction management
VR	Vice President (Marketing & Finance)	Public Company developer	19 yrs	PhD in Business Administration

Moreover, according to the aim of this thesis to implement an application of the ANP model to assess risks in real estate projects, therefore, the interviewees were asked to rank the level of consequences of each risk element in the established risk assessment criteria. In order to use this ANP model effectively, there is the need to incorporate an alternative (solution) in order to compare between two or more solutions against the set criteria (Chen et al., 2006). Thus, they were asked to consider the differences between their existing plan (Plan A) and the alternative development plan (Plan B), which was assumed in order to gather the expert's opinions about risks associated with their projects. The raw data were expressed in percentage (%) forms.

The data gained by these interviews were analysed with an instant ANP application, named "Superdecision 1.6.0" developed by Saaty, (2005). The calculated outcomes of this model would be in term of synthesised priority weighted, the higher degree of this synthesised weighted indicated the appropriated development plan, which also reflected the risky plan, but received the better return of investment. Hence, the content of the interview questions were summarised in the table below:

Section	Descriptions
1. Participants' details	To gather the participant's details, their risk assessment experience, the satisfaction of the current risk assessment techniques including AHP, ANP knowledge.
2. Project Details	- Project information, project characteristics and any particular impact to project - The interviewees used their project as the case study for completing the interview - This section also help to formulate the alternative development plans for ANP
3. ANP calculations	- The interviewees level the consequence of STEEP risk to the case study and the alternative plan in percentage (%) format. These percentages are varied upon the interviewees' experiences and perceptions towards risks.

The data retained from pilot studies were analysed with the appropriate statistical tests based on the level of the measurement of the collected data, mainly based on parametric-test or the test that needs to measure the different of Mean value (McClelland, 2009). Therefore, this research employed the

following tests as descriptive statistics, Independence T-Test, One-Way ANOVA and Rank Correlation analysis, (Field, 2000; Kahn, 2001) respectively.

The response rate of the pilot questionnaires distribution was 78% (39 out of 50). The results revealed that the respondents occupy various positions in real estate companies, such as 36% (14 out of 39) were quantity surveyors or estimators, project managers/directors (25% or 9 out of 39) and engineer/architect (25%). 56% (22 out of 39) are the decision makers towards risks but only 43% (17 out of 39) have the risk assessment experience in real estate projects and 15% (6 out of 39) have ever used risk assessment models. Only 10% (4 out of 39) acknowledged the application of AHP or ANP. Most of them (56%) have undergraduate education and their working experiences range from 0 to 5 working years (43%).

Most respondents (61% or 24 out of 39) are involved in low rise /housing residential projects whilst others are involved in hotel projects (15%), 10% (4 out of 39) are in high-rise residential projects, and retail projects (2.6% or 1 out of 39). Twenty-five per cent of projects are located outside of Bangkok Metropolitan Area (BMA) and the same percentage of projects is located within Bangkok Metropolitan Area (BMA)

In regard to the reliability of the survey instruments, Cronbach's Alpha test (Fellow and Liu, 2008) was used to test the questionnaires coefficient of reliability amongst each question. The result indicates 0.644 that means this questionnaire set is inadequate reliable (Field, 2005), the lowest acceptable alpha shall be 0.70 (McClelland, 2009). It is because of the test was undertaken based on 31 from 39 variables only. Then, it is recommend modifying or removing non-necessary questions in order to increase the reliability of the questionnaires.

APPENDIX IV: THE RESEARCH VARIABLES

Questions	Variables Name	To acknowledge/ test	Data format	Variables	Scale of measurement	Statistical test(s)
1	POST	Position of the participants	Tick as only appropriate (1)	Independent	Nominal	Crosstab (Chi-square)
2	DM	Does the participant have the decision making roles towards risk?	Yes / No	Independent	Nominal	Crosstab (Chi-square), T-test
3	EDUC	Educational Level	Tick as only appropriate (1)	Independent	Nominal	One-way ANOVA
4	EXP	Working Experience (Years)	Tick as only appropriate (1)	Independent	Nominal	One-way ANOVA
5	RISKEXP	Experience in risk assessment	Yes / No	Independent	Nominal	T-test
6	MODEUSE	Have they ever used of any risk assessment model?	Yes / No	Independent	Nominal	T-test
7		This question is consisting with the following variables				
7.1	EFFECT71	The satisfaction in risk assessment model in its effectiveness	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, T-test and ANOVA
7.2	EFFIE72	The satisfaction in risk assessment model in its efficiency	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, T-test and ANOVA
7.3	USERF73	The satisfaction in risk assessment model in its user-friendly, simplicity	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, T-test and ANOVA
7.4	FLEX74	The satisfaction in risk assessment model in its flexibility	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, T-test and ANOVA
7.5	VALUE75	The satisfaction in risk assessment model in its price and value-to-money	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, T-test and ANOVA
8	HOASSESS	How the participants assess risk, if he/she did not employ any model?	Tick as only appropriate (1)	Dependent	Nominal	One-way ANOVA
9		This question is consisting with the following variables				
9.1	RENOUSE1	Do the mentioned approach in Q8 ineffective?	rank 1 - 5 (1 = strongly disagreed 3 = neutral 5 = strongly agreed)	Dependent	Interval	Correlation, T-test and ANOVA
9.2	RENOUSE2	Does the mentioned approach in Q8 provide less accuracy data?	rank 1 - 5 (1 = strongly disagreed 3 = neutral 5 = strongly agreed)	Dependent	Interval	Correlation, T-test and ANOVA
9.3	RENOUSE3	Do the mentioned approach in Q8 complicated?	rank 1 - 5 (1 = strongly disagreed 3 = neutral 5 = strongly agreed)	Dependent	Interval	Correlation, T-test and ANOVA
9.4	RENOUSE4	Do the mentioned approach in Q8 too subjective to use?	rank 1 - 5 (1 = strongly disagreed 3 = neutral 5 = strongly agreed)	Dependent	Interval	Correlation, T-test and ANOVA
9.5	RENOUSE5	Do the mentioned approach in Q8 too difficult to understand?	rank 1 - 5 (1 = strongly disagreed 3 = neutral 5 = strongly agreed)	Dependent	Interval	Correlation, T-test and ANOVA
10	ANPKNOW	Do they have any knowledge in AHP ANP?	Yes / No	Dependent	Nominal	T-Test
11	ORGTYPE	Type of the participant's organisation or company	Tick as only appropriate (1)	Independent	Nominal	One-way ANOVA
12	ORGTURN	Participant's organisational turnover (M. baht)	Tick as only appropriate (1)	Independent	Nominal	One-way ANOVA
13	PROJVALU	Project Value	Estimated project value in Baht	Independent	Nominal	One-way ANOVA

#	Code	Question	Response	Role	Scale	Analysis
14	PROJTYPE	Type of the project that participant involve in	Tick as only appropriate (1)	Independent	Nominal	One-way ANOVA
15	PROJREGU	Does the project construct under which particular regulation?	Tick as only appropriate (1)	Dependent	Nominal	One-way ANOVA
16	PROJFUND	How can project fund, by the selected sources?	Give the '% of each attributions	Dependent	Nominal	One-way ANOVA
17		This question is consisting with the following variables				
17.1	PERCOST	The percentage of project completion in terms of project budget.	Tick as the rank of percentage applies	Independent	Nominal	
17.2	PERPLAN	The percentage of project completion in terms of project schedule/plan.	Tick as the rank of percentage applies	Independent	Nominal	
17.3	PERQUAL	The percentage of project completion in terms of project quality.	Tick as the rank of percentage applies	Independent	Nominal	
18		This question is consisting with the following variables				
18.1	SOC1C	The consequence of local community acceptances affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.2	SOC1F	The frequency of local community acceptances affect to project	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.3	SOC2C	The consequence of local community participation affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.4	SOC2F	The frequency of local community participation risk affect to project	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.5	SOC3C	The consequence of public liability compensation affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.6	SOC3F	The frequency of public liability compensation affect to project	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.7	SOC4C	The consequence of workforce availability affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.8	SOC4F	The frequency of workforce availability affect to project	rank 1 - 5 (1 = Never 3 = neutral 5 = more likely)	Dependent	Interval	Correlation, Factor Analysis
18.9	TEC1C	The consequence of project accessibility risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.10	TEC1F	The frequency of project accessibility risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.11	TEC2C	The consequence of project design and amendment risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.12	TEC2F	The frequency of project design and amendment risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.13	TEC3C	The consequence of project constructability risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.14	TEC3F	The frequency of project constructability risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.15	TEC4C	The consequence of project development duration risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis

18.16	TEC4F	The frequency of project development duration risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.17	TEC5C	The consequence of project participants' conflicts risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.18	TEC5F	The frequency of project participants' conflicts	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.19	TEC6C	The consequence of difficulty in facility management risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.20	TEC6F	The frequency of difficulty in facility management risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.21	TEC7C	The consequence of public transportation quality risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.22	TEC7F	The frequency of public transportation quality risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.23	TEC8C	The consequence of infrastructure/utility quality risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.24	TEC8F	The frequency of infrastructure/utility quality risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.25	ENV1C	The consequence of EIA approval delay	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.26	ENV1F	The frequency of EIA approval delay	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.27	ENV2C	The consequence of surrounding environment to project risks	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.28	ENV2F	The frequency of surrounding environment to project risks	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.29	ENV3C	The consequence of pollution risks affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.30	ENV3F	The frequency of pollution risks affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.31	ENV4C	The consequence of the appropriateness of site conditions.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.32	ENV4F	The frequency of the appropriateness of site conditions.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.33	ECON1C	The consequence of the developer's brand awareness	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.34	ECON1F	The frequency of the developer's brand awareness	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.35	ECON2C	The consequence of the degree of competitiveness in the trade area.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.36	ECON2F	The frequency of the degree of competitiveness	rank 1 - 5 (1 = Never 3 = neutral 5 =	Dependant	Interval	Correlation, Factor

		in the trade area.	More likely)			Analysis
18.37	ECON3C	The consequence of the competitor's selling volume affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.38	ECON3F	The frequency of the competitor's selling volume affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.39	ECON4C	The consequence of the customer's affordability affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.40	ECON4F	The frequency of the customer's affordability affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.41	ECON5C	The consequence of the marketing strategy' effectiveness affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.42	ECON5F	The frequency of the marketing strategy' effectiveness affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.43	ECON6C	The consequence of the demand and supply of the properties affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.44	ECON6F	The frequency of the demand and supply of the properties affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.45	ECON7C	The consequence of the sell records of competitors affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.46	ECON7F	The frequency of the sell records of competitors affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.47	ECON8C	The consequence of the selling prices of competitors affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.48	ECON8F	The frequency of the selling prices of competitors affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.49	ECON9C	The consequence of the amount and sources of funding affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.50	ECON9F	The frequency of the amount and sources of funding affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.51	ECON10C	The consequence of the fluctuation of interest rate affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.52	ECON10F	The frequency of the fluctuation of interest rate affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.53	ECON11C	The consequence of the illiquidity of project cash-flow affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.54	ECON11F	The frequency of the illiquidity of project cash-flow affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.55	ECON12C	The consequence of the expectation of investment return affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis
18.56	ECON12F	The frequency of the expectation of investment return affects to project...	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependant	Interval	Correlation, Factor Analysis
18.57	ECON13C	The consequence of the property depreciation affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependant	Interval	Correlation, Factor Analysis

x

18.59	ECON13F	The frequency of the property depreciation affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.60	ECON14C	The consequence of the fluctuation of construction material prices affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.61	ECON14F	The frequency of the fluctuation of construction material prices affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.62	POL1C	The consequence of Thailand political situation affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.63	POL1F	The frequency of Thailand political situation affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.64	POL2C	The consequence of the approval duration from authorities affect to project.	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.65	POL2F	The frequency of the approval duration from authorities affect to project.	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
18.66	POL3C	The consequence of the contradiction between project objectives and local development policy	rank 1 - 5 (1 = lowest 3 = neutral 5 = highest)	Dependent	Interval	Correlation, Factor Analysis
18.67	POL3F	The frequency of the contradiction between project objectives and local development policy	rank 1 - 5 (1 = Never 3 = neutral 5 = More likely)	Dependent	Interval	Correlation, Factor Analysis
19	PARTRISK	Any particular risk affect to project	Yes / No	Uncontrolled	Nominal	T-Test
20	RISKCONT	Any contingency plan for project	Yes / No	Uncontrolled	Nominal	T-Test

xi

APPENDIX V: AN EXAMPLE OF QUESTIONNAIRES SURVEY

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Sukulpat Khumpaisal

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The questionnaires survey

"Analytic Approaches to Risk Assessment in Real Estate Development"

Date

Dear Sir/ Madam

Participant Address

Dear Sir/ Madam

May I introduce myself; my name is Sukulpat Khumpaisal, PhD student at School of the Built Environment, Liverpool John Moores University, and Liverpool, United Kingdom. I am currently undertaking the research title "Analytic Approaches to Risk Assessment in Real Estate Development".

My research is focusing on application of novel risk analysis approaches to assess risks in real estate development sector. The research will consist of comprehensive case studies on the real estate development in Thailand in order to demonstrate the effectiveness of the innovative risk assessment method. Thus, the information in Thailand real estate development sector is necessary to fulfil this research objective.

According to your reputation and experience in real estate development business in Thailand. It is very much appreciated if you would give an occasion to interview you in regarding risk assessment in Thailand real estate projects as well as other relevant information, which would be useful to complete the mentioned research.

Should you have any questions or queries, please do not hesitate to contact me by the given E-Mail: S.khumpaisal@2007.jmu.ac.uk or Sukulpat@hotmail.com. My telephone number is 081 6470245 and 02 5795155.   I am looking forward to hearing your kindly cooperation.

Your kindly cooperation will be appreciated to my research and to the whole real estate development body of knowledge.

Sincerely yours

Sukulpat Khumpaisal

PhD Student

School of the Built Environment

Liverpool John Moores University

Analytic Approaches to Risk Assessment in Real Estate Development   Questionnaire survey 2009 - 2010

This study aims to investigate your opinions, judgments and perception towards risks in your real estate development project. If any question requests information that you feel uncomfortable with releasing, please skip on to the next question. If you need any clarifications of any question, you can ask the researcher himself, or contact Sukulpat Khumpaisal on 081 647 0245 or e-mail: S.Khumpaisal@2007ljmu.ac.uk.

Respondent ID :	(researcher)

Section 1: Your details (Question 1-10)

Q1. Which of the following best describes your position in project? (Please tick only one)

	Project Manager / director
	Financial Manager / director
	Project coordinator
	Site manager / Superintendent
	Engineer / Architect / Designer
	Others Please define

Q2. Are you a decision maker in regard to risk management/assessment of this project?

	Yes
	No

Q3. Which of the following best describes your educational background? (Please tick only one)

	Lower than vocational / technical diploma / certificate
	Vocational or technical diploma / certificate
	Bachelor degree
	Higher than bachelor degree
	None of the above

Q4. Please estimate your total work experience in years ((Please tick only one).

	0 – 5
	6 – 10
	11- 15
	16 – 20
	21 or above

Q5. Do you have experience in project risk management / assessment?

	Yes
	No

Q6. Have you ever used any formal approach to help you assess risks in project?

	Yes: Please indicate the approach name ....
	No

Q7. Please state your satisfaction about the formal risk assessment approach that you have ever used.

1 = Very dissatisfied 2 = Dissatisfied 3 = Neutral 4 = Satisfied 5 = Very satisfied

Effectiveness	1	2	3	4	5
Efficiency	1	2	3	4	5
User-friendly	1	2	3	4	5
Flexibility	1	2	3	4	5
Value-to-money	1	2	3	4	5

Q8. If not, please indicate the approach that you currently used to assess / estimate risks (Please tick only one)

	By background or experience
	By panel discussion
	By using secondary sources of information (e.g. compare with other similar kind of project)
	Using information from reliable sources (e.g. Bank of Thailand etc.)
	Don't rely on any system
	Other (Please define)

Q9.	To what extend do you agree that the following problems occur during the usage of the mentioned approach in Q8					
1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree						
In-effectiveness	1	2	3	4	5	
Do not provide precise data /information	1	2	3	4	5	
Complexity	1	2	3	4	5	
Subjective	1	2	3	4	5	
Difficulty in use/understand	1	2	3	4	5	

Q10.	Have you ever know about the multi-criteria decision supporting models such as Analytic Network Process (ANP) before?
	Yes
	No

Section 2: Your oorganisation and project details (Question 11-17)

Q11.	Which of the following best describes your company field of business? (Please tick only one)
	Public company limited developers (also situated in Stock Market)
	Public company limited developers (not in Stock Market)
	Small and medium size developers
	Developers' consultants or contractors (any size)
	Real estate experts (i.e. consultant, property management, valuation, designers)

Q12.	Please estimate your company turnover in the last financial year? (Please tick only one) (in Million Baht)
	Less than 10
	11 – 50
	51 – 100
	101 – 150
	151 – 200
	201 and above

Q13.	Please estimate your typical project value (Baht)

Q14.	Which of the following best describes your typical project? (Please tick only one)
	Low rise residential / housing project / sub-divisional project
	High rise residential (e.g. condominium, apartment)
	Retail (e.g. superstores, shopping arcade)
	Commercial (e.g. office building)
	Other (Please define…………………... …………..)

Q15.	Is your project affected by any of the following local planning law and regulation?
	Bangkok Metropolitan development plan
	Bangkok Metropolitan Vicinity area development plan
	Any particular planning law and regulation Please define…………………………………

Q16.	What percentage of your project funding? (Please give the estimated percentage)
	Loan (%)
	Equity (%)
	Stakeholders' share (%)
	Other sources please indicate ………………………

Q17. Please rank in order of your project completion against the following criteria	0-25	26-50	51-75	76-100
Complete to budget				
Complete to project schedule				
Complete to project quality standards/ manual				

Section 3 – Risk assessment (Question 18)

The purpose of this section is to ask you to rate your perceptions of risks occurred in your project.

Q18. Please indicate your perceptions toward the following risks in the consequent and likelihood terms (Please ring O)										
Criteria	Please rate the consequences of this risk affect to your projects?					Please rate the frequency of this risk occurring in your projects?				
	1 = Very low, 2 = Low, 3 = Neutral, 4 = High, 5 = Very high					1 = Never occurred, 2 = Hardly, 3 = Neutral, 4 = Likely, 5 = More likely				
Social risks	Consequences					Frequency				
Local community does not accept your project.	1	2	3	4	5	1	2	3	4	5
Local community does not participate in your project.	1	2	3	4	5	1	2	3	4	5
You have to compensate some public liability to local community	1	2	3	4	5	1	2	3	4	5
Difficulty in recruiting workforce to complete your project	1	2	3	4	5	1	2	3	4	5
Technological Risks	Consequences					Frequency				
Difficulty in access to your project.	1	2	3	4	5	1	2	3	4	5
Amendments in your project design and workmanship.	1	2	3	4	5	1	2	3	4	5
Project technical aspect is feasible to complete.	1	2	3	4	5	1	2	3	4	5
Duration of development affect to your project cash-flow.	1	2	3	4	5	1	2	3	4	5
Conflicts between the you and your outsourcers (designers, contractors)	1	2	3	4	5	1	2	3	4	5
Difficulty in property/ facility/ amenity management	1	2	3	4	5	1	2	3	4	5
Quality of public transportation to access your project.	1	2	3	4	5	1	2	3	4	5
Quality of infrastructure / public utility surrounding your project	1	2	3	4	5	1	2	3	4	5
Environmental risks	Consequences					Frequency				
Approving from Environmental Impact assessment (EIA) authority	1	2	3	4	5	1	2	3	4	5
Quality of surrounding environment impact to your project	1	2	3	4	5	1	2	3	4	5
Pollution during construction process	1	2	3	4	5	1	2	3	4	5
The appropriateness of your project site's conditions	1	2	3	4	5	1	2	3	4	5
Economic risks (marketing, financial)	Consequences					Frequency				
Degree of yours brand in this trade area	1	2	3	4	5	1	2	3	4	5
Competitiveness of the similar kind Of project in your trade area.	1	2	3	4	5	1	2	3	4	5
The selling rate of competitors in your trade area.	1	2	3	4	5	1	2	3	4	5
Affordability of the purchasers in your trade area.	1	2	3	4	5	1	2	3	4	5
The effectiveness of your marketing strategy / plan to your sell volume	1	2	3	4	5	1	2	3	4	5

Demand and supply of your kind of property in your trade area	1	2	3	4	5	1	2	3	4	5

Q18. Please indicate your perceptions toward the following risks in the consequent and likelihood terms (Please ring O) (Continued)

Criteria	Please rate the consequences of this risk affect to your projects?					Please rate the frequency of this risk occurring in your projects?				
	1 = Very low, 2 = Low, 3 = Neutral, 4 = High, 5 = Very high					1 = Never occurred, 2 = Hardly, 3 = Neutral, 4 = Likely, 5 = More likely				
Economic risks (marketing. financial) (Cont'd)	Consequences					Frequency				
Sell records of your competitors and affect to your project	1	2	3	4	5	1	2	3	4	5
Your project selling prices and impact to your selling volume	1	2	3	4	5	1	2	3	4	5
Amount and sources of your project funding.	1	2	3	4	5	1	2	3	4	5
The fluctuation of interest loan rate	1	2	3	4	5	1	2	3	4	5
Illiquidity of project cash –flow	1	2	3	4	5	1	2	3	4	5
Your expected investment return	1	2	3	4	5	1	2	3	4	5
The depreciation of your project	1	2	3	4	5	1	2	3	4	5
The fluctuation of construction material prices (i.e. reinforced steel)	1	2	3	4	5	1	2	3	4	5
Political risks	Consequences					Frequency				
Overall Thailand political situation and affect to your customer's confidents	1	2	3	4	5	1	2	3	4	5
Total days of approval for project construction from the relevant authorities.	1	2	3	4	5	1	2	3	4	5
The contrast between your project and local development plan	1	2	3	4	5	1	2	3	4	5

Section 4 Project risk management plan (Questions 19 – 21)

Q19	Does your project affect by any other particular risk or obstruction?
.	Yes Please define …………………..
	No

Q20.	Do you establish the contingency plan for this project?
	Yes Please define …………………..
	No
Q21.	Any additional comments for the further researches.

APPENDIX VI RISK ASSESSMENT CRITERIA

Risk Category	Sub criteria	Evaluation methods (consequences and likelihood)	Unit of measurement	The questions used in questionnaires	References
	Community acceptability	Degree of benefits to local communities	Scale or percentage	Local community does not accept the developed project.	Danter, 2007; Chen and Khumpaisal, 2008 Atkinson (1999)
	Community's participations	Degree of discourse of partnership and empowerment to community	Scale or percentage	Local community does not participate in the developed project.	
Social risks	Public liability	Degree of compensation if the project have the negative impact to the community	Scale or percentage	You have to compensate some public liability to local community	CHAI (2006); Zuckerman et al, 2001 Danter (2007),
	Workforce availability	The scarcity (availability) of workforce to complete the project	Scale or percentage	Difficulty in recruiting workforce to complete this project	
	Accessibility and evacuation	Degree of easy access and quick emergency evacuation in use	Scale or percentage	Difficulty in access to this project. (including number and the quality of access routes	Campbell and Tennant, (2008), Moss et al., (2007
	Amendments	The possibility of amendments in design and construction	Scale or percentage	Does this project cause any amendments in term of project design and workmanship?	Khallafalah (2002), Smith (2002)
	Project Constructability	Degree of technical difficulties in construction.	Scale or percentage	Does the project affect by the technical aspect that obstruct the technical feasibility.	CII, (2010); Khallafalah (2002
Technological risks	Duration of development	Ratio of total duration between design and construction per 1,000 days	Days	The number of days (duration) of development that affect to the project cash-flow.	V T Luu, et al, (2008)
	Project integration	The delay caused by a miscommunication between each project participant	Days	The conflicts between the project owner, developer and the outsourcers (designers, contractors)	PMBOK (2002)
	Facility Management	Degree of complexities in facilities management	Scale or percentage	The difficulty in property/ facility/ amenity management after project sell	Moss et al, (2007
	Transportation's convenience	Degree of public satisfaction to mass transportations provided to the new project area, including the accessibility to those transportation	Scale or percentage	The quality, frequency and satisfaction toward services of the transportation system	Campbell and Tennant, (2008); Couch and Dennemann, 2000).
	Utilities and Infrastructure	Degree of public satisfaction towards utilities and infrastructure	Scale or percentage	The quality of infrastructure / public utilities surrounding your project.	US Government, (2007)

Risk Category	Sub criteria	Evaluation methods (consequences and likelihood)	Unit of measurement	Sample of Questions used in questionnaires	References
Environmental risks	Environmental Impact Assessment approval	The delay in EIAR approving from the relevant authorities	Days	Does the approval of EIAR affect to the project progress	Pratumsinchai and Panswad, N.D.
	The quality of surrounding environment	Environmental Impact	Scale or percentage	Does the quality of surrounding environment affect to the project progress?	Chen, et al (2005)
	Pollution during the development of project	Degree of pollution affect to the local community	Scale or percentage	Does the quality of surrounding environment affect to the customers' potential to buy project?	Meherik, (2002); USEPA (1998)
	Site condition	Degree of the difficulties of the site preparation for construction	Scale or percentage	Does the appropriateness of the project site's conditions affect to construction process?	Garcia-Villarreal (2002); FTA (2007)
Economic risks	Brand visibility	Degree of developer's reputation in developing each specific real estate project	Scale or percentage	The developers' brand and reputation in the trade area are not well recognised.	D&B, (2007); Adair & Hutchison, (2005); Gibson & Louragand, (2002)
	Demand and supply	Degree of competitiveness of the same property type in the studied area;	Scale or percentage	There are a lot of competitors in the similar trade area.	Adair & Hutchison, (2005)
	Demand and supply	Degree of misestimate the demand and supply of similar property type	Scale or percentage	The marketing team misestimate the demand and supply of the similar kind or property in the trade area	YAERD, (2010); Adair & Hutchison, (2005)
	Market liquidity	The selling volume of same kind of properties in the local market	Number of properties selling in the trade area	Selling volume of competitors is higher than the project selling rate.	AREA (2009); Adair & Hutchison, (2005)
	Market liquidity	The selling prices of same kind of properties in the local market;	Prices of similar kind of property (Baht)	Selling prices of the competitors affect to the project selling volume	AREA (2009); Adair & Hutchison, (2005)
(Marketing)	The customer affordability	The ability of customer to pay back the mortgage.	Mortgage rate, housing loan rate (% per annum)	The customers have low affordability to purchase properties in the trade area.	AREA, (2009): REIC, 2008).
	Marketing strategy	The effectiveness and efficiency of the project marketing plan/strategy	Number of the sold product and inventory	The marketing plan/strategy is not efficiency enough to increase the sell volume	AREA, (2009): REIC, 2008).
	Marketing strategy	The impact of project selling volume and prices affect to project marketing strategy	Scale or percentage	The project selling volume is not satisfied as expected in the marketing plan.	Menon et al., (1996)

Risk Category	Sub criteria	Evaluation methods (consequences and likelihood)	Unit of measurement	Sample of Questions used in questionnaires	References
	Sources and availability of project fund	The amount of fund injected to the project. The number of funding sources availability to project investors	The project value and debt/equity ratio The ratio of project sources of fund	The difficulty to seek for the financial institutions to support the project's investment	Adair et al, (2000) ; Strischek, (2007)
	Interest Rate	The variation of interest rate (loan)	The current loan interest (%) obtained from bank	The fluctuation of loan interest rate and impact to project cash-flow	Sagalyn, (1990); Nabarrol & Keys, (2005)
Economic risks	Cash-flow liquidity	The ability to pay the contractual sum to the subcontractors	The interim payment schedule	The illiquidity of cash in hand (cash-flow) and affect to project progress	Lam et al., (2001)
(Financial)	Investment return	Internal rate of return (IRR) and Capitalization rate required by the project sponsors.	Percentage of rate of return	The project return could not meet the owner's expectation	Watkins et al., (2004); Sagalyn, (1990)
	Project depreciation	The property depreciation rate (straight line method)	Percentage of depreciation per annum	The depreciation of project affect to the customer's potential to buy properties	Baum (2009)
	The variation of construction materials price	The consumer price index (construction material mode)	The CPI indices (steel)	The fluctuation of construction materials, particularly the reinforcement steel and impact to project cost and budget	Khumpaisal et al. (2010)
	Overall political situation	The awareness of the current political situation	Scale or percentage	The current Thailand political turmoil affect to customer's confidence	Arthurson, (2001)
Political risks	Relevant authorities approval	The delays in approving for developing the project	Days	The delay of approving by the authorities and affect to project duration of development	Flyvbjerg, et al. (2003)
	Local development plan	Degree of contrast between the project plan and the local development policy	Scale or percentage	The development of project contrast with the local development policy and impact to the project progress	Pellman, (2008)

APPENDIX VII: DESCRIPTIVE ANALYSIS OF MEAN OF STEEP FACTORS

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Mean of Social risk consequence	Project manager/director	62	2.40	0.813	0.10	2.20	2.61	.75	4.25
	Financial manager/director	10	2.62	1.11	0.35	1.82	3.42	1.25	4.75
	Project coordinator	30	2.63	0.70	0.12	2.37	2.89	1.25	3.75
	Site manager/superintendent	19	2.77	0.95	0.21	2.31	3.23	1.00	4.50
	Engineer/Architect/Designer	50	2.26	0.79	0.11	2.03	2.49	1.00	4.25
	Others	39	2.42	0.72	0.11	2.18	2.65	1.00	4.25
	Total	210	2.45	0.81	0.05	2.34	2.56	.75	4.75
Mean of Social risk frequency	Project manager/director	62	2.13	0.71	0.09	1.95	2.31	0.75	4.00
	Financial manager/director	10	2.45	0.46	0.14	2.11	2.78	1.75	3.25
	Project coordinator	30	2.37	0.63	0.11	2.13	2.61	1.25	3.25
	Site manager/superintendent	19	2.31	0.68	0.15	1.98	2.64	1.00	4.50
	Engineer/Architect/Designer	50	2.01	0.61	0.08	1.84	2.18	1.00	3.50
	Others	39	2.19	0.64	0.10	1.98	2.40	1.00	4.00
	Total	210	2.18	0.66	0.04	2.09	2.27	0.75	4.50

Descriptive statistical analysis of respondents positions and perceptions of STEEP Factors (Social risks)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound	Lower Bound	Lower Bound
Mean of Technological risk consequence	Project manager/director	62	2.47	0.66	0.08	2.30	2.64	1.13	4.25
	Financial manager/director	10	2.68	0.42	0.13	2.38	2.99	1.63	3.25
	Project coordinator	30	2.46	0.51	0.09	2.27	2.65	1.38	3.25
	Site manager/superintendent	19	2.38	0.47	0.10	2.15	2.61	1.63	3.63
	Engineer/Architect/Designer	50	2.49	0.67	0.09	2.30	2.68	1.00	4.00
	Others	39	2.47	0.65	0.10	2.25	2.68	1.13	3.88
	Total	210	2.47	0.61	0.04	2.39	2.56	1.00	4.25
Mean of Technological risk frequency	Project manager/director	62	2.33	0.64	0.08	2.16	2.49	1.13	4.00
	Financial manager/director	10	2.30	0.55	0.17	1.89	2.70	1.50	2.88
	Project coordinator	30	2.30	0.46	0.08	2.12	2.47	1.38	3.38
	Site manager/superintendent	19	2.13	0.38	0.08	1.94	2.31	1.63	2.88
	Engineer/Architect/Designer	50	2.33	0.62	0.08	2.15	2.50	1.00	3.63
	Others	39	2.40	0.80	0.12	2.14	2.66	1.00	5.63
	Total	210	2.32	0.62	0.04	2.23	2.40	1.00	5.63

Descriptive statistical analysis of respondent's positions and perceptions of STEEP Factors (Technological risks)

		N Lower Bound	Mean Upper Bound	Std. Deviation Lower Bound	Std. Error Upper Bound	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum Lower Bound	Maximum Lower Bound
Mean of Environmental risk consequence	Project manager/director	62	2.51	1.00	0.12	2.25	2.76	1.00	5.00
	Financial manager/director	10	2.37	1.17	0.37	1.53	3.21	.00	3.50
	Project coordinator	30	2.39	1.02	0.18	2.00	2.77	0.75	4.25
	Site manager/superintendent	19	2.78	0.94	0.21	2.33	3.24	1.00	4.25
	Engineer/Architect/Designer	50	2.39	1.02	0.14	2.09	2.68	0.00	4.50
	Others	39	2.56	0.81	0.13	2.30	2.82	0.75	4.00
	Total	210	2.49	0.97	0.06	2.36	2.62	0.00	5.00
Mean of Environmental risk frequency	Project manager/director	62	2.20	0.74	0.09	2.01	2.39	1.00	4.00
	Financial manager/director	10	1.87	0.74	0.23	1.34	2.40	0.00	2.50
	Project coordinator	30	2.21	0.99	0.18	1.84	2.58	1.00	4.25
	Site manager/superintendent	19	2.02	0.66	0.15	1.70	2.34	1.00	3.00
	Engineer/Architect/Designer	50	1.91	0.76	0.10	1.69	2.13	0.00	3.50
	Others	39	2.21	0.79	0.12	1.96	2.47	0.00	4.25
	Total	210	2.10	0.79	0.05	1.99	2.21	0.00	4.25

Descriptive statistical analysis of respondents positions and perceptions of STEEP Factors (Environmental risks)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Mean of Economic risk consequence	Project manager/director	62	2.79	0.65	0.08	2.62	2.95	1.29	4.29
	Financial manager/director	10	2.60	0.75	0.23	2.06	3.13	1.29	3.86
	Project coordinator	30	2.75	0.64	0.11	2.50	2.99	1.57	4.21
	Site manager/superintendent	19	2.81	0.67	0.15	2.49	3.14	1.21	3.79
	Engineer/Architect/Designer	50	2.66	0.92	0.13	2.39	2.92	0.00	4.21
	Others	39	2.69	0.71	0.11	2.46	2.92	1.43	4.29
	Total	210	2.73	0.73	0.05	2.63	2.83	0.00	4.29
Mean of Economic risk frequency	Project manager/director	62	2.50	0.61	0.07	2.34	2.66	1.14	4.29
	Financial manager/director	10	2.22	0.63	0.20	1.77	2.68	1.29	3.50
	Project coordinator	30	2.50	0.74	0.13	2.23	2.78	1.43	4.21
	Site manager/superintendent	19	2.33	0.47	0.10	2.10	2.55	1.07	3.07
	Engineer/Architect/Designer	50	2.40	0.86	0.12	2.15	2.64	0.00	4.07
	Others	39	2.43	0.67	0.10	2.21	2.65	1.00	3.64
	Total	210	2.43	0.69	0.04	2.34	2.53	0.00	4.29

Descriptive statistical analysis of respondents positions and perceptions of STEEP Factors (Economic risks)

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Mean of Political risk consequence	Project manager/director	62	2.92	0.92	0.11	2.68	3.15	0.00	4.33
	Financial manager/director	10	3.10	0.66	0.21	2.62	3.57	1.67	4.00
	Project coordinator	30	3.16	0.79	0.14	2.86	3.46	1.00	4.67
	Site manager/superintendent	19	3.19	0.87	0.20	2.77	3.61	0.67	4.33
	Engineer/Architect/Designer	50	2.84	1.07	0.15	2.54	3.15	0.00	5.00
	Others	39	3.04	0.72	0.11	2.80	3.27	1.33	5.00
	Total	210	2.99	0.89	0.06	2.87	3.11	0.00	5.00
Mean of Political risk frequency	Project manager/director	62	2.43	0.82	0.10	2.22	2.64	0.00	4.33
	Financial manager/director	10	2.70	0.53	0.16	2.31	3.08	1.67	3.67
	Project coordinator	30	2.73	0.75	0.13	2.45	3.01	1.00	4.33
	Site manager/superintendent	19	2.75	0.82	0.18	2.35	3.15	0.67	3.67
	Engineer/Architect/Designer	50	2.57	1.05	0.14	2.27	2.87	0.00	5.00
	Others	39	2.69	0.81	0.13	2.42	2.95	1.67	5.00
	Total	210	2.60	0.86	0.05	2.48	2.71	0.00	5.00

Descriptive statistical analysis of respondent's positions and perceptions of STEEP Factors (Political risks)

APPENDIX VIII: SUMMARY OF HYPOTHESES TESTING

Hypotheses	Descriptions	Tested by	Results
1	It is expected that the there is no significantly difference between the Thai practitioners' perceptions toward risks in the real estate projects		
1.1	The positions of the respondents	ANOVA	The null hypothesis (Ho) was accepted
1.2	A decision making role toward risk management/ assessment	Independence T-Test	The null hypothesis (Ho) was accepted
1.3	An experience in project risk assessment/ management	ANOVA	the null hypothesis (Ho) was rejected, the differences existed
2	Real estate projects in the studied area are impacted by the consequences of risks caused Social, Technological, Environmental, Economic and Political (STEEP) factors. Thus the association between the following shall be found (the main hypothesis was accepted due to three associations were existed)		
2.1	The organisational type of business and organisational turnovers in million Baht	Cross-tabulation	Associations were found, the null hypothesis was rejected
2.2	The typical projects that respondents participated and the related regulations	Cross-tabulation	Associations were found, the null hypothesis was rejected
2.3	The position of respondents and the current risk assessment methods.	Cross-tabulation	No association between these two groups, this hypothesis was accepted
2.4	A role in decision-making towards risk and experience in using the systematic risk assessment model	Cross-tabulation	Associations were found, the null hypothesis was rejected
3	It is necessary to implement and adapt the systematic risk assessment methods (techniques) as tools for the practitioners to assess risks in the real estate projects.		
3.1	There was a correlation between the satisfaction of the systematic/formal risk assessment models employed by the respondents	Correlation	The null hypothesis was rejected; there was a relationship between these variables.
3.2	The satisfaction in the current risk assessment methods might be varied in according to the experience in using the systematic risk assessment techniques of the respondents	T-Test	The null hypothesis was rejected; there was a variation of the satisfaction level.
4	It was expected that statistically significant and positive correlation amongst the risk factors (STEEP factors) shall be existed	Correlation	The null hypothesis was rejected; there was a relationship between these variables.

APPENDIX IX: AN EXAMPLE OF INTERVIEWS RECORDS SUMMARY

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Interview Record of
"Analytic Approaches to Risk Assessment in Real Estate Development"

INTERVIEW RECORD

The researcher will record all information in regard to participant's details, background, the attitudes towards risk assessment and risk management in real estate development projects. Any particular data such as participants' opinions of risk assessment criteria and methodologies employed in this dissertation will be also recorded by the researcher in the provided interview record forms. All interview process will follow to this given structure accordingly.

The Participant's details

1. Gender
2. Position
3. Educational background (optional)
4. Is this participant the decision maker of risks of his/her project?   (Y / N)
5. Working experiences .... years
6. Does the participant have any risk management / assessment experience?   (Y / N)
7. What kind of project that him /her experience in risk assessment/ management? ....
8. According to the participant's opinion and experience in real estate development business, what kind of risk has the most impact to real estate development projects being managed by the participant?
   ....
   ....
9. The frequency (likelihood) of that such risk to real estate project ....

10. Consequence (impact) of that such risk to real estate project. ....

11. Does the participant employ any risk assessment method to assess risks in his/her project? (Y / N)

    If yes, what is the name of risk assessment method he/she uses? ....

    How frequently of using this assessment method? ....

12. How does the participant feel about the risk assessment method that currently used by him/her?
    ....

    How efficiency of the risk assessment method that currently used by the participant? (Rank 1 -5 from best to worst) ....

13. Does the participant experience Analytic Network Process (ANP) or Analytic Hierarchical Process (AHP)? (Y / N)

    If yes, what is his/her opinion about AHP and ANP? ....

14. According to this interview, does the participant believe that ANP, AHP models are the good solution to help the developers to assess risks in real estate project? (Y / N)
    ....

15. Any additional comments or suggestions from the participant................................

PROJECT'S DETAILS

The researcher will observe and record all information in regard to project's details, type of development and any other useful information to consider risks related to the project. All observe process will follow to this given structure accordingly.

THE PARTICIPANT HAS USED ONE OF HIS PROJECT AS THE CASE STUDY FOR THIS SECTION

1. Project type of development (Residential/ Commercial / Mixed – used)

....

2. Specify the project characteristics, details, outlet, sell or lease

....

3. Project location

....

4. Does the project construct under any local development plan/ regulation? (Describe all related Details)

....

5. Approximated project area   .... m^2

6. Number of units / outlets / floor   ....   Units

7. Estimated project selling value   ....   Baht

8. Major type of customers / users

9. Number of competitors in the same area

10. Type of competitors in the same area

11. Project Duration (approximately)   ....   Days

12. Estimated project progress   (%)   ....

13. Estimated construction budget   ....   Baht

14. Sources of project funding   (in %)

            Equity   ....   Debt ....

15. Sources of contractors

....

16. Designers & Consultant firms

....

17. Sources and quality of construction workers / contractors

....

18. Facility management team (if any).

....

19. Quality of project accessibility/ transportation

....

20. Surrounding environment / neighbourhood (describe)

....

21. Any obstructions / impacts to project during construction and selling process.

....

22. Any particular sources of risk that may affect to project vitality (describe)

....

23. Are there any contingency plan to mitigate risks in this project? (Y / N) ....

     (if Y, describe its contingency plan)

....

     (if N, what is the reason of non-contingency plan established in this project)

....

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Interview Record of
"Analytic Approaches to Risk Assessment in Real Estate Development"

Please estimate risks that may be relevant to alternative assumptions (Plan A and B) or your real project plans. Thanks.

Criteria	Sub-Criteria	Valuation methods	Unit	Alternative Plans*	
				A	B
Social Risks	Community acceptability	Degree of benefits for local communities	%		
	Community's participant	Degree of discourse of partnership and empowerment to community	%		
	Public liability	Degree of impacts to local public health & safety	%		
	Workforce availability	The scarcity (availability) of workforce to complete the project	%		
Technological Risks	Accessibility & Evacuation	Degree of easy access and quick emergency evacuation in use	%		
	Amendments	Possibility of amendments in design and construction	%		
	Project Constructability	Degree of technical difficulties in construction	%		
	Duration of development	Total duration of design and construction per 1,000 days	%		
	Facilities management	Degree of complexities in facilities management	%		
	Transportation's convenience	Degree of public satisfaction to mass transportations provided to the new project area, including the accessibility to those transportation	%		
Environmental Risks	Environmental Impact Assessment approval	The delay in EIAR approving from the relevant authorities	%		
	The quality of surrounding environment	Environmental Impact	%		
	Pollution during the development of project	Degree of pollution affect to the local community	%		
	Site condition	Degree of the difficulties of the site preparation for construction	%		
Economic Risks	Brand visibility	Degree of developer's reputation in developing each specific real estate project	%		
	Demand and supply	Degree of competitiveness of the same property type in the studied area;	%		
	Demand and supply	Degree of misestimate the demand and supply of similar property type	%		
	Market liquidity	The selling volume of same kind of properties in the local market	No.		
	Market liquidity	The selling prices of same kind of properties in the local market;	Baht		
	The customer affordability	The ability of customer to pay back the mortgage.	Loan Rate		
	Marketing strategy	The effectiveness and efficiency of the project marketing plan/strategy	No.		
	Marketing strategy	The impact of project selling volume and prices affect to project marketing strategy	%		

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Interview Record of
"Analytic Approaches to Risk Assessment in Real Estate Development"

Please estimate risks that may be relevant to alternative assumptions (Plan A and B) or your real project plans. (Cont'd) Thanks.

Criteria	Sub-Criteria	Valuation methods	Unit	Alternative Plans*	
				A	B
Economic Risks	Sources and availability of project fund	The amount of fund injected to the project.	Project Value		
	Sources and availability of project fund	The number of funding sources availability to project investors	Ratio		
	Interest Rate	The variation of interest rate (loan)	Loan Rate		
	Cash-flow liquidity	The ability to pay the contractual sum to the subcontractors	IPS		
	Investment return	Internal rate of return (IRR) and Capitalization rate required by the project sponsors.	%		
	Project depreciation	The property depreciation rate (straight line method)	%		
	The variation of construction materials price	The consumer price index (construction material mode)	%		
Political Risks	Overall political situation	The awareness of the current political situation	%		
	Relevant authorities approval	The delays in approving for developing the project	%		
	Local development plan	Degree of contrast between the project plan and the local development policy	%		

Notes   Alternative development plans are

- Plan A: The Existing project (please see the Project detail section)
- Plan B: An assumption of mixed residential project combining with 2 storey townhouse, shop house and detached house

APPENDIX X : THAI DEVELOPERS' INTERVIEW TRANSCRIPTIONS

APPENDIX X-1: TRANSCRIPTIONS OF THE INTERVIEWEE NO. 1 (LW)

Date 16th February, 2010

Date 16th February, 2010 at the Developers' office, Bangkok Eastern region, Sukhumvit 52 Road

The interviewee was the project advisor running the low-rise condominium projects, his company developed 3 low-rise condominium projects in Bangkok area. According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "LW".

- I am the project advisor and have the decision- making roles towards risk in real estate project, I have 18 working years 2 experience and I have background in risk assessment in real estate project and financial investment.

- I believe that all kind of risks affect to the project development process of a real estate project. However, in my opinion, I particularly focus on risks occurred during the land acquisition process is the most important one, because of if we purchase the wrong parcel of land. This will mismatch the need of our customers' requirement, and will cause the hardship to the further development.

- For example, we bought the land parcel in the current project area for condominium development, and we identified the price of 70,000 Baht/m2., the unit price of 3,000,000 - 5,000,000 Baht. The project would be absolutely sold out, because of the location wise of the project. But if you bought a land parcel in the wrong location, the price of land would be higher up, then you have to increase the selling price, but this would affect to selling rate of the project.

- The other thing is even you bough the land parcel in the good location, however, you bought with the higher prices or late bought, these would affect to the selling rate of the project as well. Then, the timing in buying the land parcel is a key factor to the marketing strategy of the particular project. According to the studied project, we came earlier than the other developer, then we could have the lower land prices, because the land owners may not acknowledge the end-project price per unit. We could settle down the price of the product as the first hand, therefore, we could also be the first one to sell project out. The developers need to understand the marketing and economic conditions of the trade area and Thailand situation as a whole.

- In my opinion, the fluctuation of land price has the stronger affect to the marketing and investment strategies than the other related cost (construction cost).

- Our company has established the contingency plan to response to the risk in land acquisition process, because we had clarified the target clearly (e.g. product of city condominium, prices between 50,000-80,000 Baht/sqm. and the distance to the mass transit system is less than 500 m., the customers had been categorised as B or B+ above). Thus, if we found the land parcel, which is located more than 500 m. from the mass transit system, we would not accepted that land and not

undertaken further development. It could be concluded that our location selecting strategy is absolutely clear enough.

- Because of our land selecting strategy and target of market are crystal cleared, it is therefore stated that these strategy are effective enough. However, the obstruction to these strategies is a scarcity of land. It is difficult to find the site that match to our criteria, because of the land prices in the similar area are increased dramatically that affected infeasibility to the project's cash-flow.

- The location strategy also influences the rental market, according to our findings that most of the foreigners usually staying in this area because this area is well-regenerated and full of facilities and amenities, closed to mass transit system. We also found that the rental and yield (of the condominium units) in this area are higher than the other Bangkok CBD nodes.

- We always assess the project risks, especially when we commit a new project. Therefore, we have divided the risks into the following categories;

- Marketing risks, the marketing team had been bounded with marketing schedule (absorption rate of units selling). Thus, in the case of the selling volume did not match up with the marketing plan, they have to revise the marketing strategy or consider on any promotions and products' price.
- Construction risks, we calculated the appropriate construction budget (e.g. 8,000 sqm. condominium, spared budget of 120,000,000 baht), then we have to reserve 5% of overall construction budget to respond to variation. We also monitored the contractor's progress by controlling theirs interim payment, if the contractor payment did not on the schedule, that means the overall construction progress would be not on target time as well. It is necessary to control the variation of all work to be not exceed than the 5% contingency.
- Product's quality, we need to ensure that the customer accept our product's
  quality. We have to monitor and control the contractor's performance by asking the contractors to issue the monthly report. All suppliers had to submit us the monthly progress report as well.

- Financial risks: as we had specified the net profit margin, Return on Investment (ROI), and Initial Rate of Return (IRR) of each project clearly. These would influence to the monetary cash-flow and construction cost of each project and cause a strong impact to the selling rate and marketing plan to sell all units in the time limit in order to gain the acceptable ROI. We normally found that the project have never finished on time and within the limited budget. However, if the market absorption rate is good, we could sell the units and gain the acceptable profit. We have to adjust these financial ratio to suit with the current situation, but we need to limit the construction cost in budget or in the worst case, not exceed than the established contingency.
- Competitors, there are a lot of competitors, who develop the similar type of residential project (City Condominium) in this area. Thus, we have to set up the effective marketing plan to suit with this situation. We were in advance than the others because of we were the first developer in this area, we could select the most appropriate land parcel with the good price. Then, we could also set the suitable marketing plan. It proved that our project has been 80% selling rate.
- I, myself had acknowledge some formal risk assessment techniques, for example, one was based on the comparison of the lists of mathematic variables, then the user has to prioritise each variable, by given weight of each variable according to his/her perception of each risk.

SK: according to my thesis, one aim of this is to implement ANP as the risk assessment tool for Thailand real estate business. This model is sound similar to the method that you have studied before, but I thought that the model that you have known was Analytic Hierarchical Process (AHP). Anyway, ANP and AHP have something in common in regard to these models had to compare the weight of each criteria against the created or assumed alternatives.

- The company has created the monthly report progress and shown these on the website, this website encourages customers to monitor and follow the construction progress of the project in an interactive way.

- The construction progress of the case study is 100% completed and all sold out, however, there were some problems in regard to the transfer process (for example, the prohibitive or non-credited customers). Then, the project has to absorb the said units (approximately 10% left) to sell to only affordable customers and we could top up the prices.

SK : I have walked around this project and I have seen some competitors, who undertaken the similar type of property with the same group of customers. According to your opinion, do you think theses competitors would cause any problems to the selling progress of your project?

- Actually, this area is seemed as the supermarket, there are a lot of similar kinds of properties in this area. Each customer has a fully right to select whether a project that suit with his/her requirements or lifestyle. However, each competitor including us has its own target group of customer as well as its own marketing strategy, for example, if a customer needs more privacy or retreated, that customer may select our project because of the project is located far away from the cluster of other condominiums. Or if a customer needs the fully furnished unit, he/she may select us rather than the others.
- This project's investment budget is approximately 140,000,000 baht (land + building and overhead). The sources of funding could be categorised as firstly equity, secondly loan from banks and thirdly down payment. We had received around 10% of down payment from the customers, and used this amount as the project income as well. The other 80,000,000 baht was loan from banks. The rest amount is equity or the owner's fund.
- This project employed the outsource contractors using the bidding and tendering method to select the qualified contractors. The company also established the contractors' performance indicators, by assessing their performances from the previous projects. If they are not qualified, the company will terminate the contractual agreement between them. We also apply the qualification assessment criteria for all suppliers as well. It is like a learning-curve for us to recognise and select the appropriate vendors for this project. We do not actually select the bidder from the lowest price, but also consider on their performances and the ability to catch the project schedule.
- We have also revised the detailed designs of the project in order to modify all designs to suit with the requirements of customers and to reduce the conflicts with suppliers and contractors.
- This project was scheduled at 15 months, but the actual completion was 18 months. However, there was no affect to selling process or project cash-flow because of the marketing team has clarified the possible (actual) completion date with the customers at the pre-sale period, actually it was our normal practice to negotiate with the customers at the earlier stage in regard with this said delay. On the other hand, the project manager had dealt with the financial institutions to reduce the pressure from FI in regard to loan.
- Moreover, the contractors has been controlled by the interim payment schedule (pay as the completed progress), if they do not finish works of schedule, they will not be paid as well. Then, there was no pressure from the contractors to project cash-flow.

- The project designer and consultant teams were all out- sourced as well. However, the company also employed some specialists as the in-house consultant in order to monitor and control the performances of the designers and consultants.

- Other source of risk being concerned by the company is law and regulations of Bangkok Metropolitan Area (BMA) and construction supervisor act. It was my own opinion that the relevant authorities delayed the development process at every stage of development project. The authorities had a wide range of justification in regard to approve or terminate the development process, particularly, law which related to environmental impact assessment. There is no crystal clear rule of EIAR regulation at this moment, thus it is hard to deal with environmental inspection authorities. The current government bureaucratic characteristic also enables the corruption by the officer at every stage as well.

Date 18th February, 2010

Date 18th February, 2010 at the Developers' office, Bangkok Eastern region, Sukhumvit 59 Road

The interviewee was the managing director of a new found real estate development company. His project was a low-rise condominium projects in Bangkok area. According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "TT".

The researcher has introduced himself and the interview records, scope and limitations of this interview. The information of this project has been obtained by the researcher observations and the advertisement leaflets provided by the interviewee.

- I am the managing director of the real estate developer company, undertake the low rise condominium at Sukhumvit 65. I have to look after and control every single risks occurred in this project. Our first project (D65 Condominium) had been completely developed, it took about 3.5 years in construction and selling. Now this project is on the selling and transferring stage. It is already completed selling.
- This project is consisting of two buildings, 8 storeys and 190 residential units, total gross building area of 17,000 m^2. The project land area is approximately 4,000 m^2
- The reasons to develop this project as the low rise condominium was because of this project site is located in the small Soi (lane), therefore this project is strictly bound by the Bangkok Metropolitan Area (BMA) planning regulation. This regulation has limited on the Floor Area Ratio (FAR) and Open Space Ratio (OSR) . This building could not be built higher than 23 m. , and the gross building of each building could not exceed than 10,000 m2.
- Before responsible for this project, I have never had any risk assessment/ management experiences in real estate development business. However, I have learnt of how to manage/assess risks by on the job training.
- It could be said that we did not have the systematic risk assessment or management techniques before the project committed. However, when we found that the economic and political situation around our project atmosphere change, we do have the ad-hoc risk management plan to response for these changes. We prepared the scenario analysis into 3 options as worst case, medium case and most optimistic case. For example, if I traced back to 2007, the project was just commence of construction, the oil price was increased dramatically, this increment of fuel price was also affect to the variation of construction materials price. Therefore, we had to prepare the risk assessment plan and the negotiation plan to deal with the contactors. In that case, we had the better option to purchase a huge load of reinforcement steel, in order to response for the fluctuation of steel's price. Another option that we have made was to increase our product's price, however, we had to compromise with the target customers that we must improve our product's quality as well.

SK: According to your experience in this industry, what kind of risk that has the most strongly affect to your project?

TT: I think the major cause of risk in the real estate project is the cost overrun risk, this had been affected by the external out-of controlled factors such as increment of construction material price, or the increasing of fuel prices and the problems in the loan and mortgaging markets. These are all beyond-controlled factors and may be affected by the current economic and political situations.

SK: Can I ask about how your project finance? What are the major sources of fund to this project?

TT: Our project sources of funding were a mixture of equity and loan from banks, we also used some down payment from the customers to generate our income and paid to our contractors too.

SK: According to your experience, could you please give your opinion about the effectiveness of the risk management plan currently employed by you?

TT: As I earlier informed you, we have the on-the-job training experience in managing risks, we has never prepared the risk management plan before. However, we gathered some experience from this project and my learning and will use these as a benchmarking for the future projects.

SK: If someone develops the systematic model for assessing risk in Thailand real estate business, what are your opinions about this thing?

TT: It would be great to see someone trying to do that, because of now every new real estate projects have to assess the project risks before the commencement of projects. The information that necessary to be included in this model are cost, both land acquisition and construction costs, but the most important cost to be attached with the model is "the financial cost", because the new or small or medium developers like us are indeed need to make a loan from financial institutions, and there are some issues to be concerned such as interest rate, mortgage rate for example.

Moreover, the improvement or modification of the building regulations also being concerned in this model, particularly the Environmental impact assessment (EIAR), because of the delay in approving of the regulations consumes the project time and cost as well, for example, if the developers had to loan from financial institutions, they have to burden by the interest from the first day of loaning, the more time spent in approving of these regulation, that mean more cost that the developers have to bear, too.

These regulations approving also affected to the marketing schedule as well, because of the customers have to wait until project approved, then they can purchase.

So these are all inclusive issues that need to be attached in this risk assessment model.

Date 25th February, 2010

Date 25th February, 2010 at the Developers' office, Bangkok South western area, Rama II road

The interview was conducted at the developer's office, it was located at the south-western area of Bangkok Metropolitan Area (BMA), the interviewee hold a position of managing director of a company, and also the president of Thailand housing development chartered. In order to protect his private and business confidentiality, he is named as "IB" throughout the interviewing and data analysing process.

SK: According to your opinion, what kind of risk that has the strongest affect to your project?, how about the consequences of that risk?

IB: Our own particular risks are: firstly, the external factors such as the economic situation unstable, which may be related directly to the foreign/overseas economic situation or Thailand political situation. Even these are the external factors, but these affect to this industry, because of the nature of the real estate product, is theoretically big, life-long usage, once buy in a life time and contains high value. Then, the customers' confident is counted as one major factor to delay the decision-making towards buying a new property. As said, the real estate product is big in its physical, then the customers could buy it anytime, could wait, it doesn't like the other consumer products that the customers may need it every day. Thus, this factor in my opinion is one major factor of risk in this industry. In the case of un-forecast even (economic, politic), this would affect directly to the customers, and this is a risk of Thailand industry as a whole, not only us.

Secondly, it was the marketing risk, especially the market segmentation, this risk is a foundation of marketing activities. This is an internal factor and also influenced by the competitors in the similar trade area and the current situations. For example, we have our own project, which firstly aimed to be built as the detached houses project, if we concentrate on the internal factor only, our products prices could be ranged between 3 to 5 million baht, and we also have the other products, with the lower prices (1 to 2 million baht). We found that there is a huge gap between our existing products and the new prices. We believed that we could come across this project smoothly, and the project should be faster sold. We have already conducted the feasibility analysis and submitted to bank to issue the loan. We have launched a series of the big houses to test the market absorption, but no one interested to buy our projects, because the customers may switch to buy the lower prices house instead of the bigger houses. We continued testing, but these products did not attract the customers. So, in order to solve this problem, we then modified our project in regard to change the products types from detached houses to be the town-houses with the ratio of ½ , modified some designs such as the size and frontage of town-houses. It was found that these drawn back the customers' attractions, and we could sell these products well. This marketing risk affects to our competitors, as he positioned his project in a high-class sector, but this area is not suitable

to develop the high-class residential projects, therefore this project paused the construction for 4-5 years already. Even this project located in the better location, and closer to the main road than our project, but it could not be sold. So, I think the marketing risk also has the strong influence to our projects and this industry.

Moreover, the real estate project also suffered risk caused by the revision of land and construction regulations. This risk did not affect us much, but I can give you an example of our competitor. He has already designed the project set off distance from the road, relying on the limitation of construction supervision acts, but that was confronted with the limitation of the Land planning regulations. So this project has been prohibited to build until the designer revised the design layout. There is another project of friend, his project is located adjacent the canal. According to the canal conservation regulation, any building or project must have 6 metre set off distance from the rim of canal, but he did not check this rule thoroughly. He designed his project boundary with 3 metre set off only, this cost him a load of houses and time to start construction. It is necessary to check the limitation of the related regulations before the commencement of the project, because of some areas are dedicated for specific purposes such as the flood-bumper area, these did not allow any developers to build their projects. I can conclude that the regulations and delay in approving the project construction affected strongly to the project schedule, following by the cost of finance, interest payment, marketing and selling activities, and income stream of the project.

SK: Does this project construct under Samut Sakorn Province Planning and regulation?

IB : Actually we have several sites around BMA area, for example, Pracha Utit area, we constructed the detached house project, townhouse in Samut Prakarn, and the new project in Pathum Thani area. We do not have much land banks like other developers, but we had expanded our brand to many area only. In the case of Pathum Thani project, we found the problem that the local authorities required us to re-draw the project site plan due to this area is a swamp and water conservation area, therefore this required special waste water treatment plan and drainage system. However, for Bangkok site, we did not need to do that.

I think there are several risk factors that affected to the project vitality, both external factors (economic and political) and internal factors such as marketing risks, marketing and product positioning, marketing segment or whatever. If it failed at the first, then all following activities would be failed as well. Moreover, legal and regulation violation risk was an important risk to be discussed. For example, we have learnt that one big well known company (also registered in SET) had built its project closed to the southern ring road area, this company have already invested several hundred million baht, the mock up housed had been completely constructed and in the selling period. However, it was obstructed by the construction of access bridge across Pasi Chareon canal, the PWD approved for this construction, but the Department of Cultural and Heritage (DCH) forbid this bridge construction (Note: this canal had been registered as the ancient and conservation place). Then, this access bridge could not be constructed and this project was abandoned to build for many years ago. If the developers was in the small or medium scale, this would be collapsed or bankrupted immediately, however this developers is a big one, then it had the other sources

of income to fill up the company's cash flow. Therefore, I stated that the regulation and planning risk must be concerned by the developers before commented the construction as well.

SK: How do you set up the risk treatment action/contingency plan?

IB: Firstly, we need the feasibility analysis, or pre-feasibility study, this is a key for risk treatment, for example, in the pre-feasibility analysis, and we do not need much formal information, just use the outcomes of this study for helping us the decision making. This pre-feasibility analysis might take around 5 minutes to complete. In order to do the pre-feasibility analysis, we need the exact cost of construction (per unit), labour cost including the land development cost to form up the total development cost, then we multiply by the building area. It is just complete in 5 minutes. However, according to our experience in risk and consequences of related risks, we must do the formal feasibility analysis for each project even we have information of the similar kind of property in that trade area.

In this regard, we have given you an example of our previous project, this project confronted with many problems such as the planned marketing strategy did not meet the actual demand/supply of the customers, and the risks caused by the increment of interest rate. These problems reflected to the customers' potential to buy new properties, due to the decrement in their affordability and loan pay ability. Then, it could be concluded that these factors are needed to be concerned while conducting feasibility analysis, these may also include external economic, social and political situations

SK: How do you think that pre-feasibility analysis helps you to set up this project contingency plan?

IB: Of course, anyway, we need to conduct these pre-feasibility analyses although there is some beyond-control, unforeseen events or hand of gods, despite we could not control these situations, but the systematic feasibility analysis would help us in reducing the consequences of risks. Because of in the systematic feasibility analysis, we have to research and investigate all relevant information, particularly marketing, demand and supply, competitors including the financial feasibility and project cash-flow then, we could conclude whether this project is feasible for further constructed or terminated.

According to our experience, we found that the serious issue for the feasibility analysis was the marketing feasibility not financial feasibility. It is because of the financial feasibility, in my opinion is a tool for the management representatives to finalise their decisions only or this was used as the agreement between us and financial institution in regard to loan and interest rate, these had been naturally identified by the condition of each financial institution in a format/ term of agreement. We know that how much we could ask for loan, and also easy for us to identify the project discount rate. However, for the marketing issues, we could not predict the future situation, particularly the unforeseen economic or political occurrences. Things that we could do for the marketing feasibility were only competitor's analysis, demand and supply, including the products absorption rate, but these have never provided us the exact numbers.

SK: In case of somebody attempts to develop the Analysis Network Process (ANP) model to assess risk in real estate project. This model providing the mathematic statistical number for the decision makers, how do you think this model contributes to this industry and what are the barriers of the practitioners in using the systematic/formal risk assessment models.

IB : It would be great, and this would help us to monitor risk or assess risk. However, we have never studied this ANP before, and we did not have any knowledge in this model application. Thus, the ideal risk assessment model shall:

> 1.) Provide the real-time results, because the decision makers need the fastest results to help them making decision.
> 2.) The input of this model shall be clearly identified for the users as well as its process and outputs.

In regard to the barrier to use the systematic models, I think it was because of the complexity of the models, and you should know that we (Thai practitioners) do not believe in mathematic/statistic figures than our experiences. However, in my opinion, I am personally delighted to use any new risk assessment model. If you complete your model, please let us test that.

SK: Who are the main/major customers of your project?

IB: We have several types of housing projects in this area, and our marketing positions were settled to every sections, for example, the highest price of detached house is 10 Million Baht. Then we have the other mixed used residential project that includes townhouses, detached houses and semi-detached houses together. We named our projects as Beside Canal 2 and 3 (Rim Klong 2,3) as the mock-up house that we are sitting now is one type of our inventory (townhouse 6 m. width) the prices of this type were between 1.5 – 2.0 million baht. So if we can specify the segment of customers geographically, it can be stated that 40% of them were the expanded families from the inner-BMA area or other suburb in the south-western areas, particularly the west bank of the Chao Praya River and the. Our trade area covered approximately 7-8 kilometres or 10 kilometres by using this project as the centre of perimeter.

Other type of our certain target customers was the customers who purchased the properties in this area before, the entrepreneurs or workers in this area also being our customers, this group is approximately 40%. The rest 20% were the customers who living or working in the farther area such as Bangkok CBD, Samut Prakarn. However, according to our interviewing with customers, they have some business interactions in this area for a long time (10 years or more) and they had already purchased houses, because this area has less traffic problem, while comparing with the other BMA zones.

SK: In the case of the mass transit system (MRTA) reached to this area in a near future, what would be the impact to your project?

IB: It could be counted as a positive impact to our project, since it provides more flexibilities for our customers to access to the core area of BMA. I think it is an opportunity to increase new categories of customers, because of the simplicity in accessing to the business area would

encourage some customers, who were usually dwelling in farther to speculate a new property in this area as well.

SK: Did you face any problem from the potential competitors?

IB : If we analysed them topographical wise, we using the outer ring road or the Rama II (the main road) as the boundary for assessing our competitors, we have not been influenced by any direct competitors, because of the prices of land parcel in the first 5 kilometres of this main road are extremely high, not feasible to developed as the housing projects. Or otherwise, the prices of our competitors products would be also higher than us from 4 till 10 million baht up, most of these competitors are the large developers registered in Stock Exchange of Thailand (SET). The other type of competitors is the low-class condominium, with the selling prices of 0.6-0.9 million baht, they positioning on the different type of customers from us (the lower segment).

However, the rest areas from that main road were specified by BMA regulation as the green zone (conservation for agricultural purposes). These obstructed the new face developers to build the housing projects in this particular area. Only two townhouses residential projects were launched in the past 2 years.

Meanwhile these obstructions became our advantage in regard that we do not have many competitors (the similar type of projects) in BMA area. However, if we counted the competitors in Samut Sakorn Provinces, there were some competitors (the local developers) who posited their projects closed to the industrial estates. These would become our direct influenced competitors.

SK: Which class of the customers that you expect for this project?

IB : We have positioning our project as the middle class, whether middle-low or high. In details, our detached houses and semi detached were priced 4-10 and 2.5 – 3 million Baht, then these were categorised as middle-high, moreover we also have townhouses which were priced as 1.3- 2 million for the middle class.

SK: Did this project complete in construction ?

IB : Not at all, because of the large size of our project area, we have just completed the townhouses section and sold out, but the other detached and semi-detached house were yet completed, its progress is approximately 70%

SK: When did this project start to build, and how long that you expect to completed overall project?

IB : This project was commenced to construct in the last quarter of 2007, and the rest of 150 units were just started a couple of weeks ago.

SK: Can you estimate the total cost of this project?

IB: Out units were approximately 1500 units, the construction cost was average at 1.4-2.00 million baht per unit, then we have to price these at 4-10 million baht per unit in order to

cover all related construction cost (soft and hard cost, land cost, land development and profit) We had estimated that our margin was about 30%, then the overall project budget was roughly 3000 million baht.

SK: It was a quite large sum of money, how can you fund your project, and where are your major sources of fund?

IB : Some of our funds were retained from our working capital gained by the profit of our previous projects, we have to maintain the debt/equity ratio in the appropriate rate to reduce the burdens from the financial institutions, as we have an experience in the shortage of fund and higher rate of loan repayment in 1997. Now our D/E ratio is not exceeding than 0.5, we are conservative and would not invested more or expand our project if we considered that was not feasible. Then, this also affected to our project plan/schedule, we did not have a long term plan for this project.

SK: Does your project require any Environmental Impact Assessment (EIA) report in order to gain the permission to construction?

IB: We don't need to do any EIAR, actually EIAR was assigned for the residential projects which contained more than 500 units. If any project had the number of 500 units or more, it must follow the EIA regulations. According to this point, we have divided our project into 5 phases and separately enquired for EIA approval, each phase was designed to contain 400-490 units not higher than these figures. It seems that each phase was adjunct to the other, but we have build the separate access routes to each phase (it is a regulation of EIA that need the access route of each residential project)

SK: What is a source of major contractor, in house or outsource?

IB : We have both types of contractors, these were dividing into 2 phases, first phase we assigned the outsource contractors to undertake every construction processes from foundation to finishing. On the second phase, we deployed the pre-cast system by using our own employees, in the structural works, then we employed the finishing contractors and M&E from outsource. We are using our designer department in –house.

SK: Do you have any conflicts with the in-house design team?

IB: Not actually, because it was in-house, therefore, we could sort the problem out in-time and we did not have much problems in design amendment

SK: What about the affected from the Residential project juristic person act 2000, which specified that every residential project have to found the juristic person as the property manager, does it affect to the customers' willing to buy this project?

IB : I don't think this is an impact to our customers, but it should be the new lifestyle of our customers to learn how to share the public facilities and amenities, including they also have their responsibilities for the project as a whole. For example, if the project registered before 2000, the dwellers must form their own juristic person, but if the project registered after 2000,

the developers must respond to set the juristic person. Anyway, this is good for customers in any sake.

SK: Since this project is located quite far from the main road, does this affect to the customers' potential?

IB : At the first sight, this project is really quite far from the main road that also contrasted to the customers' decisions in regard to the location wise. However, according to our research, our customers decided to buy our project because of the quality of products, for example the townhouse units with 4 bedrooms, internal pantry and outside kitchen, fully furnished. These encouraged a group of customers who looking for the best and reasonable prices properties.

We have spared large parcel of land at the project' frontage (1 km. from the main road) since the local development plan specified that area shall be the conservation area for agricultural purposes. We did not build any units till the revision of plan. However, we have settled our pre-cast yard and plan nurseries, scrap yard in this mentioned area.

SK: Was there any event that obstruct to the marketing plan/ selling plan of this project?

IB : The project started in 2007, and we found the problem caused by the increment of interest loan rate. This affected to our marketing plans/ and the customers' affordability. Then, we had to modify our designs, firstly we aimed to build this project as the detached houses as a whole, since this reason we had to change to new product, which was high-class townhouses in order to boost up our selling volume. We could sell our products much more than expected, then we can repay our loan in the near future.

SK: I have heard a news that the Thai government would stop the tax reduction policy in housing transferred in a near future. Would this government action affect to your project?

IB : Of course, this would affect to this business sector as a whole, but for us, we have prepared the contingency plan already, since we predicted that the policy would be ended anytime. Anyway, this is unavoidable and the customers have to response for the increment of housing prices.

SK: Finally, are there any unforeseen events or accidents that obstructed the progression of project?

IB : The obsolescence of the access routes, traffic accidents and the lack of qualified workforces, and the non-skilled workers, particularly in the festive seasons such as New year, or Thai new year in April.

Date 4th March, 2010

Date 4th March, 2010 at the Developers' office, Bangkok CBD, Paholyothin Road

The interviewee was conducted at the developer office, the interviewee hold the position of budgeting/financial manager of the number one real estate developer in the current Thailand real estate market, which registered in SET and performed some significant growths during the past 5 years. In order to protect his business confidentiality, the interviewee will be named as "POS" in this interview record.

SK : Do you have a role in decision making towards risks in your real estate projects? What are your actual duties in this company?

POS: I am the financial/ budget manager of this company, I am responsible in project feasibility analysis, budgeting and cost planning of every projects that our company undertaken. However, I have to monitor all project cash-flow, budget, profit/loss statement before submit to our CEO to approve the commencement of project constructions. Actually my department responsible in financial managing and budgeting control of the whole company, this department divided into 2 majors group as project estimate and site support units.

SK: How long have you join the real estate business sector?

POS: 5 years for this company, and about 10 years all.

SK: Do you undertake any particular projects?

POS: No, because of this department is a centre of the company's financial management, we have to handle with every projects committed by the company.

SK: So, what are the typical projects that you or your team handle?

POS: So many types, the company typical projects could be divided into 2 groups as condominium (both high and low rise buildings) and housing sub-divisional land plot projects. Anyway, our department would take care especially for the projects with value of 185 million baht or up.

SK: According to your own experience, what kind of risk that affect to the real estate projects' progression, budget and the succeed of project?

POS: I always mentioned the location factors and risks in land buying or acquisitioning as the highest risks factors. If the developers had the wrong decision in buying the land on time and on the expected prices, that would affected to the project cash-flow, income and cost as a whole. As well as the time spending in the location selection will cause some delays during the construction period that also influenced to the project progression (income earning).

However, the land prices do not matter, because if we got the expensive land prices, we could also escalate our product prices, but the necessary thing is that that land parcel must be in a really good location, then our project could be sold out. I conclude that the land acquisition process is the first

priority of real estate development projects, whether the price of land high or low, it affects to project vitality as a whole.

SK: Have you ever used any risk assessment models/ applications in the company's projects?

POS: We developed our own programmes to deal with risks in our projects. However, these were not used to not assess the consequences or level of risks, but to evaluated the project' feasibility and constructability. We have just forecasted the probability to sell out any project, if the project could be sold out, then we committed the construction. We have to modify our products to test the market absorption rate or probability to sell out such as we may change the project outlets to be detached houses, or townhouses to see which products could be faster sold. Then, we have to predict our competitors selling volume. Anyway, the key to success of our project is Net Profit, if the Net Profit of any projects indicated high value that means that project is success.

SK: So did you apply sensitivity analysis as an embedded function in this programme?

POS: Actually we did not do that much, we have just done the sensitivity analysis for the projects that we considered as the risky in order to see the variation of incomes and cost, when any project conditions changed , for example, the overseas projects. We have to conduct the sensitivity analysis for every new projects. For the local projects, we did not apply that sensitivity analysis because of we believed that we could control our projects.

SK: Why you have to concentrate more on the overseas projects?

POS: Because of there are so many beyond controlled factors such as the legislation of that country, the tax system that may different from Thailand's, in this regard the variation of inflation rate was one of our considered factor while conducting overseas project.

SK: If someone developed the systematic risk assessment model for this real estate project, please give your opinions about that?

POS: It should be tested prior launched to use in the real case, but for me, I did not require that model. According to my scope of works in this company, I found that there is not much risk involved in our projects, particularly in the financial or monetary matters. The programme that we developed could handle these risks and that was what we are familiar to. Anyway, I also think that the new models would not provide more flexibility to our staff.

The ideal risk assessment model should estimate or measure risk real time, and flexible enough or even installable to every computers we have. That model should be able to collect or analyse data risk by season, by time, and by project type.

SK: It seems like you prefer the risk assessment model which provided more flexibility, so what do you think if somebody develop the programmes to be as easy (both in using and finding) as Microsoft Excel?

POS: That would be good. However, according to our experience, we had hired the outsources programmers to develop the instant feasibility application. We do not have any knowledge of how this application functions, we also do not know how this programme made or connect with other supporting software. Then, we could not trace or fix the problems occurred during using that such

application, but have to wait the programmers to sort the problems out. That consumed much time and expense.

On the other hand, in regard of using Excel, I found some weak points of Excel that this Excel could analyse one project per one file, it provides only the calculation and formulation of our assumption once per project, but does not provide the information to compare with our previous projects or predict the future projects. Excel, itself is a spreadsheet programme, it does not contain the database for the further analyses.

SK: Could you please one of your project as the show case for this study?

POS: Yes, I'll go for the project name Prueksa 17, this project is combined with 221 detached house units, and it is located nearby the south-western highway.

SK: Is it cover by the BMA planning regulations? Could you please estimate the project land area of this project?

POS: Yes, 75200 Sqm. The project value was roughly estimated at 600 million baht. The selling prices were average 2.0 – 2.5 million baht/unit.

SK: Who is the major customers type of this project?

POS: The major type of our customers was a working person who can purchase the house (less than 3 million baht), or the new married couples.

SK: How many competitors who developed the similar kind of project?

POS: I am not the market surveyor, I can not tell you all, however, and I though there should be a few competitors (with the equivalent potential) in this area.

SK: Does this project locate in the Green reservation area for agriculture purpose?

POS: No, it is located adjacent to Green zone, however, according to the planning regulation that allow only the development of detached houses project.

SK: How long did this project construct to complete?

POS: It should be about 500 days, or one and a half year to complete, however, we could rush this project to complete before expected date, but we did not. We did not build the house to stock unless the order from customers or marketing teams. This project is not complete to sell project by its nature. Sometimes, we built the spared units for 10-12 units only in order to support the just-in-time requirement of marketing team.

SK: How many months/ days to complete each detached house unit?

POS: Not exceed than 3 months.

SK: Can you estimate the progression of this project?

POS: I cannot estimate the progress of this project, due to this project is still in pre-sale stage, there is no transfer of property to the customers. Anyway, this project is nearly sold-out.

SK: Can you roughly estimate this project budget?

POS: It is approximately 400 million baht.

SK: What is the major source of funds of this project? Loan or equity?

POS: We usually loan 60% of the land value, this sum of money would be used in the preliminary stage of project construction (site office, clearing and grubbing, etc.). Actually, when the project committed for pre-sale, we could gain large amount of money flow in from the customers' down-payment. We could use that income to support the construction of the houses. According to our construction techniques, each unit is actually complete in a short period of time, then we can gain the faster down payment and instalment from banks or the customers.

SK: Does this company have its own construction team?

POS: No, we using the sub-contractors strategy to control and monitor them. We have never used one general contractor to take care whole project. Thus, we can have some advantage in terms of the competitions between those sub-contractors, if they could finish before the schedule, they could gain the contract sum earlier as well as the bidding prices. We have settled our standards to measure the contractors' performance, if they could not finish in time, we have Interim payment schedule to identify the payment, and damage.

SK: So, what about the designer team?

POS: We usually hire the outsourced designers, by the reason of the mentioned strategy.

SK: What would be the impact to this project, if the government terminate the property's transfer tax reducing policy?

POS: Of course, this has the strongly influence to the customers decision making to buy new property. As well as it affect to the transferring cost of property and land acquisition cost of developers, too. In fact that if the cost of transferring increase 10%, the developers suffer 4% of that increment, while the customers suffer the rest 6%. This is a high impact to the entire real estate industry not only us.

SK: Do you think the selling volume and prices of the second hand houses affect to your marketing plan/strategy and the company's income?

POS: Yes, there are counted as the indirect competitor in my opinion. Since, the second hand houses are the choice of some customers who do not have the affordability to buy a new house, and they have to suffer the transfer cost as well. They might consider the cheaper option such as second-hand house or rental or condominiums.

SK: So, according to the company reputation, I can conclude that your company strongest points are the prices strategy and construction speed, can't I?

POS: Yes, you can, moreover, we also cut-throat guarantee that if you pay us a down-payment, you will absolutely have your house within 3 months.

SK: However, according to the current political situation, the customers may reluctant in your company status?

POS: Of course, but if the customers could pay down payment and first sum of instalment, the customers will have 100% confidence that they must get their house absolutely.

SK: How did the company prepare the risk contingency plan to suit with this situation?

POS: We will act as mediator between financial institutions and our customers, using our credit to ask banks to re-finance some of our customers. That was the way we have done, but we will issue more plan to help our customers.

Date 9th March, 2010

Date 9th March, 2010 at the Developers' office, Bangkok CBD, Bantadthong Road

The interviewee was conducted at the developer office, the interviewee holds the position of the project manager supervising various sub-divisional land and housing projects. This company also registered in SET, in order to protect his business confidentiality, the interviewee will be named as "PP" in this interview record.

PP 9-3-10

PP : I have 20 years working experience in real estate business sector, my background was an architect, responsible for designing of the products and then promoted as the design manager. I resigned once to work with my friends and then rejoined this company again but changed to the construction supervision team, I am now the project manager of this company, responsible in the construction stage of 5-6 projects.

SK: Do you have any experience in projects risks assessment/management?

PP: Yes, I have, but in this company, we held at least 2 meetings every month in order to report the project's progress and obstruction to the management to acknowledge the progress and problems. Of course, one major agenda in each meeting is risks and their consequence to project progression. The mentioned meetings are usually attended by the company executives, then in case of risks, we employed the discussion between site team and executives to sort all risks out, in order to achieve the project goals, with in schedule and budget.

SK: According to your experience, what kind of risk that has the strongest impact to your responsible projects?

PP: Actually before the project commenced, our supporting teams including the executives had already prepared the project planning and organising plans to suit with the conditions of each project. However, the highest influenced risk at this moment is caused by the lack of workforce (workforce availability) and the quality of the contractors. These are all beyond-controlled factors that affect to our projects, we have several kinds of construction contractors, both in corporate term or individual term. The quality of these contractors must be considered by us, and that was a really considerable risk. If the contractors are well-qualified, they will complete our works on time and within budget. However, if they are not, they might their own initial problems such as financial problems, credit problems etc., we have to replace them by the other selected or substituted contractors. That costs us a time and the expected completion of projects. The said problems becoming our typical problems and we have to face these in our current projects.

The lack of workforce availability becomes our problem as well, because sometimes the contractors may not have the adequate number of workers, they might rotate their workers to other projects, or most of the workers always resign in the harvested or festive season (cyclical un-employment). Those affect us strongly in term of lack of qualified workers to handle our projects to complete. This problem is our serious issue to be sorted out.

SK: How many projects that you involve/participate?

Now I am responsible for 4 projects, all of them located in the south-west area of Bangkok Metropolitan Area (BMA). My position is actually the general project manager responsible for monitoring controlling and directing all project under my supervisions to reach the projects' goal. These also included the roles in coordinating and communicating with the contractors or each project. Then, my duties are to meet with all contractors, monitor their work progress and interim payment schedule, measure their progress based on actual performance, and include approving a contract payment to them. We usually abided by the conditions of contract drawn with contractors, vice versa, they have to follow the conditions of contract as well. For example, each housing unit was planned to complete within the time limit, if the contractors could not complete in time, they must pay us a damage or fine.

SK: Do you have any contractors' risks management plan/strategy to deal with this kind of risk?

PP: Since we have foreseen this problem, in order to reduce the impact of this risk, we have the substituted contractors, or always recruiting the contractors. This will help us to deal with the risks caused by the contractors' violation of contracts.

SK: So, do you have any risk assessment plan for your responsible projects?

PP: We actually discuss the impact of risks to each project in our monthly meeting. In this regard, the project manager submits the project' progress report to the meeting board, this report format indicates the overall progress in percentage and the responsible persons of each unit. Our project managers must monitor the project progress every week and then summarized and report in this monthly progress report. We could trace each project's problem by inspecting the project report, normally we aimed that the completion of each unit is to hand over the unit to customer. If we found that any unit could not be transfer to the customer that meant this unit would have any problem. Then, we can keep a track on this unit especially to find out the related problems and sort them out. In this meeting, we employed the panel discussion to assess risk and find out the risk prevention/mitigation methods, too.

SK: Does this panel discussion method appropriate for the current situations of your project?

PP: I think this method is most suitable for us by now, we continuously using this method for a long time. Since we believe that this method would provide us the concreted outputs and this report or the panel discussion also direct us to see the actual problem that occurred at site. For example, if any unit struck, we are able to acknowledge the sources of this problem immediately as well as solve the problem in time.

SK: Have you ever use any formal/ systematic models to help you assess risks in your projects?

PP :   Yes, I am using MS Excel as a tool to present the site work progress, because I have to write a weekly report of the project work progress and submit to our BOD, this helping me in monitoring each contractors' performances as they could reach the target or schedule. Then this report is used by our executive to assess the quality of each contractor, this report is also presented by the statistical figures such as average, mode or whatsoever in regard to benchmark the performances of each contractors, and then we can classify them into A, B or C and so on grades, anyway this report is simply and only presents the necessary figures, not so graphically details.

At the work site, I can monitor the improvement and trend of each contractor, we assigned the inspectors to inspect each unit thoroughly, they are equipped with the progress checklists, quality checklists, which could be evaluated as percentage (both in term of actual percentage and percentage to complete). We have to use these progress checklists as the tools to confirm the actual works of the contractors with the Interim Payment Schedule, the contractors are paid in term of percentage of actual works completed in accordance with the milestones schedule as identified in contracts.

SK: So, if someone implemented the systematic risk assessment models, which grounded on the complex statistical tests devices, what are your opinions about this and will you try to use it?

PP :   Firstly, we have to consider the practicality of this model when using in the real business case, as well as the accuracy of the data collected, including how easy to interpret or calculate the figures/graphic presented by this model. It is because of the current risk assessment models that I have known are complicated and full for miscellaneous figure, it is quite hard to understand at the first sight. I know that the statistical or mathematical figures are necessary to create the formal risk assessment model, but this model shall provide the easy to understand conclusion, may be just "Yes" or "No" only, and this model shall be fast in calculating or analysing. If the said model could provide the attributions as I mentioned, I think it is interesting to use and it shall be useful for the developers.

SK : I have noticed that you are responsible for the projects on the western side of BMA, how many projects that you have to handle, and if you do not mind, could you give me one project as the "Show case" for this study?

PP : Yes, I am responsible for 4 projects on the western side of BMA, there are 3 projects newly constructed, and the other one completed project. Therefore, I will choose project name "Charan Modern" as the case study for your research.

SK: Thank you very much, can you explain me why you have to choose this project?

PP :   There are many interesting points in this project that made me choose this project as the case study, firstly I am concentrating much on this project because of this project was just grand-opened in last November, and it is the most updated project of our company. Secondly, even this project is a newly launched to the market, but it has been well accepted by the

customers. It is in pre-sale stage now, but there were a lot of customers reserved the units. These encourage us to prepare the best construction methods and materials, including the proper project schedule in order to hand-in the properties to the customers within the limited time and budget.

This project land area is approximately 54,400 m2, combined with 164 units. It does not need the approval from Environmental Impact Assessors because of the land area did not exceed 80,000 m2 , which is according to the Environmental law. The project value was 640 million baht, there are two type of units, which are detached houses of 80% and semi-detached houses of 20%. According to our survey, we found that the most popular type of residential units in this area is detached house. The previous projects in this area are mostly townhouses, so when we developed the new type of residential units, the potential buyers like to visit us and reserve the units.

SK: Could you estimate the numbers of competitors in any site in your trade area?

PP : The potential competitors in this area are around 5-6 companies, but there are a few small or medium developers in this area, but these SME developers could not threat us as 5-6 large developers. The name of these bigger developers are such PS or SAN companies, they are also developed detached houses projects.

SK: Can you estimate this project duration?

PP: This project should be completed within 3 years, we divided this project into 2 phases, we almost sold the first phase out, and the land development progresses of land filling, infrastructure, utilities etc. are about 60-70%. There are 117 units in the first phase, and we completed approximately 60%, our marketing team evaluated the turnover of first phase at 380 million baht.

SK: Do you employ the outsource contractors?

PP : Yes, actually they have worked with us in the previous projects, and they have co-operated with us many years ago. However, we also hired new contractors at the work site in order to proceed the project work on schedule. Our contractors selection methods are simply, we announced for the new contractors at work site, then we observed their performances in the real case as well as their company turnovers in order to assess their potential. If they are qualified, we would assign some works to them, and we have to monitor their performances, whether we can assigned them more works or not.

SK: So I conclude that the new contractor contracts may be renewed in a term of project by project. If this contractor causes you some problems on site, or it lacks of good performances. The contract between you and this contractor would be over, isn't it?

PP : Yes, we have to monitor the contractors performances, if we consider that they are well works and do not cause us any problems, we would assigned them more works or even keep in touch with them for the next projects. However, if we see that any contractors would cause us any problems, we have to replace this with another immediately in order to reduce the further risks. As I informed you before, the major risk in the construction stage is the

contractor risk, even we think we could control our contractors. In fact that there are really difficult to control them to perform the best for us, because there are so many hidden agendas, for example, the contractor is less in credit, then they cannot purchase some construction materials, or they had a little cash in hand, so they could not hire more workers, and so on .

SK: Which kind of contractors that cause you a lot of problems?

PP : In fact, if we assigned any contractors, they have to handle every construction stages from foundation, structure till finishing, they may hire their own sub-contractors or vendors. Our company also provide or buy some construction materials for them in order to complete the project on time. So if we justify the performances of contractors, the good contractors in our determination are the contractor who has adequate workforces, adequate operational cost, and their cash-flow are flow able. This kind of contractor is a good one and hardly causes us problems, they could run the project until finish, with good performances. On the other hand, the contractors who cause us a problem are almost the new contractors who never worked with us, they may not be prompted to handle a big project as well as could not maintain or control their workforces, and some of them may have the illiquidity cash-flow. Thus, they could not hand in the assigned works to us on time, these would cost us a lot.

SK: Did you establish the contractor selection methods or standards?

PP : Yes, as I informed you earlier that we have to clearly check that contractor's portfolios, including the past experience and the previous projects, we also monitor on the past quality of works of this contractor. After we inspected this contractor clearly, and if it passes our qualification criteria, we would assign the works for it.

SK: Do you have your own in house designers or assign the consultants to design?

PP : We have our own in-house design team to response for the design matters, we have both architects and engineering designer in-house. They are responsible for designing our products.

SK: Do you have any participation in forming the project juristic persons to undertake the project's facilities management?

PP : We usually participate in facility management of each project developed by us, we have to maintain the conditions of project, particularly the infrastructures, utilities, facilities and amenities until we hand in the project to the juristic person, then we also help them in maintaining the common area of project until we can hand in all units to the customers.

SK: Does this project have any accessibility, access route or transportation problems?

PP : Actually this project is located on the sub-road that is a short cut to 3 main roads in the north-western zone of BMA, and this project also located closed to the new purposes mass transit system (the red line), the distance between our projects to the nearest station is approximately 1.50 km. This area will become the node of Bangkok transportation and main road in the near future, it is also filled with public utility, retails malls, the public services such as hospital or police stations. That's why the customers invest on this project, anyway

the access road to our project is too narrow and winding, this always cause the traffic jam problems. However, there are only a few detached house projects in this area, and the projects designs and products are mostly outdated, the customers required a new project, and they thought that this is an appropriate time for change.

SK: Do you have any else problems rather than the contractors, which obstruct to the selling progress of this project?

PP : There are a few problems caused by the local development regulations, and this project is located adjacent to the high voltage electricity poles and cable, therefore I had to coordinate with the Electricity Generator Authority of Thailand (EGAT). Moreover, the district officers always visit our to inspect the condition of construction and safety, including the approval documents from the related authorities such as Approval for construction, approval for sub-dividing the land etc. We have to prepare documents and our site conditions to response for their inspections. Anyway, we do not have to gain the approve from EIAR, because our project did not reach the level of EIAR to do the environmental impact assessment, then we do not have the risk caused by delay from EIAR approval.

SK: I have sent you the risk assessment criteria, in order to ask you to rate the consequence of each risk in this criteria against the alternative plans, which are Plan A is a residential project contained only townhouse, and Plan B is a mixture of detached and semi-detached houses. Could you please give me some opinions or comments in regard to this established risk assessment criteria?

PP : Actually Plan B is an actual project that undertaken on the site, our actual project is a combination of detached houses and semi-detached houses, therefore, Plan B shall be more feasible and less risks than Plan A. It is because we have conducted several project feasibility analysis and recheck every factors that would be related to the project progress. We also undertaken the pre-feasibility analysis before decided to buy this parcel of land, and after that the marketing also made the thoroughly study to gain as much supportive details and to encourage our plans to ensure that our products could be smoothly sold in this area. Therefore, if you given me two options like this, I would immediately select plan B because I have a details information of this plan already and I am confident that Plan B is less risky than Plan A. In the actual business case, if you select the wrong options, every related factors would be dramatically changed such as marketing plan/strategy, construction methods even the difficulty for us and our customers to seek for the sources of funds. Then, I think risk when you select the wrong options might be double than the corrected one, because the project time or budget would be varied than expectations, the completion time shall be also varied that make the break even point or return on investment distorted from the expectations, too.

SK: Thus, do you think that these criteria are included as the evaluated variables, when the marketing team or the company executives conduct the feasibility analysis or assess risks in the real case?

PP : Yes, it is right, the marketing teams have a responsible for analysing the feasible of this project, they have to do a survey or research in the trade area to find out the numbers of

similar kind of projects in the trade area, the competitors and degree of competitions, the replacement products, the prices that customers can afford, the type of customers, and the target groups and so on. They have to make a carefully analysis to ensure the feasible of the products, then if they believed that the project would be success in an expected time and budgets, they would issue the marketing plan and hand it to the design units to design and plan the project layout and products.

SK: How do you think about the established risk assessment criteria in term of their coverage to the real risks occurred in the projects, or do you think that need to improve, please give me some useful comments towards that?

PP : Overall, if I scan this criteria quickly, I think this is OK, and it also covers on the major risks that occurred in the real projects, but there are a little points that may make the answerers do not understand the questions and calculation methods. For example, the brand awareness risks, you mentioned that both options would have risks caused by our brand are not recognised in the trade area, I think this one could not be adopted for our project, because our brand is also strong in the Thailand real estate market. That's only trivial point, so I have given your all the best I can, and I think overall this criteria is quite OK, it covers on the major kind of risks as I told you earlier.

APPENDIX X-6: TRANSCRIPTIONS OF THE INTERVIEWEE NO. 6 (SP)

Date 14th March, 2010 at the Developers' office, Bangkok Eastern region, Rama IV Road

The interviewee was the project of a new found real estate development company. His project was a low-rise condominium projects in Bangkok area. According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "SP".

I am the project manager, responsible for planning and budgeting of this project. I have working experience as civil and structure engineer for 15 years. I also have some experiences in making-decisions towards risks, mostly risks occurred during the construction stage. The project that I am involved with is a joint venture project between Singaporean company and Thai company. It is an 8 storey selling condominium located in Bangkok Central Business District area.

According to the current situation (political situation), I thought it is affect to our project progress in terms of selling and marketing, because of the situation was really hard to predict, beyond forecast and we could not know what would be an impact after this turmoil. This also affect to the customers' decision to buy our properties. At first, we could sold our project smoothly because the customers had confident to buy and not so panic in the political affairs. But now, the political situation has rapidly changed and seemed like some serious incidents would happened, thus these strongly affected to the customers' willingness to buy our project. I think other developers also faced with the similar situation by now.

Nevertheless, we also have some strong points as we do not have the financial illiquidity problems. We have sought for the funding sources from Singapore partner, which had the better economic and political situation than Thailand. On the other hand, we also are supported by Thai banks. So we do not worry much about the sources and amount of funds or cash-flow of this project. However, if we continue to invest in the other future real estate projects, there would be some points such as financial or cash-flow issues that really need to be concerned, because of the condition of investment would be changed extremely, not like this project.

This project has less marketing risks affected, because of we had forecasted the demand & supply clearly. We found that there was a need of the residential units in that Core Commercial area, that was our certain demand. If we can build the project there, we should have the certain customers surely.

Our company have never used any formal/systematic risk assessment models, I am usually use the profit/loss sheet to forecast and evaluate the project progress and vitality. To be honest, I have just focus on income, cost and expense of the project's cash-flow and I can evaluate any impacts or factors that influence to our project progression. If we know that factors, we then seek for the controlling methods.

We have never assess the real estate risks, but we intensive seeking for the risk prevention and control. Our project participants had to involve with these risks prevention. In our case, we employ the balance sheets such as Profit/loss, project cash-flow as the risks measurement tools, because of every project participants could understand and communicate these tools. Then, we did not implement any other risk assessment tools at this moment.

If you allow me to estimate the level of risks that influence to this project at this moment, from the scale of 1 is lowest and 5 is highest. I found that this project risks could be adjusted at 3 (neutral or moderate), the high impact risk that we face now was the fluctuation of construction materials prices. This fluctuation caused by the inflation rate, anyway we have the prevention techniques by clearly monitoring our profit/loss statements and creating the cost checklist to see any variations in every construction stages. We have to control our contractors since we awarded them to undertake our jobs and see how they estimated construction cost as well.

In regard to the implement of the novel risk assessment models, I am keen on using that if someone has developed it, because our company love to try something new and useful. However, the outcome or output of this model should be easy to interpret and easy for every project participants to understand. On the other hand, we have to concern on how to communicate the outcomes of this model to our shareholders, too.

Our project is a low-rise condominium project, it is single building with 8 storey, it contains 52 selling units, separated into 8 design schemes, and it located at the heart of Bangkok well-known red - light district area. According to these project characteristics, we did not have to conduct the Environmental impact assessment report, then we could reduce the approval from authorities time. Anyway, our management also concerned on the further environmental regulations even these won't be announced in the near future. As seen from the designs of our project, we concerned on energy saving and environmental issues, then we adapt the energy saving (passive and active) construction materials such as double-gazed glass as the units' windows, lighting dimmers, fresh air cooler etc. These would also support our image, in term of energy and environment conservation, and help in promoting our project to public.

The land area is approximately 1,500 sqm, due to the limitations of planning regulations in terms of Floor Area Ratio (FAR) and Open Space Ratio (OSR), we had to leave some spaces for general purposes. The project value was estimated at 400 million Baht, our major customers were the foreign businessmen, or Thai business owners, high-class citizens. According to our energy conservation concepts, we used the high end materials, and that also increased the prices of the units, but not so significant and the customers are able to afford the prices.

We have conducted the marketing survey before, so we could set our selling prices at the level that our target customers could afford. In addition, this project is located on the very busy commercial area (red-light district as well), the large parcel of vacant land was rarely find out, if it had, the prices would be extremely expensive. According to this scarcity of land, there are only we build the residential project in this area. The closest competitors built their project in high-rise condominium but may be 1 kilometre away for us. It was not the apple-to-

apple comparison to our project anyway. Now this project progress is 90% and shall be completed by end of March 2010, the construction budget was estimated at 110 million baht.

We employed outsources contractors, who specialist in low-rise condominium building, we also employed outsources consultants and designers. It was because of our company is new face in this business, we have small number of employees by now, if we hired those specialists, that would increase our fixed-cost and other non-productive cost such as welfare, tax etc. In case of using outsourcers, we could also learn some useful experiences from our outsourcers, because our project was so small, we can save a lot of cost by this regard.

I confirm that this project has less marketing risks, because of it located in the area that the residential condominium units were really difficult to find. Our selling progress was good before the current political turmoil, if there is no such situation, our project would sold out in a month. Our project becomes the high-end project that suit for posh or business owners, the prices per sqm is average 136,000 Baht, while our competitors could price at 70,000-80,000 Baht/ sqm., but they could not have the best location as us.

APPENDIX X-7: TRANSCRIPTIONS OF THE INTERVIEWEE NO. 7 (PT)

Date 19th March 2010

Date 19th March, 2010 at the Developers' office, Bangkok CBD, Rama III Road

The interview was conducted on 19th March, 2010 at the developers office in Bangkok CBD, the interviewee holding the position of Chief Executive Officer (CEO) of the well-known developer. His company has registered in Stock Exchange market as the public company. According to the researcher investigated on the company profiles, this company is one of strongest developer amongst the others. In order to protect his company trade confidentiality, he will be named as "PT" from company name "SUP"

PT: I am the Chief Executive Officer (CEO) and the founder of this company, I have more than 32 years of working experience in real estate development industry. This company is a Public Company Limited also registered in Stock Exchange of Thailand (SET).

SK : What kind of risk has a serious impact to your involved project?

PT: In each project and each period of time, there are the variations of risk, which fluctuated in according to the project types and time spending in each project as well. We can categorise risk in this business as business risks, financial risks, legal & legislation risks, and community risks (sometimes these risks may caused by other sources such as a violation of law). These are my example to this regard, I also believe that the political risks also affect to the real estate industry, thus, I cannot definitely defined that which kind of risk has the strongest impact to the real estate projects.

SK: Could you please scope to the current situation for your SUP Company?

PT: In the case of the current situation, I think the financial risk is low, because of the loan interest rate of the top 5 commercial banks are still low and the interest rate will be decreased in the near future. That's all. If we emphatically focus on our company, I think we are less affected by business risk as well, because of I am in this industry for 30 years, and our company was established 20 years ago. We have constructed our projects in several types (high-rise condominium, low-rise condominium, housing project, leisure resorts etc.) and in many cities rather than in BMA alone. Then we have the better risks distribution method than the company who emphasized on condominium or housing projects, or the company who built the project in BMA only. So we estimated that our business risk should be below average when compare to our competitors in the same industry, our financial risk also lower than the others because of the depleted loan interest. In regard to the dividend to our shareholders, we have to adjust our profit to pay them that was only 1/3 of our profit only, so we do have the other 2/3 to spend within our group of companies.

SK: This is because your company has a good risk distribution method, isn't in?

PT: Our Company focusing extensively on risk distributions and the impact of risk affected to our business. We was the first real estate developer company who registered in SET in order to mount up the other source of funds rather than loan from Banks or Financial Institutions. We are named "the residential specialists developer" because of we developed every types of residential projects, low-rise, high-rise, housing land sub-division, and so on. Whereas the other registered companies developed only one type of residential products, such as the condominium expert only developed condominiums. We have followed to this principle for 17-18 years, and it was found that the other developers tried to follow us in regard to develop every type of residential products in the past 5 years. We do have only a few commercial building projects, but not so significant because that is not our company business ethos.

SK: How can your company assess risk?

PT: In our board of directors, we established risk committee to assess and deal with the company risks, we have hired the risk specialist to be our risk committee chairman. We have set a training course of risk assessment or risk management to educate our staff annually. On the other hand, for the project site level, we also have the health and safety risk committee to handle the trivial risks caused by the problems at the site.

However, we positioned ourselves as we would follow the principle of Buddhist middle path, we would not extremely conduct our business in the most modern or the most outdate ways. We poised ourselves to follow the limitations of Thai construction and land-subdivision regulations, never tried to violate the laws and strictly followed to the business ethics, but sometimes we change our principles depend on the situation. For example, we never announced that we sell only completed houses or we build upon orders. We selected both of these methods to run our business smoothly. Thus, according to this principle, we gained more credit from our customers and financial institutions. Unlike our competitors who proclaimed themselves as the number 1 in Thailand real estate industry, they used every single way to boost their own selling volume, without concerning on the limitations of regulations.

PT : We did not struck ourselves with any extreme marketing campaigns such as "100% completed to move in, or the fastest developers in Thailand real estate industry". This would help us reduce our marketing risks, in the case that we committed to complete a unit of house with the customer, but we cannot finish in the contractual time, we therefore have to pay a damage to that customer, and we also lost our credits. Anyway, the completed house campaign has one advantage in regard to it could reduce risk caused by the fluctuation of construction materials prices, the project manager could control the overall budget, but they have other kind of business risks, for example, if they build the completed 100 units, but the coup de tat occurred, those would not sell out because of the customers may cancel to buy a new property.

According to our ethics, we usually build the mock-up houses at the same time that the approval for construction approved, we must not contravene the laws and must follow our business ethics strictly, and we would not take advantage from our customers in any possible

ways. Every project stage or marketing plan/strategy must follow the related regulations, our business ethics and don't take advantage much from our customers.

If we discuss about our case only, we have the strategy to build the mock-up house completely as an example for our customers, on the other hand, we also parallel build a few houses and do some project landscape or finishing works. These could guarantee and ensure the customers that they could have the house on time as they expected. In this regard, we can also forecast the number of products to be build by the customers' order and down payment order, if the customers satisfy with our progress, they would order, then we have to finish our works. That's all. Our strategy is quite similar to Toyota just-in-time manufacturing strategy.

SK: So your strategy should be suitable with the low-rise or the housing projects only, shan't it?

PT: I have given you an example of the housing projects, because of for the high-rise condominium projects, the selling strategy must be varied. In the case of high-rise condominiums, we have to employ the sell-before-construct strategy, we have to gain as much down payment from the customers. Since we have to loan some funds from the banks, the loan condition defined that we must have the 30% of selling volume, then the bank can lend us money. Thus, for the condominium projects, we have to gain as much as possible cash-inflow before ask the bank to lend us some more funds.

Moreover, the build completed before sell strategy also has one major disadvantage, it is the developer had to suffer from the fluctuation of loan interest rate. That means they have more financial risks and then they have to increase the product prices to response to the higher financial risks. Therefore, if we sell before complete construction, that would be good for specifying the marketing plans as well, we can sell our products cheaper in the sell opening, then we could slightly increase our prices, the customers who still satisfying with our products would please to pay more, or they can wait until the prices adjusted, I think that is fair for every party. It is like you buying a new car, sometimes you couldn't see your exactly car, you just buy the invoice and you have to bear your own risks.

SK: Did the selling volume during the pre-sale period affect to the amendment of design?

PT: Yes, but it almost encourage us to improve our products' quality, in the construction stage, if we could improve our product's quality, we would amended our design to suit with customers' requirements. For instance, in the case of high-rise condominiums, we operated the selling period into phases, this provides us more flexibilities in order to amend the design themes to suit with customers' requirements. For example, we could obtain the customers' requirements from the first phase, then we can analyse their actual needs and the trends, then we can forecast the trend and adjust our design, prices or services in the second phase. If the first phase could be sold out that means it is possible for us to top up our prices in second phase. Vice versa, if the first phase could not be sold as expected, we could delay or postpone the second phase selling, or decrease our prices, that's all.

In this regard, we also could amend or adjust our design, or modify some specifications to suit with the affordability of the customers, if we cannot reduce the prices, in order to boost their potential to buy our products. We designed and modified ours upon the situations and customers' requirements and affordability. Actually, the construction costs always increased, and the demand & supply of the real/target customers of this industry is hard to predict. In some situations that the economic status was really unstable, there was an oversupplied products in the market, we have to reduce our prices, and set up some marketing promotional plans. Thus, I could conclude that dividing the large projects into phase of construction and marketing is a way to reduce the business risks, too.

SK: Can I conclude that the high-rise condominium project associated with more risks than the low-rise or housing sub-divisional project?

PT: In the monetary point of view, yes it is, because of the high-rise or special condominium projects consumed much more cost than the lower one. The more bigger project, the higher risk we suffered, because the bigger projects consumed more cost, time, workforces, selling effort, whatsoever rather than the smaller project.

SK: According to the company risk committee, how can they assess risks?

PT: Their assessment methods are based on the theoretical basis of risks, consequences against likelihood to occur, sometimes they are using the discussion between their team and site member to sort out followed by risk matrix. Anyway, our company strictly follows to the maxim of "Prevention is better than correction", and try to distribute risks with many methods. As earlier mentioned, we followed the middle-path, not extreme on any side. We do not position ourselves as number one in this market, that also reduces our business risks.

SK: If someone try to develop or implement the systematic/formal risk assessment model to be used in Thailand real estate industry, do you think that is suitable in this situation?

PT: Yes, it would be good, because of even an attempt to do something good for this industry is a very good idea. However, Thailand real estate industry contexts contained with many sources of risks, these are sometimes really complicated, itself has the different characteristics from the other industries/countries. The model programmer/developer should understand overall Thailand real estate industry as well as have an in-depth information from various sources in order to create the appropriate model for this business, you could not apply other countries/industries risks assessment tools (even it success) for this specific industry.

SK: Do you have any project case to be used as the showcase for this study?

PT: We can use the company's largest project as the case for your study, the project selling value was about 4,000 million baht overall, and the gross building area was approximately 160,000 sqm. We could purchase the project land in a half price of the market land prices. This project is one side adjacent to the New Road (Charoen Krung) and the other side have frontage on the river Chao Praya. Our land purchasing strategy was we bought the land parcel which was adjacent to the road first, and then the internal plots would have no accessibility, then the prices were decreased dramatically, then we purchased those plots, anyway, we also

hired the professional brokerage to deal with this matter. The prices of our land were average 70,000 baht / 4 sqm., very cheap while compared to our competitors who developed condominium in this area. The land area was accumulated at 22,400 sqm. We could reduce a load amount of land acquisition cost, therefore, we could also reduce risk in land acquisition as well.

According to the large size of this project, therefore we divided it into 2 phases, according to the construction law, each phase shall be less than or equal to 30,000 sqm. In the time that we started this project, some of our units area were not conformed with the customers' requirements, those were bigger than 40 sqm., our selling period and volume of the first phase was really slow, then we have to adjust design and marketing for the second phase, then, this had boost us more selling volume and the number of customer' bases.

SK: How long did this project complete?

PT: It was about 1000 days, it was 4 buildings in the adjoining area, and we divided into 2 phases, and opened for selling 2 buildings together as the first phase. For the second phase we have just opened the third building, but hold an opening for the fourth building. The project phases were similar to our previous large condominium development.

SK: Does this project combine with four buildings situated on the same base, and share the common areas, facility area?

PT: It seems like four buildings are adjoining together in the same area, however, first three buildings shares the common area and facilities together. It is according to the change in regulations that each condominium phase must have its own common area and facility area. Then, for this project those three buildings are sharing the facilities together because of they were opening at the same time, but for the rest fourth building, it needs the separate facilities and common area. These also affected us because at the first time, we designed the common area for four buildings together.

For the fourth building, we had to inform our customers that they could not use the facilities of the first phase, and then we deducted one retail unit at the ground floor and modified it as the fitness area for this building, we also had to dump our prices of the units inside this building down, because of the customers could not enjoy the total facilities provided by us. We had lost some of our profit, but we could also reduce of risks in term of legal violation and risks in the condition of contract with customers' fraudulences. We have to inform the truth to our customers as it actual happened on the project site.

SK: Are you a chief of designer of this project?

PT: Yes, actually I take part in designing in every single project of our company, but I have just given the conceptual designs and then our design teams will work those out. Then, I am also the design reviewer of each project.

SK: How about your contractors?

PT: They are working with us long time ago, we have the strong relationship with them. However, we also have our standard to filter and to select the appropriate contractors, we are not relying on the bidding prices only, but we also concerning on their performances and technical capabilities including their financial attributions, in order to guarantee that our projects would be completed on time, within our budget.

The rests of this interview record were undertaken with the case study's project manager.

SK: According to your position and your experience in this project, could you please tell us what kind of risks as shown in the criteria has the strongest impact to your project?

PT: If I conclude that immediately, I thought this project had a less affect from marketing and economic situations, because when this project started the pre-sale period, it was sold out in a short time. The reasons were because of the prices were not so expensive for the customers to afford and our brand is counted as one of the strongest brand in Thailand real estate market. However, it met some problems in regard to the bank was reluctant to lend us some loan, because of in this situation, everything are fluctuated and could not be easily predicted. Banks would not lend a large sum of money unless they know that they could be one hundred surely repaid. This project also faced this situation, but when the project started pre-sale, we could sold them out, and we gained some down payment as well as satisfied selling volume. These became a main factor that helped the banks considered to lend us some funds to continue our project.

Notwithstanding that the project sold out, however, we gained the non-satisfied expected rate or return, because of the longer time spent in selling the fourth building, because of we discounted our prices as my CEO informed you. That would encourage some problems from the depreciation or property obsolescence of the non-sold units, but, we also mitigate this by reducing our prices, this could help us a lot to deal with the aforesaid problems (risks).

In regard to the contradiction between our project plans and the BMA regulations, we justified this kind of risk as low because we have clearly check and verify the conditions, contents of the related regulations. This is actually the strongest risk that affect to the developers who did not clearly check the conditions of BMA regulation, or even check but trying to find some gap and violate the rules. Those would affect the project as much as the project would be not approved to construct, or could not sell to public.

Thus, in my opinion, the best way of the real estate developers to reduce risks in this business is to have a better understanding or knowledge in local/urban development policies and regulations and then followed to those such rules strictly, as well as they have to know and estimate their own capabilities, in regard to handle any projects.

SK: Can you give some idea about the idealistic risk assessment methods for Thailand real estate industry?

PT: If anyone developed this for real estate industry, that would be great and worth a trial. However, this programme/model must provide the reliable, updated information or the sources of information for the users to investigate more if the users need more data. In addition, the model shall be linked with the database that provided the real-time information and link to the cash-flow or feasibility analysis programmes, for example, the developers also need to know the available area left for them to develop a project in the specific zone of BMA development plans. They also want to know what kind of project could be built in the site area and become more feasible. Moreover, this model should combine with many disciplines such as economic, financial, legal, technological, and sources of reliable information. It should be used both the specific location in the specific time and in general location and time, too.

Date 22nd March 2010

Date 22th March, 2010 at the Developers' office, Bangkok Eastern area, Lad-krabang road.

The interviewee was conducted at the developer office, the interviewee hold the position of Managing Director of the leisure & sport complex, which located in the Bangkok remote area (closed to the new Bangkok International Airport). In order to protect his business confidentiality, the interviewee will be named as "NM" in this interview record.

This project is not a first one in this market, because of there were some sport and recreation facility projects like this already built and grabbed some succeed. For example, Piyarom Sport Club or Sport City, however, our project has many appearances that significantly different from the other previous projects. Before I committed to this project, I had been appointed by many project owners to undertake the property management duties for the recreation club houses in their projects. Actually, those club houses were in the dull conditions, nearly to be collapsed or shut down, when I was there, I have improved the conditions of those facilities and then they recovered. From these points, I perceived that the demand for the work out or fitness places of the Bangkokian were really high and after that I have analysed their demands and found that these demands would be dramatically increased in the near future. However, there were no work out places or fitness that suit with their individual demands, thus I went to several countries like USA, German to observe and investigate the most appropriate model for the sport & recreation complexes.

This project started in 2005, on that period, the new Bangkok airport was not completed, and the main access road to this project was not expanded, too. The surrounding area was mostly rice fields, not fully developed. Many of my colleagues, friend, customers, have just wonder why I had to build this kind on project in the remote area. However, I selected this site myself based on my experiences and my investigation's findings that our target customers should be the workers with families. Therefore, the project site area must be big enough to suit the families' requirements (ages, gender, interested, hobbies) for recreating purposes. There would be no such large vacant land parcel in Bangkok CBD, if had, this project would not feasibly carried out. In addition, there are many alternatives or competitors who run the same business like us in the CDB area such as California Fitness, Fitness First, but these competitors' places would not suit for the elder or children like our project.

When I first conducted the feasibility study of this project, I believed that I have less risks than expected because of I have committed my own investigations, done a load of market survey, done a lot of research and analyse, thus, I felt confidence enough. Moreover, we started our project while the government issued the fitness campaign, they helped in promoting and advertising our project, thus we have no need for the marketing and promoting budgets. According to my own research, I found that the gyms in CBD also pushed some customers to our project that means the working class people with family. For the CBD's gyms, they could not bring along their families to use those facilities as well they have to

concern on their family together activities, too. Therefore, it could be concluded that the CBD gyms were not suitable for family man, some of our targets had changed their membership from those gyms to become our members after they were getting married.

I personally insist that I perceived the less risks for this project because of we have our curtained customers in our hands, including I have simulated this model before in the residential projects that I managed. Thus, I felt really confident.

According to my research findings, I found that the clubhouses in the residential projects always bust or less maintenances because of the design and the facilities provided by these clubhouses did not match with the customers' requirements, they do not fulfil the customers' need for the complex work-out spaces. For example, it does not equipped with work-out machines and most of them have small spaces, not fully functional and less maintenances by the project owner.

I almost conducted marketing research by myself, did not hire any researchers, however, it consumes much time. Actually, I use the past sport-complex projects as the case studies of my research. These case studies also covered on the clubhouses in golf-courses, clubhouses in large residential projects and the gymnasiums in CBD area. Then, we could design the sport-leisure complex, which could be fitted with the requirements of customers, in this project, we also have the meeting hall, gymnasium areas, tennis courses, squash courts, swimming pools, and so on.

What did the research outcomes help me? These help in figure out the number of the target customers. For example, we have known that in this area (5 km. radial of this project), there are 200 residential projects, which are the middle-high class detached houses. For the customers in the commercial organizations, we also have the information of them, according to my survey, there are approximately 2000 companies clustering in this area. These formulated our potential customers to could afford our project. In this area, there are two industrial estates with at least 10,000 employees, if we filtered them in accord to their incomes and lifestyles, we shall have approximately 10% of them as our potential customers. Even we got only 250 of those, it was still feasible for this project.

In addition, as we have the meeting convention halls in this project, this facility serves the promotional events or organized parties of the companies in this area. We have got the approximately number of the companies in this area, that was 2000, but most of them do not have the place or hall to promote their goods, then they have to use our conventional halls. These information also gained by our intensive survey and analysis.

I have never used any risk assessment models, software or applications, because of I did not have any knowledge in those models and I think these must be complicated and difficult to learn. I am an old generation, so I have just only used the sport-club management software created by myself here.

But anyway, if you could offer me a risk assessment model which is easy to understand and easy to use, it is worth for me to have a trial.

The barriers to learn this risk assessment model are my age and my enthusiastic to learn a new thing is reduced dramatically. I am old guy and need more time to understand one new thing, I am not special in computer using as well, and according to my duty I do not have time to operate this software myself. That's all.

In addition, I manage risks using my own research data, and analyzing these data manually. These reduce time spending in decision-making towards risks.

What is your method to distribute risks and/or mitigate risks?

Firstly, we have to know ourselves, our core business, we are doing the services business. Then we have to know the exact requirements of the customers, and serve them best as possible as we can. If we focus that our business is the services and our specialty, we will not do the other business, which we are not expert. For example, in this project, we had let the cafeteria area for the famous restaurant chain to manage our catering services, or the musical school, we also let this area to the expert to run the music school. Thus, these would better fulfil our customers' requirement rather than we do these ourselves and make them worse. Let the experts do their own business and we trade them by rental income. We do not run every business in this project.

Actually, this might not being the good risk distribution strategy, anyway we do not have to take risk of our non-core business in the case of these failed to respond the customers' requirements or generate less income than expected. We have certain income from the membership and rental that would adequate to smooth our cash-flow.

One thing that I learnt from my survey was the design concepts being crucial to the success or failure of the sport-complex. I travelled to many countries to seek for the best sport-complex design and I have found that the best design concept must be associated with the followings:

1. Let the expert do their own business, don't do everything ourselves
2. The complex must be attached with cafeterias, restaurants, shops, health services
3. Closed to the residential projects, or infrastructure, particularly the mass transit system
4. Closed to rural business district or industrial estate, these would generate the target customers for the project .

We have followed these mentioned concepts strictly except the location of this project is quite far from the existing mass transit system (BTS), anyway, there will be a new transit system that feed the passenger to the new airport. This new system would affect to us positively.

In regard to the legal terms of this building/project, there was no specific term of a similar kind of our project in Thai construction supervision laws. Then it could be called as "special purpose sport and complex", but our initially definitions, this building could be categorised as "resort, sport and spa" because of this mixed the characteristics of each function together. We aimed to build this project as comfort as the resort, then we designed it with the modern resort concepts.

We do not have the matched competitors at this moment, the closest competitors are located far away from us, and so they could not be counted as the direct competitor to this project. I also believe that there would be no competitors in the near future, because of the characteristics of this kind of project that need a large parcel of land. The competitors have to invest more money on that, and there would be another interested options than building the sport-complex such as department stores, or else.

We undertaking the services industry, therefore our main problem is the quality of our services rather than other issues. To mitigate this problem, we sorted out by:

1. Our opening time is 6.00 – 22.00 daily, no holidays.

2. We focus in customers' requirements and provide the superior cares to our customers, better than 5 star hotels. For example, for our member, they would received the outstanding services by us better than the non-member or pay as you go.
3. There are a variety of customers' type and requirements, then we prepared our project to suit with everybody, not specific on any age, gender, class.

I understand completely about the requirements of the elderly people or senior citizens, therefore, I have set up many activities to respond to these OAP's needs, such as Yoga class, aerobic class, book club, or chess clubs. However, our competitors focus extensively on only one group of customer (working age)

Because of we have a variety of customers, these reduce our marketing risks. We have to enjoy with these customers and stand by their sides.

In regard to the risk assessment model or any software to help me manage this project, to be honest, I have never used any software, according to my mentioned reasons, like the people in my generation, we faced with every problems, experienced them and sorted them out by our experience.

I think every business has risk, but the level of risk might be varied according to the business size, turnover, and employees and surrounding situations. For this project, I considered that this project has little risks because of we have well-prepared plan and we have used the other projects (whether success or failure) as our case studies. I did not prepare any contingency plan for treating risks, because I feel confident that this project would run smoothly in any circumstances.

This project land area is 35200 m^2 and gross building area is 20000 m^2, it was opened in 2002, this area was a rural BMA area before. However, this area is developing to serve the new Bangkok airport, there are a lot of superstores in the nearby area such as Tesco, and other residential projects as well.

If we do not develop this project, this area shall be appropriate to develop as the high-rise condominium project only, but lower in prices and class. Moreover, we have to spare land area for some purposes according to the new planning laws, so I thought the condominium project might not be feasible like this project.

In regard to ANP calculation, may I refuse to do that because I do not have any knowledge or background in mathematical or calculation, and I afraid that I would give you the wrong answer. I apologise for that matter.

Date 31st March 2010

Date 31st March, 2010 at the Developers' office, Bangkok CBD, Sathorn Road

The interviewee hold the position of executive vice president of one famous Thai real estate developer, the interview was taking at the office of the interviewee. In order to protect his business confidentiality, he is initially named as "PW".

PW: I am the senior executive vice president of this Public company limited (Qhouse), I have 30 years working experience in real estate development industry. I graduated Civil Engineer and also got MBA background, my responsible is to handle the housing projects, mostly the detached house with various prices ranges (between 3-5, 5-7, 7-10, 10-20, 20 Million baht).

PW: In my opinion, I reckon that the most affected risks are

1. A financial risk, because of each project needs a large sum of money to inject to every activity in the development stages.

2. Land, due to the scarcity of land. In regard to a purchasing of lands, we do have many factors to be concerned. It is because of location and land would influence to the following marketing activities/plans. For example, how to design products to match with the attributions of the purchased lands, how to run our project. The purchasing of land also affects to the project cost, in regard to we have to plan or design the product to match with the land cost as well. If the land situated in good location, the buying cost and development cost would be higher, too. However, I rather find the land parcel with a reasonable price than cheap land, because of sometimes the cheaper land would located in worse location, and hard to design or match it with the customers' requirements. Thus, it could be concluded that the better location, the higher development cost and higher products prices. We have to design our products to suit with the limitation of land we bought.

SK: Do you have experience in risk management/assessment in real estate projects?

PW: I used to assess risks in real estate projects, firstly, when I decided to buy a land parcel, I have to check the regulations, particularly the town planning/developments in order to check that our projects could be constructed on this land or not. Secondly, if the town planning allowed us to build our projects, I had to check and follow the land sub-divisional regulations in order to design the facilities for whole projects, in regard to the big land sub-divisional projects, the buying of land parcels could be equipped with another way to assess risks, but just in the general not specific in any particular categories. Moreover, I have to clearly inspect the surrounding environment of the land being purchased to guarantee that there would not be affected by flood, have to check the capacities of ditches (if any). If there is no ditch, do we have to build the dam to protect flood or build any bridges. I have to use my experience as a tool to help me assess these aforesaid risks affected by the location of land.

Moreover, our company has the marketing team to help us conduct the feasibility analysis, emphasise on the marketing issues such as customers' profiles, marketing situations, competitors, the requirements of customers, and the appropriate design concepts of our products.

I consist that when we buy a new parcel of land, we have to inspect this piece of land clearly. This also the way to assess risks which would be occurred in the future. However, in regard to assess risks in our projects, I used my experience, together with my background knowledge and thoroughly site inspection. Anyway, the land purchasing is a key to project succeed, because of it would affect to our budget and development costs, then we have to inspect the site thoroughly even the site conditions, is there any holes in the ground, swamps because that would related to the cost of land filling, dam or bridges, because of these would influence to our development cost, particularly infrastructure cost definitely. After that, we could plan or design of our projects and products to suit with the conditions of land.

It is mandatory that if the project needs to obtain funds from the financial institutions, we have to conduct the feasibility analysis to show our promptness to develop the land parcel to be a housing project and generate income. Then, our company committee would approve the feasibility reports before hand in to the Banks. The responsible persons in this regard are our marketing team mainly, and the production team as well.

If somebody develop the risk assessment model that would be good aspect for our industry, because of every developers must assess the risks before, during and after the project construction stage. However, we do not have the tools to deal with risks, it does not like the financial risks which had the tools to respond to the level of risks significantly (figures, rate of return, etc.). However, for the risks in this industry, they are blurred and need some tools or models that would be good to help for assessing risks.

SK: I have developed the criteria to assess risks in Thailand real estate development projects, this was established based on my previous experience in this industry, my literature review and background knowledge, could you please scan this and give me some opinions in regard to the effectiveness and efficiency of this risk assessment criteria?

PW: There would be some points that I disagreed with your criteria, for example, we are specialist in housing development, we develop a project, making the beautiful atmospheres, and our project would have the positive effects to the surrounding communities, then I reckoned that the risks caused by community not accepted or not participated our project would be less affect to our projects progression, excepted we build our housing projects in a remote area from CBD, that would be high protested from the local communities. Thus, risks caused by the pollution during construction also has a little consequence to our progression, because of housing projects actually do not require higher construction technology. Moreover, in regard to risks caused by lack of workforce, these also affect us less, because of we always hire the outsources contractors, the contractors must maintain their own workforces rate and the quality of their workers, actually this risk does not affect us much.

SK: Could you please tell about the particular risks that affect to your projects by now?

PW: Actually, housing development is a kind of conventional construction, and we undertaken housing development projects long time ago, however, we still having some problems from the contractors, and the selection of construction materials, including the materials suppliers. It is depend on how we select the qualified contractors and the criteria that we used to select them. To mitigate these problems, I think we should modify our selection criteria to suit with actual situation.

In regard to the scope of our project management, our products quality is our constraints as well. We have to control and monitor our contractors to build the products as per the limitation of costs and budget, and within schedule. However, the housing projects do not require high technology in construction even there is a trend to use the pre-fabrication elements in housing projects, but that would not affect us much. For project time/schedule constraints, it is depend on how the marketing team forecasting the selling volume and the returning income, and we have to compare the planned with the actual to see the feasibility of that project.

Infrastructure and accessibility to the project affected only a little to our housing projects, because of our projects mostly constructed in the suburban area of BMA, which were under BMA infrastructure networks supporting. The government would take action to survey these areas to see the population density and then support the necessary infrastructure to the area. So these risks are not influence us and our decision-making towards risks.

SK: Your Company has one famous maxim "5 qualities house", what does this mean to you? Does is constrain your project progression?

PW: This maxim becoming our company's policy that we have to follow it strictly, this policy combines with 5 criteria as 1. Each products must be well and modern designed, 2. We must use the good construction materials only, 3. We build the good society and community for our customers, 4. Our projects must be ultimately secured, 5. We must have the sincere services to our customers.

This policy directed us to manage and provided the best for our customers, then it also positions the class of customers to us, as we emphasise on quality, therefore, our customers type was scoped down to the middle-high class of customers. Moreover, we also follow the policy of "completing each house before selling", and we follow this policy since 1999, this was good to us in order to present our image to public and guarantee that our customers could definitely get the house, not betray by us. This campaign becoming our strongest point in determining the marketing position and segment as well.

Since there were several cases that the developers asking the down payment from the customers, but avoided to build the houses/properties and those customers lost their large sum of money, and also violation the consumer law. Moreover, there is another disadvantage for the order to build (in the housing project) that the customers could not be ensured about the environment surround their properties, and not felt secure enough.

Therefore our campaign was new in that time and this also boosted the customers' confidences, our products were ready-to-move in, the customers had the advantage that they can inspect and check the products before decided to buy. These helped us in communicating with the customers in terms of we could directly and quickly get the actual requirements from the customers. However, this campaign has some disadvantages in regard that the developers must work harder in order to identify the real requirements of their customers, to build the properties matched with the customers' demands, as well as more difficulty in finding the project funding, because it is look alike investing and wait for buying. Anyway, we could get the improvement of the products' quality, because the design and production was thoroughly analysed and clearly inspected, then the quality of product and life cycle of producing are certainly identified. The customers would get the most satisfaction towards our products, it should be better than the conventional housing construction methods that the finished products always being modified, or extended, in term of time and cost consuming.

We should focus on the customers point of views, we found this campaign made our customers happier because of they could know the product's quality, surrounding environment, neighbours and facility provided in each project before deciding to buy. By the way, they could see the real things, not in a paper or in the pictures.

SK: How can you predict or forecast the selling volume to ensure the effectiveness of this campaign?

PW: We have to work more harder in regard to predict the real demand of customers, we have to do the sales projection by calculated the demand of customers based on project timings. For example, if we assume that we could construct 10 housing units in 1 month, each unit using 7 months to complete. If we need the volume of 10 units a month, we have to build 70 units continuously, we have to phasing our project into sub-phase. However, this would need the construction management efforts to keep this rate of track in order to maintain our stocked products to sell just-in-time or by the orders. This phasing strategy would help us in monitoring our selling rate/volume, forecast the demands, and managing our inventory and raw materials. We could adjust our plan/strategy by monitoring each phase of each project, in which products have the most selling rate, and which one not, then we can adjust our production strategies, too.

SK: Because of your company has a variety range of products prices, that also make your company to face with more competitors, for example, for the detached houses with 3-5 million baht, your competitors are Company S and A, for the 5-7 million baht, your competitor is Company P, and so on. Do these competitors and the competitive situations pressure your marketing team?

PW: Actually the properties could not be compared apple-to-apple, because of the location factor has the most influence to the decision-making to buy a new property. Anyway, I also feel that there is a little pressure from the competitors. For example, we and one competitor located project in the same street, if there are two customers coming to this street at the same time, they might select the project that suit with their exact requirements. In this regard, rather than location wise, the customers may also concern in the developers' brand. The criteria of

selecting the suitable property of customer may be a mixture of 1. Location, 2. Products and the satisfaction towards products (aesthetic, functional) and 3. Reasonable prices. These 3 factors will be used by the customers to compare the products, and developer's brand also becoming one factor that considered by the customers, brand in this case conclude the after sales services, and market segmentation. The brand of the developers would also support the customers' status quo, and their social status. These aforesaid factors combined to be a criteria to make a decision to buy a property. So, if we go to your question, according to our survey, each customer may have many type of project in his/her mind, but when he/she visit the site, he/she can filter only a few brands/projects/properties that mostly suit with his/her requirements, and some of the customers may categories themselves a market segmentation, that would suit to their affordability. Each of our project is positioning based on the prices range, for example, 3-5 million baht become the brand 'A', 5-7 million baht the brand 'B' and so on, vice versa, these categories are segmented in according to the customer's requirements and affordability as well. Thus, our prices range would reply to the customers' actual needs, even there are some competitive situations in the real market. Moreover, the customers would take a long decision making to buy a new property, because there are many concerned factors, and in a fact that house needs a large sum of invested money and it is a lifelong product. The Branding strategy and pricing would help in clustering the customer's type and the appropriateness of the products.

SK: I have noticed that there is another developer (LH) who developed the similar type of project as your company has taken a biggest share in your company. What are the different between your company and LH, and does LH project has any affect to your project in the similar trade area?

PW: Actually, we have the separate market, we focus on developing the middle-high class of residential projects (15 million baht up), whereas LH has a few projects in this class. For the middle market, 5-7 or 7-10 million baht, we have only a few projects in this area, while LH keen on developing this project type, anyway, our and LH projects are located on the different area, or the same area but different main access roads. Thus, the customers may select their own house based on the location wise, and then our market and LH are in the different market, not a head-to-head competition. Actually, each developers may have their own show-case project types or their specialists, some might special in low income townhouses, some might special in middle class residential units, thus they avoid having a direct face-to-face competition with the others. In our case, even LH is a biggest shareholder of our company, but LH does not influence us, because of we have the different managerial or executives team, different selling/marketing policy, and different market segment. LH image may reflect to a few customers, but not at much.

SK: How about the pressures occurring during the manufacturing of the housing products?

PW: The construction technology innovations do not affect us too much, to be honest, we just keep on or production rate, if we could maintain our rate, we could get the faster turnover from selling our products. In our case, we using the conventional construction method, it does

not provide us more speed than the pre-fabrication methods, however we insisted that the conventional methods given us more flexibility than the new method because of

1. The conventional method suits the actual Thai customers' behaviour which likes to modify or extend the houses. You can notice that every single house has been modified or extended from the original in order to suit the owner's requirements. This behaviour becomes the limitation to the pre-fabrication method, in both technical and constructability terms. Actually, pre-fabrication methods always used for the lower price housing units, between 2-3 million baht per unit, for the house prices 5 million or higher, the developers preferred the conventional methods in order to provide them the flexibility in modification. The reason was that the pre-fabrication methods indeed need the larger number of products to meet the economy of scale

2. The pre-fabrication method in my opinion, just only a contemporary trend, most of the large developers still preferring the conventional methods, because of Thai labour cost are still in the acceptable range, and there are a plenty of workforce in the market, not scarcity of workforces on the other hand.

SK: What was a reason that turns your company policy to be "completed before sell"?

PW: We used to be like the other Thai developers in the sense that we built the unit upon. However, we turned to this policy in 1999 after the mass crisis in 1997-1998. We met the problems that our customers required us to extend or modify our units, such as extended the toilet area, or the car parking. That made us a mess, because we were unable to control our quality, time and cost. That was a main reason that made our executive considered to change the policy to complete before sell, because of we could control our budget, our cost as well as maintain the condition of contracts with customers. Customers also satisfied to this policy, because they could see the products and products details, including the surrounding environment before making a decision whether buy or not. As the customers had to save their money (may be their whole life) to buy a new house, so they were happy to see the houses that already finished and did not need any more modifications.

According to this policy, this becoming our key to success in the industry, we could also control the economics of scale, in regard to we could order a load of materials, then produce, and sell, everything becoming good practices. Whereas, if the customers looking forward to hiring the contractors to build, they would have the satisfied well designed house, but they could not control their budget, as well as they could not guarantee the quality of surrounding environment, security, facilities, amenities or even infrastructure. Our projects and policy guarantee the good quality of life for our customers, then the customers who aimed to build 5-20 million baht houses had switched to buy our project instead of building the houses themselves. It seemed that the house building-to-order business has turned into the complete real estate development business. After we turned our policy to completed before sell, some of our competitors also changed their policies, but these would be the better benefit for the customers, in term of every projects would compete to provide the good for their customers, and these would make more options for the customers as well.

SK: What about the current risks that would affect to your project progression and company's income stream?

PW: If we discuss about the current risks, I think it should be the risks caused by the instable political situation, as in 2009 April, there was a Red-Shirt riot. It affected to our selling volume, because of the customers confidences radically dropped, they were not confident enough to buy a new property since they did not know how and when the political turmoil end, and also did not know the future of Thailand economic situation. This year 2010, the Red-Shirt conducted their protests again, but more violence and serious than the last year, they occupied the main road, CBD area, bombarded the infrastructure, that would make the situation worse until the government used the anti-terrorist campaign, the situation would get better. Moreover, the government policy towards the real estate transferred tax reduction would be end soon, that affect to the confident of customers to buy a property as well as affect to developers cost budgeting.

Anyway, there are some housing demands remained in the market, that demand type is an indeed need a house demand such as the wedding couples need to expand the family. Thus, this indeed demand still boosting the real estate market, the selling volume of real estate industry did not dramatically dropped as expected, but I think if we focus on the whole real estate market, the developers with a famous brand would get more selling volume, while the overall market drop.

The customers mostly preferred the "Brand" of the developers and used this as the criteria to make a decision, because of brand awareness affected to the customers with high potential, they have more options and they would preferred the developers who could guarantee their quality of life. For example, if the customer has 30-40 million baht in hand to buy a new house, they would prefer the famous developers rather than non-famous developers. The customer behaviour also changed, they do not concentrate only on prices, but more concern on quality of life after moving in the property, and I also found that the number house speculators has reduced, and they changed to speculate on condominium instead of houses or other types of residential units.

SK: As I have noticed that your products are in the highest prices range, and the constraint of you companies policy, you might found that your products could not be sold off, how can you handle with the problem?

PW: To be honest, I have never found the problems caused by our houses could not be sold. It is depend on 2 reasons as 1. The increment of land prices, for example one of our project bought the land with a price of 4 million per unit, but we still have some of unsold units in our project, then this project has extended its boundary by purchasing more land parcel, however, the price of land would not be 4 million per unit as it was, it was increased to 6 million per unit, and the construction material prices also increased. The increment of both land and materials prices influenced us to increase the products prices immediately, then after our prices increased, the customers who wanted to buy a new property and considered at the first time to buy our products may come back and buy the unsold units, with the prices still

holding. So I can conclude that it is a critical enforcement of new products prices affect to our stocked inventory, in regard to that would help us to sell the stocked products out faster.

On the other hand, it was related to the affect of location finding, the new projects might have the higher prices, but might not good enough in location wise. Then the customers would find the houses in better location, and most of them were located in the old projects. So the location wise would be the other factor that helps us to sell our products. In this situation, we can conclude that this is a buyer market, the buyers or customers have more and better options, depend on their requirements and affordability.

APPENDIX X-10: TRANSCRIPTIONS OF THE INTERVIEWEE NO. 10 (PC)

Date 1st April 2010

Date 1st March, 2010 at the Developers' office, Bangkok CBD, Sathorn Road.

The interviewee was the vice president in the well-known Thai real estate developer, his company was the leader in housing development and also registered in the Thailand Stock Market (SET). According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "PC".

I am the vice president of business development department, I have 9 years working experience, and I graduated MBA (finance).

SK: Do you have any experience in the project risks assessment/ management or making a decision towards risks in your projects?

PC: In our organisational system, we do not have the specific unit to response for risk assessment/management, but we have formed the project teams to response for managing each project activity, from the marketing till the construction stages. They also responsible for risks in their projects, in each project, that might be a different kind of risk, therefore, we assigned them to handle these. It can be said that the project management team dealing with the project risks or "the operational risks" and the project teams have to handle the project according to the budget and schedule.

For the organisational level or the macro level, our company board of director, executive would set up the policy to deal with risks after they had inspected and monitored risks thoroughly, the BOD actually focuses on risks in the macro level such as company image, the related regulation and the overall situations and affects to organisation as a whole etc.

The project teams and other departments then implemented that policy and used in each project. In regard to the location of project site, the project teams are responsible to find the best location upon budget and then report to BOD for approve, thus this is the duty of the project operational level.

I am responsible for the project feasibility analysis and also monitor risks occurred in the project, which affected especially on project budget. For example, does the project progress well in accordance with the established budget? , if not, what would be the major risk that affect to the progress?. Does the sell volume of each project achieve the marketing target?, if not, what is a reason or what kind of risk that affects to the marketing activities? These included but not limit to the risk treatment actions and how can we mitigate risk in each project, too.

SK: I can conclude that, in regard to the organisational structure of your company, the BOD is responsible for monitoring risks in the macro level, risks caused by the economic, political instability etc. Whereas, the project team is responsible for risks in the operational or project level.

PC: Yes, that's right, for example, the BOD has forecasted that the fluctuation of interest rate would not affect to our company next year, because of there would be no increment of loan interest rate. Or next year, the prices of construction materials would be slightly increased, the BOD will set up the policy or sub-policies to deal with the mentioned risks. These also affect to the project operational activities in regard to the project team have to follow the policies.

I usually provide information of financial or marketing to both BOD and operational teams in order to sort the risks and how to mitigate the occurrences.

SK: According to your experience and duty in this company, what kind of risk that has the strongest impact to your company/project progression?

PC: I think marketing risks have the strongest impact, these would be caused by ill-prepared, carelessly marketing study or misestimate of the real supply/demand of the customers. It is because of our products are the residential units, therefore, it is necessary to clearly identify the market segmentation and positioning. Otherwise, our products would sell to the wrong targets, and that may be more difficult to sell. This risk could be mitigated by conduct the thoroughly analysis on the received information.

SK: You mentioned "information for marketing" so what is a major source of information that support your decision making? Self research, or using the secondary data?

PC: We obtained this marketing information from both of ours database, as we have various projects around BMA area, each project generate its own database, then we can use data to support our analysis. Some secondary data are obtained from the consultants, brokerages or research agencies. However, we also conduct own research to confirm the received information in the case of some doubtful or unclear data.

SK: How is your opinion about the effectiveness and efficiency of the data obtained by both methods? Can they help you making a decision towards risks?

PC: Yes, those information would help us in making decision towards any project activities, however, there is no information has 100% precision. The decision-making process also needs the managerial vision or sense in order to decide or predict the future trend/direction of the project's feasibility or probability to launch to the market. The information could be used as supportive evidences to support the decision making process, for example, the aesthetic of the products, it is a really subjective matters, and anyone could perceive the beauty of products in various way. The way people perceived then are synthesised as the information, but in order to design the products effectively, we need to choose one designs that could suit with the customers' requirements. That's all, however, the significant factor that influence the decision-makers/manager to make a decision is "the location", other kinds of information

would be less important when compared with the location factor, but information are also necessary for us to specify the product's segmentation and position in the market.

SK: Do you know how the BOD or committee evaluate the precision of the supportive information for decision-making?

PC: They always monitor and recheck with the real situation, for example, in the operational line, they have to settle the budget and the monthly target selling volume. If the selling volume could not achieve the target, then we have to recheck and monitor the plan and the alarmed keys for ourselves such as the number of site visitors per week, number of real booking per week. As I said, if the actual progress or volume cannot achieve the plan, that alert us to monitor the real situation in project site to seek for any problems that may occurred during the project stage, so we are able to solve these problems in time.

SK: So can I assume that the weekly monitoring and rechecking are the methods you use to mitigate risks in your projects?

PC: Yes, that's right, these are the ways that we used for solving risks or any problems in the project sites. For example, if we plan that we expected 30 site visitors a week and 10% of them would decide to reserve our units, but in the real case, there were only 15 visitors and we could get only 1 or no reservation this week. These alarmed us to continuously monitor and recheck our marketing and business plans, it may because of we could not communicate to our target customers. Then, we have to foresee the other situations or factors that may obstruct the customers.

SK: Do you think that the said monitoring method is effective enough and help you to forecast or assess risks that may occur in any projects?

PC: Yes, this method may help us to evaluate and assess risks, but we have to improve this method to have the best capacity, anyway this method may not be the best method to assess risks. We did not have this kind of monitoring before, we had just estimate the number of customers and expect the selling volume, but now we have to specify the target customers, as well as planned the selling volume, and we use the plan VS actual as the tool to monitor our progress and performances. I think the method is suitable for us now, but we have to develop this in the near future.

SK: Now I try to develop the systematic/novel model to help the developers to assess risks in real estate projects, this model is created based on Analytic Network Process principles, it seems like we have to adjust the weight of each risk in the established criteria and then compare to see whether option 1 or 2 is the best option for the situation. Do you think that this model is practical for your company to use, and what are your opinions about this mode, is it needs any improvement?

PC: It is interesting, but we have to know more details about this model such as how does it work?, or how precise of the calculation. We also expected that the model shall provide the real-time and up-to-date information for the decision makers. For example, if we input a data

of Gross Domestic Products (GDP), the increment of fuel and construction materials prices as well as export rate or even our company growth rate. This model will calculate on time and then give us the answer. Anyway, I do not know the details of your model yet, if I know more, I can give you more idea.

SK: According to your opinion, what is the risk factor that strongly affect to your project progress? If you compare you involved projects with the other selling/constructing options, which would be more risky?

PC: I think it is hard to answer, it is depend on your belief and your risk management styles. Anyway, before every projects started, it is need to have the project feasibility analysis as accord to the project management theory. The project feasibility shall combine with 1. Marketing feasibility, 2. Financial feasibility and 3. Production feasibility. These 3 studies must be matched together to gain the most fruitful information. Because of each project has the feasibility analysis at the first stage, but that is the marketing theorem, so it is like trial and error, nothing right nor wrong. The actual project may varied than the expected, however, our projects have pass these feasibility analysis already, and I think this is another way to reduce risks.

SK: As you said, you have these 3 kinds of project feasibility analyses to help you assess and reduce risks, so that means you do not need the new model, isn't it?

PC: To be honest, I do not know the details of this new model, therefore, I am not confident about the model input, process and the precision of the outputs, for example, if I key some data in this model, and the model would calculate the risky percentage 50% or 60%. I could not know how accurate of the output too. Some of risks are uncountable in term of mathematical figures such as customers behaviours, or designs. For example, if I said I will design this product as this, how is the risky level of this product?, and if I input the research information such as customer confident index, then this model could calculate risk in the mathematic figure or not. So, I am not sure about the capability of this model to measure these subjective matters. Those things are really important for this business, because of this business is mostly related with the customer behaviours, the real estate business have to aware the importance of customers behaviours.

SK: The ANP model as I informed you earlier, must be equipped by the risk assessment criteria, so what is your opinion about this risk assessment criteria? Moreover, could you please allow me to use one of your project as the cases study for this research?

PC: I think your risk assessment criteria are interesting, and this criteria could be more modified in the future, for example, it is like a personal credit checking before applying for the credit cards. This also equipped with this such criteria in order to filter the applicants and evaluate the applicants chances to apply for credit cards. This criteria could be adapted for our company to evaluate the customers' potentiality as well, and then this tool could be used to evaluate the probability to buy our products of the customer. In my opinion, your model may be suitable to use but I need more details of this model, in order to help me justify your model as a whole.

In regard to the project case study, I need more time to check one project details, but now I have not much time, so I will giving you the overall perspectives of our project at the north-eastern area of Bangkok instead.

Our project was located at the North-eastern area of BMA, it is closed to the northern connection ring road. This project combined with 80 units of detached houses, the prices of each house was stated at 16 -20 million baht, then the project income is approximately 1000 million baht. The major type of customer is the businessmen or entrepreneurs, and this project was classified as a high-end class project.

SK: According to your company policy that only sell the completed houses to the customers or "Completed before sell", does this policy pressure on your marketing plan/strategy, because of the higher prices of your products influence to the products or inventory management as well as you could predict the selling volume correctly?

PC: If you ask me that the policy of "completed before sell" pressure on us, my answer is "no", because of before we launched this policy, there were several studies of this policy and those studies were conducted thoroughly in order to identify the best marketing strategy/plan for us. This policy suit us in regard to a selection of matching materials with the products, that reduces the problems while selling to high profile customers, then if we ask our marketing/selling team on site now, they would answer us that they thing this policy "completed before sell" is more appropriate.

We have conducted our on site research in project named "LADA" in regard to the customers behaviour, profiles and their requirements of the housing products with the prices of 20 million baht. We also monitored on the sale rate of the similar products in this project, for example, if I need to sell 3 units/ month according to the survey or information of the similar products in this area. If I sold 3 units/ month, I have to check our return on investment or IRR to see whether those financial ratios are suitable or not. If yes, we just target that our sell rate is 3 units/month and then we have to build the number of stocked houses to reply to this sell rate. After that we tried to shift the sell rate to more than 3 units/ month such as 6 units/month to see those financial ratio as well. In this regard, if you shift to double selling rate, you may double up your cost too. If the financial figures derived from the best case do not satisfied us, we will maintain the worst case or normal case (lowest selling rate as possible). This strategy in maintaining the worst case helps us in reducing risks in inventory management, we have to control the number of workforces, contractors, materials to be adequate for 3 house/month selling rate. These can help us managing our project cost, for example, there might be the unforeseen event or any accident occurred, the project selling rate could not reach the expected, I would break the construction in order to safe our cost, the houses may be exterior finish or skeleton finished, but the interior works and landscape works did not finish, however in this case, the construction could be promptly continued within a month after break. This also helps us reducing the risks of property lacking of maintenance, the project site manager have to control or monitor the stock of products as well as seek for the method to maintain the number of inventory to suit with just in time selling and hand in to the customers.

In term of construction, we have divide each project into phase, firstly we have to 100% complete the frontage approach to project site and access route, if it did not 100% complete, these would not draw an attention from the customers. The clubhouse or the amenities may not complete in the first sub-phase, but the sell office (mostly the mock up house) must be completed 100% to suit for the presale and grand opening stage in order to appreciate our image to customer, then we monitor on the selling rate and income from down payment. We therefore construct the rest access road, project road, as well as build houses in according to the number of reservations in order to reduce marketing risks. Anyway, in term of project construction, the first priority structures to be built are project fences, road and land filling.

SK: Therefore, it can be concluded that the phase division is the way to reduce the construction risks, so what are the sources of your contractors and designers?

PC: Our contractors are all outsources, we and our joint ventures do not have our own construction teams, and these contractors have working with us for a long time.

In case of the designers, we both have in-house and outsources designers, but these would be up to prices of the projects, for example if the product price is 3-5 million, we will use our in-house designers to design and coordinate with contractors, but for the higher prices, we mostly hired the well-known design firms to design products for us. For the landscaping, we hired only outsources, we have the duty to control, monitor and check their designs only.

SK: Thus, it could be said that your company relying on the conventional construction methods, and you do not have the strong point in construction technology, isn't it?

PC: In this case, you should define what the new construction technology is, I think in this Thailand real estate industry, the developers did not rely too much on the technology, it does not like other manufacturing industries, which developed the innovative technology to help the workers such as using PDA for orders, or something like that. For example, if you ask me that the "pre-cast" system is the new construction technology or not? My answer will be "yes" but this is not as much innovative so the other competitors could not reach or have some knowledge about that method. One developers (PS company) may use this point as its strongest to catch some customers, we also invented this as well, but we found that technology is not suitable for our products. Then we turned back to our policy and relied on the conventional method. The precast methods are not also suitable for the small or medium developers because of this technology need a load of demand in order to make this profitable or in the economy of scale, the number of the units must be 100 units up, the SM developers may not have the big project or the capacity to make this. Can you give me example of innovative construction technology?

SK: Such as a trend in energy saving? And some developers tried to use this as the marketing strategy "energy saving houses", for instances.

PC: Based of my opinions, I don't think this is a such kind of innovative technology, I think this a kind of gimmick, or to find the way to sell the products smartly. Our company also concerned on this point, our products also included with the energy saving materials such as

green glaze to filter UV from the sun beam, or ventilated ceilings. These help us in boosting our selling volume as well as building our image.

SK: According to my experience, the customer who buys a high prices house may need the uniqueness of his/her house. So does this affect to your selling progress?

PC: In this regard, I also do not think this is the technology matters, but I define this as the product appreciation methods to suit with the customers' satisfactions, such as I included the temperature control system in the house, natural ventilation or solar cells.

However, if we discuss this in term of cost/benefit, we would spend more cost and then make the cost/unit higher that the customers' affordability, thus it is less benefit.

SK: As I have survey the area of "LADA" project (case study), that area is a newly developed residential zone, could you estimate the number of competitors and please classify your project position in the market?

PC: There is not much competitors in this area, but there would be some competitors with the same scale closed to the main road, but those positions are different from us. The main competitors are such SC Asset, TCC, Q Company or PP company, but they developed their projects in the other different segment and different products. Our project is a high-class housing project and the prices of the product are ranged from 10-20 million baht/unit. Some portion of this project is in the construction progress, but already sold some units.

SK: Do you think that the longer duration in constructing the project has any impact to the financial status or project cash-flow? And how about the completed-before-sell houses, do they affect to the company financial status? Is there any pressure from the financial institutions?

PC: In this case, you have to divide this question into 2 sub-questions, firstly yes, the longer duration would generally affect to the project cash income and cash-flow surely. The longer duration in construction means the less income received by selling.

Secondly, in regard to our policy, there is no pressure from banks because of we found that we got faster cycle in income gaining rather than using the old policy. You can see by our yearly company report for shareholders, that the debt/equity ratio has been reduced, that means we are able to repay loan to banks, so that is not a problem of this policy. The risks cause by financial institutions pressuring on the company cash-flow would be occurred when the overall real estate industry is burst or declined, but this industry seem to be stable by now.

SK: I have sent you the established risk assessment checklist to you, this had been created based on the requirements of ANP, to find the best option, in this checklist, there are 2 options as Plan A and Plan B, both plans are assumed to be built on the same land plot, Plan B is an actual plan on site, but Plan A is an alternative a mixture of semi-detached and detached houses, what do you think about this criteria?

PC: This criteria, to be honest, is suitable only some kinds of project, which could be altered to build the other project type or products. However, for this specific case study LADA project, it is impossible to alter to Plan A. The reasons behind that is firstly the real estate as you know, combines with land and house, the cost of land is fixed and could not be varied or altered. For example, if I bought the land with prices of 80,000 – 100,000 baht per 4 m2, the detached house could not be developed, it could only be developed as the high rise condominium only. Moreover, the cost of this land influenced the marketing team to sell the land with house in a higher prices such as 400 m2 of land include a house with prices of 16 million baht, right, but if you said "change to other options" such as reduce the land area or modify to the other type of residential unit, I have to reduce my products prices, too. Then, this project might not be financial feasible, or marketing feasible. Even I bought this land but did not develop and sold it to the other developer, the other developer may consider to build the similar project as us, but he/she has advantage in the cheaper land development cost.

Some kind of project may have an alternatives, but for this LADA project, there is no alternative, because of if this project change to the other plan, that might be feasible, and the customers may not accept that, the image of project and the company as a whole may be cleared enough for the community to accept the alternative.

SK: **Your comments in regard to the alternative development plan was really useful for me to further develop this criteria, your case study was an example of the constraint that land cost fixed, and this land parcel could not be developed other else except high-class residential units.**

PC: Thank you, but I did not intent to specify that this land parcel has no alternatives, I might sell this land parcel to the other developers or even stand still and don't do anything on this land. Every alternative may depend on the constraints and conditions of each developers, other developer might develop this land as the others type of outlets, but for us we have no choice due to the cost of land.

SK: **So what do you think about the risks caused by the social issues such as the non-acceptance of the local community to this project?**

PC: Mostly the new real estate project causes a positive benefit to the local community, for this project itself, it is located closed to the old village/residential projects and build on the public vacant land, so there is no such risks occurred in this project. However, I think there are some people might not happy because of the traffic in this area may be more jam, but I think it is not so significant, it does not affect to the quality of land, whether positive or negative. Anyway, if this project is decided to be the commercial project such as retail malls, there would be more benefit for the local community and the prices of land in that area may be risen.

SK: **So can we alter this project to be the commercial buildings, or retails mall, in accordance with your experience?**

PC: No absolutely, you cannot change this land to be the retails mall or commercial malls, it does not feasible at all, and you may be collapsed in this regard. We have an example of the

famous retailer who failed to develop their outlets on the large piece of land similar to this land parcel. It is because of the large scale of the land and the local community, customers potential and affordability that constrain you to develop the retail buildings. This land area is too big to develop the commercial or retails, its land area is approximately 48,000 m2, so in my opinions, I think I would develop the mixed used between commercial and low-rise residential units, the commercial/retails may be built at the frontage adjacent to the road, and the rest area become the residential. However, in order to decide to develop any projects, you have to check the requirements of the related regulations and consider the benefit of the project dwellers or customers, perhaps the retails may not be their major benefit.

PC: I think your criteria was well established, it covers on several major risks that occurred in the real business cases, however you shall add more criteria such as the cultural diversifications because of some projects may developed on the Muslim land, but the majority of customers may be Buddhists or else. This is quite a delicate issue, and religion matters.

Anyway, your risk assessment criteria coverage is fair and could be modified for the other purposes too.

Date 3rd April, 2010

Date 3rd April, 2010 at the Developers' office, Bangkok Core Area Sukhumvit 3 Road

The interviewee was the managing director of an old real estate development company. His project was a mixed used (condominium, hotel, service apartment and retailed)projects in Bangkok area. According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "PS".

I have 20 years experience in Thailand real estate business sector, the worst risk that we experienced was in 1997, it was the South East Asia monetary crisis (Tom Yum Kung Crisis). Our building was completely built and opened to sell, but due to that crisis, we found that the selling volume was less than expected. That crisis strongly affected to our project in terms of selling, marketing and financing.

We also faced other problem from the local neighbours, they were the key persons in the government cabinet in that time. They did not want us to build the high-rise building nearby their houses.

Anyway, we did not suffer as much severe as the other developers, because of we did not make the overseas loan. If we have done, the fluctuation of currency exchange rate shall affect our loan repayment and that would increase our debt automatically. We found that on that time the financial liquidity in Thailand real estate sector was really gooeyness, monetary flow-ability was lost. However, I believed that in every crisis, that would be an opportunity for the seeker. On that time, Thai Baht was dropped from 25 Baht per $ 1.00 to 50-60 Baht per $1.00, that meant it was a chance for the foreigners to buy properties in Thailand, because of the properties prices were cheaper. As Thai baht rate was dramatically dropped, that also boosted Thailand tourism industry that encouraged the foreigners tourists to spend more in Thailand, then we changed our marketing plan to sell our units to expatriates (travellers or workers). First, we built our project as multi-units condominium for selling, but for the units that could not be sold, we rented them to expatriates short term or long terms depended on the duration of their visits. Frankly speaking, the unsold units had been changed to be serviced apartment units. According to our changes in marketing strategy, that helped us survived in that critical era.

Thus, I conclude that the fluctuation of currency exchange rate has affect to both real estate and tourisms industries. It is depend on who can oversee this and seek for an opportunity from any crisis.

By now, the Baht rate was slightly increased, that made some of foreigners, particularly Britons, withdrawn the willing to buy properties in Thailand, in Bangkok CBD, Phuket Island, Samui Island or Pattaya. According to Thailand Tourism authority report, the largest number of foreign tourists was British (English).

The situation of Baht rate increment would postpone the decision-making to travel or visit Thailand of the foreigners.

What is my opinion in regard to Thailand current economic situation? According to my research, I thought the economic situation has slightly rebound, the export rate is still looking good, the Stock exchange market index still in the good condition even there are some political protestant or riots. Thus, I did not find any reason for the government to devalue the Baht currency rate, I think the economic situation is now fairly stable, but the number of foreigner visitors has considerably decreased. That's point to consider for my project/business.

What does the high currency rate affect to foreigners? Yes, it affects in foreigners' spending, they might feel that our goods or services becoming more expensive than the past. Anyway, Thailand still attracting the foreigners tourists that other countries in this South East Asian region such as Singapore, Hong Kong, because of Thailand is still full of natural tourism resources, beautiful beach, sun sand and sea, superior services to foreigners, these attracted the European or Westerner tourists than the other countries.

In my opinion, the current risks occurred in Thailand real estate industry could be categorised as:

1. For the completely built projects, if they are focusing on the foreigners or expatriates, the selling volume would drop down. However, if they focusing on Thai customers, the projects must locate closed to the mass transit systems or infrastructure.
2. For the newly built projects, there would be risks in regard to the increment/ fluctuation of construction materials prices. That affects to their construction budget. On the other hand, the land prices also increased, especially in the superb locations. Thus, for new developers, this time is a risky period to develop a real estate project.
3. Moreover, for the new face developers, it would be more difficult to seek for the loan from the financial institutions. If they do not have a good credit report, banks would reluctant to lend any loan to them. Particularly, for the developers of hotels, services apartments in the protestant area, they might have more pressures from banks, because of banks would not lend any money if bank considered negatively on the current political situation. Banks will inspect that area clearly, and will terminate the supportive funds for the developers in Red area.

Thus, I conclude that if the real estate project was aimed to serve Thai customers, which would be less affected than the project, which aimed to serve foreigners.

Our project could be defined as mixed-used project, it is combine with retailed area, hotel units, serviced apartments and condominium units. This project could be counted as real estate as well even the major outlets are hotel units. Hotels or serviced apartments or leisure building are one type of real estate, but there is only little different in the income generating concept. Hotel or serviced apartments earn income in term of room rate/night, every checking in and out, you can earn frequent certain incomes. For the other real estate outlets, you can also earn certain income, but the frequency to get income may be varied in according to the conditions of contract/rent.

The mixed-used real estate concepts were widespread throughout the rest of the world, such as Hawaii Islands, Australia, or any tourists attraction cities. They are mostly the mixture between hotels and selling condominium, for the new planned projects, the designer divided the portion of hotel and condominium separately to suit with the requirement of both customers groups and enhances the customers' privacies and securities. For example, the new projects will have the separated lift lobbies for each portion or swimming pools for each portion.

Because of our project is an old mix-used project, we did not well plan actually. Therefore, we have some problems in services both type of customers, however we could handle that by separate the serviced team for each group, anyway, we could not separate the facilities and amenities area, and they have to enjoy those together.

Our project is 35 storeys single building, comprised 390 residential units, which designed as the serviced apartments for 260 units, and the rest are selling condominium units. The dwelling area started from 9th floor, while 2-7 used as the car-parking, 8th floor as swimming pool, gymnasium, facility and amenity area. Lower ground floor, ground floor, first floor and second floor were designed as commercial and retail area with 44 units.

The target customers of this project are the foreigners or expatriates, but mainly focuses on the cooperate workers (managerial levels) and long holiday tourists. It was because of this project located in CBD and night life entertainment area. However, the long holiday tourists are the mainstream customers of our project. Most of them are European and Westerners (American, Briton, Aussies). Briton was our largest group of foreign customers, but now according to the economic and political situation in Thailand and UK, they became the top 5 customers only.

My opinions through the new type of hotel, boutique hotels, I think the boutique hotels in this area are either our competitors or not ours. Boutique hotels could gain some customers from us because of their room designs were superb, 5 stars designed. However, the boutique hotels almost provided only the rooms for short term or a night staying only. They are lacking facilities and amenities for providing to the customers, for example, they do not have other completed functional rooms for event, large swimming pool etc. by these bespoke limitations, I sometimes did not count them as the competitors in this trade area, due to our uniqueness. It is because of the foreign tourists need more functions from the hotels they stayed, our project could respond to their requirements more than these boutique hotels.

We are able to keep our loyal customers, we used the mouth-to-mouth marketing strategy, and therefore we do not need much marketing budget. Moreover, we keep on improving our services quality all the time since the opening of this building 13 years ago, actually this building is quite old. However, we carry on renovating the rooms every 3-5 years, but we always re-decorate the small scale decorating such as carpets removal, wallpapers replacements, etc.

In regard to our redecorate or renovate projects, we hired the specialty contractors to undertake those activities, because we are not expert in construction and building. For the

facility and property management as well, we outsourcing the specialists to take care these such as security guards, maid.

We concern that our specialty is rooms services and we keep on improving our quality to suit with the customers' requirements. We would not do anything that we did not have skills or experience, just focusing on our own competency.

We will not expand to do the other business in which we are not expert, but if we want to do that. We have to make sure or confident enough that we have the based target customers, sufficient income and budget. Because we have notable skills in property marketing then we can use this as our core competency. Last year, we expand our market to the South Asia region (the interviewee has an Indian ethnic, but he legally Thai), particularly Nepal, the political situation in Nepal was worse than Thailand current, but there were some local businessmen would like to invest overseas to reduce risks caused by political chaos. I have foreseen this requirement of the Nepalese, so I went to Nepal to promote our project and our business there. It was also fruitful returns to our effort. According to this, I have modified our promoting and marketing strategy, we focus especially the Asian tourists or customers such as Korean, Indian, Malaysian, rather than aim on Westerners only.

What is my favourite risk assessment method? I only use my own common-sense and experience, plus information by the reliable sources to assess risks in this project. I rated the common-sense was the most important thing to be equipped with the risk assessment model, because risks are mostly subjective, sometimes these could not be measured by any mathematical devices, and common-sense is an individual thing, not teachable.

Then, my own risk assessment techniques comprise my own sense, reliable sources and experience. I have never used any systematic/formal risk assessment models, because of that would be complicated and difficult for an old generation like me to learn.

However, if you or someone develops this risk assessment model, it is worth a trial.

My ideas for this risk assessment model are firstly this model shall be user-friendly one, easy to use and not so complicated. It should be communicated to every project participants in terms of figures or numbers or in the easy looking scale. Secondly, this model shall provide the real time output because of the businessmen need the just-in-time data to support their decision-making towards risks, if the programme needs too much time for analysing and interpreting, they would rather use their own techniques such as experience, discussions.

The obstructed risks had happened when this project was newly launched, as I mentioned before. However, we had the risks mitigation plan to distribute our risks, we had look forward to bringing more shareholder to share the investment in this project, and we also invest overseas to reduce our own risks. In this regard, we had to travel to other countries with the purposes to find the investment shareholders and promote our project overseas.

Date 9th April, 2010

Date 9th April, 2010 at the Developers' office, Bangkok CBD, Sukhumvit 19 Road

The interviewee was the vice president (project manager) of a new found real estate development company. His projects were located around Bangkok, he managed a high-rise condominium projects in Bangkok area and the hotel project at the Thailand famous beach (Pattaya) . According to his organisational trade confidences and LJMU ethics, then his initial name had been given as "NP".

SK: Could you please introduce yourself to this research?

NP: I am the vice president of the real estate developers, I am working here for 5 years, and responsible for two projects, which are hotel at the Pattaya Beach and one low rise condominium. I graduated the Master of Civil Engineer, but I have work experience in the infrastructure project (the Bangkok new airport) and other construction field for 2 years.

SK: Are you a decision-maker towards risks in your project?

NP: Yes I am, but I also assist my boss (the president) of this company to make a decision in each of project development stage. In the case of project management, I have to responsible for everything occurring in the projects.

SK: According to your experience in the real estate project, what kind of risk has the strongest impact to your project?

NP: To be honest, we have not start the formal risk analysis, yet. Actually we are the affiliated company of the life and the property insurance company, and our parent company has just started the formal risk management plan last year. We have assigned a team to cooperate with our parent company, but we did not set up our risk management team. However, to response to risks in our real estate projects, our team has done some of our research to make a preliminary risk analysis such as market survey, feasibility analysis, cash-flow management, funding management including sources of fund planning. We relied on the results gathered by the feasibility analysis, which provided more solid marketing and financial information. In my opinion, I think risk management team has many components and duties to do, not only the feasibility analysis, but also included the monitoring and managing financial risk, accounting risk. However, we did not set the formal risk management team and plan, sometimes we have the auditor team to audit the project activities, but there were the typical audits, not extensively concerned on risks. Therefore, if we found any risks occurred during our project stage, we would ad-hoc or case-by-case risk managing.

SK: So, is there any serious risk affect to your responsible projects?

NP: I thought the current political turmoil and instable situation has affect strongly to our hotel project, anyway, we did not have a team to assess how serious of these kinds of risk, or any formal assessment to the consequences of these risks. The management or executive just focused on the loss of profit, decrement of reservation by the foreign tourists. As earlier informed, our company do not have the risk management/ team to assess or analyse these risks, in regard to how severe we received from each political turmoil.

SK: So, what do you think about the necessity of risk management plan, do you think the company' business can proceed whether it has or has no that such kind of plan?

NP: Anyway, we shall have the risk management/assessment plan in the nearer future, as I informed you earlier, our parent company have just started their risk management/ risk assessment plan a few years ago only. We are now in the process of study the roles and duties of the risk management team, and in the near future may be 2 or 3 years later, we will go for the risk assessment/analysis first. In regard to the risk management plan, there were some discussion to settle down this team in our board of director/executive meeting, but we have to find out more solutions and the policy to response to the establishment of this risk management team. Our parent company must have the risk management team, because it is an insurance company, otherwise they would not qualify for the National Insurance Committee (NIC) accreditation. NIC enforces every insurances companies to settle the risk management plan or team, as well as requires them to implement the risk management plan in the insurance processes.

However, for the real estate developers, there are no kinds of law or legal to enforce us to set up the risk management team, to be honest. Anyway, we also concern on how serious of risks in our business, but it is not as urgent as we have to do in a few years, we have found the plan in advance to establish this risk management team, it may not a big team at the first, but we have to hire the specialists to handle this task for us. These risk specialists would come and inspect on the processes and activities of each department, and also focus on the risks that may occurred in each department process, that may also include the project development processes, account, the contracts between our company and the contractors and so on. These inspections may include the simulation cases that if any risks occurred, what are the following affect that would be happened as well as the risk identification processes. I also have some knowledge in risk management, because of my boss subsidised me to learn some about risk management.

SK: According to your opinions, why Thai developers did not pay much attention to risk?

NP: In my point of view, I think that risks are quite new subjects to this industry, and there were not so much studying in regard to the affect of risks to Thailand real estate development industry. Thai or local developers may not pay much attention to risks, because of risks in this industry are not so complicated, as well as they think they can handle any risk that may occurred in their projects. However, for the expatriated developers, they are concerning on this issue, they also set up the risk management policies. Other industries such as financial institutions or insurance companies also need to commit the risk management/assessment plans. In the case of Thai real estate developers, they might have the risk management plans,

but these may not be in formal or standardised formats, but if that developer registered in the Stock Exchange of Thailand (SET) or the overseas companies, they must have the formal risk management/assessment plan because of these are enforced by the Stock Exchange Committee (SEC) and NIC as I told you earlier.

SK: Have you ever used any formal/systematic risk assessment model?

NP: Never, I did not learn this subject specially, and I have never known anything about risks until I joined this company, I have learnt some risk assessment model.

SK: Could you please tell me what risk assessment model that you are interested?

NP: Actually, in this case, the learning means I have to study risks as I am the management level of this company, I am not the operating person in risks management. I focused on the overall risk management system/processes but not dig deeper in the risk operational terms. For example, the management would focus on how the risk management system work, or what will the risk specialists does when they inspect each of our department. In regard to the risk assessment model, it is out of my scope of works, this should be the responsibility of the risk management team, which we will establish in the near future. They have to study of the appropriateness of each risk assessment model, or the feasible to purchase any risk assessment applications to use in our company. To be honest, I don't think I will have to buy any risk assessment model to use in our company.

SK: If you have to assess the risks in your real estate projects, how can you do that?

NP: For example, in the case of our hotel project, we assess the seriousness of risks by checking on the reservation lists as well as the number of the bookings, these help me evaluate the number of selling volume. Our hotel project have been affected by several crises in the past as well as the current political turmoil, first the global economic crisis in 2007-2008, then the second was the political protestant in 2008, the third was the political riots in April 2009, following by the current political protestants of the Red shirt. Every single political protestant actions had diminished our booking, particularly from the foreigner tourists. It is because of Thailand hotel & leisure industry is 100% relying on the foreign customers. But now, they don't have the confident enough to visit Thailand as well as they are panicking that the current situation would get worse. This current situation will affect to the selling volume of hotel till next year, because of the reservation or selling of the hotels, you have to make an advance sell, may be at least 1 year. We have to rely on the numbers of foreign tourists gained from advance bookings more than the walk-in or local customers. You have to let your hotel rooms to the overseas agencies to sell the rooms for you, then those agencies sell to the tourists. These overall processes may take around one year, so if something happened this year, the overall booking numbers may be affected till next year.

It is actually the nature of selling the hotel rooms, you have to forecast your selling volume till next year, and it is like you selling the future commodity. In fact that 90% of the customers in hotel/leisure industry are the advance booking customers, while the rests are walk-in or the spared. You have let your rooms to the agencies, then the agencies sell to the tourists company or the tourist event attendants. For example, if we want to sell all of our

rooms for the next year Thai New Year Festival (which is in the month of April every year) you have to sell the rooms by now (March or April), it takes time about 1 year, in order to let the agencies sell, the customer decides and buy the flight tickets or buy the travel package, and so on. Then the current political situation this time definitely affect to the hotel rooms booking till next year, in the case of this situation ended up in June this year, it is too late to sell the room for the Christmas holiday period, which is the real high season of the year. So, I think Thai tourism industry suffered the severe affect from the current political turmoil, and this affect would chain-react to the other related industries, particularly the services industries.

Thus, to solve this problem, I may modify our marketing strategy/plans such as reduce the Westerner or European targets, but more focus on the local Thai customers, or the neighbourhood countries such as Malaysia, Singapore or the nearby countries, which has the shorter distances to Thailand.

SK : Then we start the second section of this interview, can we use the project Ocean Tower 2 as the case study?

NP: In this project, I am actually handling the rental activities of the juristic person and the construction progress of project. However, I did not concentrate much of the marketing team, I was just overall monitoring their activities.

SK: Could you please explain this project's characteristics?

NP: The project is a selling condominium projects, there are 48 rooms consisted in one single building, the rooms were designed as half of them is 1 bedroom and the rest are 2 bedrooms. This building could not be built as the high-rise building in according with the limitations of BMA planning regulation 2005 that allowed us to built only 23 metres high above the ground or equivalent to 7 storeys. This building is located at the Bangkok heart of CBD area, the gross building area was approximately 7,000 m2, which included parking spaces, lobby and all common areas, whereas the saleable areas are approximately 3,700 m2. The prices for square metre is from 100,000 Baht up, the customers are both the local and foreigners. Our target customers are the management level or executive level with age 35-50 years old, this project is located adjacent to the Bangkok Transit System (BTS) so it is most comfortable transportation, they can use that BTS to access to this project.

The land prices was really expensive, it was about half million baht per 4 m2, but we bought the land parcel as the freehold land. The prices of land also affect to the feasibility of this project, particularly the Initial rate of return (IRR) and Return on investment (ROI), because of the land purchased cost was accrued in the project cost, but when we planned to buy this parcel, we had ran the project feasibility analysis already, and found that this could be feasible to build as the low-rise selling condominium unit.

SK: You classified your condominium project as the low-rise condominium, thus do you have any pressures from the competitors, particularly from the large-scale condominium projects?

NP: To be honest, I do not feel that the large scale condominium projects are counted as our competitors. It is because of the large scale condominium had the different target customers from us, they have to build more than 100 units per buildings to suit with their type of customers, some of their customers may be the speculators who wanted to buy the condominium units to let to the foreigners. Actually, I found that the low-rise condominium dwellers do not like to swap to stay in the high-rise condominiums, vice versa the high-rise dwellers do not like to stay in low rise. These are the lifestyles issues of the customers, it was also found that the privacy in the low-rise buildings is more peaceful than the high-rises.

According to my experience, the high-rise condominiums may attached with the commercial or retails area, and also equipped with the bigger facility and amenity areas as well, but because they are a load of users want to use those facilities in the same time, so they would have less privacy and flexibility in using those. In the case of small building, there are only 48 units, the chance that you use the facility may be a few time weekly, so you would gain more privacy than the high-rise buildings.

However, there are some disadvantages in running the low rise condominium projects, particularly the maintenance cost and facility management cost. For example, in the high rise buildings, you have at least 2 security guards, but for the low-rise buildings, you also have 2 security guards, too. Even the vague differentiate in the gross building area, but you shall have the similar numbers of staff to take care the whole project. Therefore, both of these buildings may have the same maintenance or expense, but if you divide these expense by the building area, you would find the cost of low-rise per m2 is higher than the high-rise. This would affect to the customers in case of in the condominium project, the customers have to pay for the common maintenance fee, and this fee is calculated based on the ownership ratio, for the low-rise building, they have to pay more per month, but they would not have the same quality of facilities or amenities like in the high-rise building.

Then, if we discuss about the construction cost per m2, the low rise building may spent less construction cost than the high rise building in terms of structuring works, these may be similar in term of architectural and finishing costs, but the high rise buildings may spent more cost on the mechanical & electrical (HVAC) system in accord to the requirements of the safety and security regulations (e.g. security equipment, fire staircase, sprinkler, pumps etc.), anyway if we divide the total cost of construction per m2, the construction cost of low and high rise are almost similar.

SK: I have heard about the new trend in condominium development that was a "HIP (highly individual person) condominium, can you classified your project as the "HIP condominium"?

NP: I could not understand this word clearly, I think we did not aim our project as the HIP type of condominium, but our project concerned on the customers' privacy, as well as provide as much uniqueness for our customers. Our design themes are modern, and using earth tone or black& white tone for each room.

SK: Could you estimate this project progression by now?

NP: This project is in the defect-correction and final finishing stages, some units had been already transferred to the customers. We also have units waiting for reserving and transferring. Few customers paid their down payment sum, but still dealing with the financial institutions, and some of them paid us in cash. So, there are several types of customers in this project.

SK: Since this project is located at the Red shirt (The political protestant) area, so does it affect to your customers?

NP: Yes, this project is located on the heart of the Red area, however, it is not a big problem for the customers who had already transferred and stayed in our projects, but there would be a problem for the new customers, who bought our units and let for rental, they might face the problem that no one want to rent their units in this particular Bangkok area.

For us, sometimes we face the threats from the protestants, then I have ordered them to stop their works if the situation becoming worse.

SK: Can you estimate the construction duration of this project?

NP: this project spent about 1 year and a few months, for the high-rise buildings that I responded, it might be a few years, because of the high rise buildings required more activities in the land acquisition and purchasing processes, contractors bidding and tendering, designing. However, for the small scale building like this case study, we have no need to acquire for the Environmental impact assessment, therefore there was no delay in project construction approving from the related authorities.

SK: Do you think that the approve of EIAR affect to the progress of the large scale condominium projects?

NP: Yes, of course, in the future, every large scale projects have to acquire the EIAR, particularly the high-rise building may spent longer time in the approval periods. Then, the high rise building shall spent at least 3 years for completing the project, which also include the acquiring period for both EIAR and construction approving, but for the project outside Bangkok or on the beach, the project schedule may be longer, because of there are some special related regulations for that beach and coastal area.

SK: What are the sources of project funding? Did you loan from some financial institutions?

NP: This project fund was sponsored (loaned) from the parent company which is the insurance company. However, in order to reduce the risk in this regard (source of fund), our executive had discussed that we need to find the new sources of fund may be from the bank or other kind of financial institutions in order to distribute the risks caused by the sources of fund, and the fluctuation of interest rate. It is because of our parent company is not a financial institution, so it would be better to make a loan from the accredited banks or financial institutions.

SK: How much does this project cost (construction)?

NP: I have estimated the initial construction cost at 250 million baht, I cannot remember the IRR or the return on investment rate. At the first project feasibility analysis, we estimated the gross margin of 30%, but with the lower selling prices per m2 than the current prices. We therefore estimated the income received when project selling out at 400 million baht, we thought that according to our selling prices and the location of project, we are able to sell our project out, but the prices may be little adjusted to suit with the customers affordability.

SK: What is your source of contractors?

NP: We do not have our own construction and finishing teams, then we have to issue a tender and ask the contractors to bid for our tenders in every projects of our company. In this project, we also invited the small or medium contractors firms to bid for the construction works. On the other hands, we also have the contractors who had a strong relationship with us or worked for us a long time.

For the designers team, we hired the outsourced designer firms to handle the designing works for our projects, there are a firm designer firms have the business relationship with us, but we also had some work records with them. In the case of our new bigger projects, we opened for the foreign designers firms to bid for our designing works, too. However, for the small project, we have to rush our construction and design, therefore, we might cut out some tendering/bidding processes.

SK: Do you have the risk management plan or the contingency plan for this project?

NP: We do not have that such kind of plans, and our company also did not establish this kind of risk management plan, actually we have just discussed about the current situation in the Board of director meeting, and if we found some problems, we then sought for the way to mitigate that in the meeting. For example, the Red shirt Protestants marched to our neighbour area or in front of our project, the BOD would then ring to the committee to seek for the ad-hoc risk reduction plan. However, it is not a well planned risk management, we always rectify the impromptu problems rather than plan or foresee the risks in advance. Anyway, I think our company should have the risk management/mitigation plan in the near future somehow.

APPENDIX X-13: TRANSCRIPTIONS OF THE INTERVIEWEE NO. 13 (BC)

Date 8th April, 2010

Date 8th April, 2010 at the Developers' office, Bangkok CBD, Rama IX Road

The interviewee was conducted at the developer office, the interviewee hold the position of senior budgeting/financial manager of the registered developers in SET and performed some significant growths during the past 5 years. In order to protect his business confidentiality, the interviewee will be named as "BC" in this interview record.

I am the senior budgeting manager of Property Perfect PCL, responsible for company balance sheets, project cash-flow, annual project budget, and conduct the project feasibility analysis of each project under the company's business.

I have experience in interior decorating and architecture business for 4 years, but used to work in financial institutions for 17 years, my background education was MBA (Finance).

In this company, the marketing teams and risk committees are responsible to assess and analyse risks that may occurred in our projects. The risk committee also identify the discount-rate for using in the cash-flow analysis, in this regard, discount rate is a figure that indicated the rate of risks of the project/company as well.

I have also conducted the pre-feasibility analysis with my executives, the initial gross profit margin of each real estate project shall be equal or higher than 30%, if not that project was not feasible to construct.

In this stage, we do not have to come across to IRR calculation, just focusing on the initial gross profit. Since there are several factors related to the IRR calculation such as operational cost, land cost etc. so if the initial gross profit is less than 30%, this project is not worth to commence. Moreover, according to the innovation construction techniques, now the construction project could be finished before expected schedule, this also affects the IRR Value.

Now, the housing projects could finished earlier than the past, because of the construction techniques had been developed all the time. One house was completely built in 6-8 months, but now it is reduced to 4 months only. Therefore, the products turnover shall be faster to respond to this trend, the product turnover rate used to be 300 days/unit from foundation to transfer, but now the construction techniques such as prefabrication made the turnover cycle becoming more faster. Our company also adopts this method as well as still using the conventional methods for the higher prices houses, because of the fuzziness of the customers who buy the luxury houses shall be higher than the normal who buy the low prices house (in my opinion only).

This company has just settled the risk committee to deal with more complex risks in any projects. The company risk committee focuses the location of project as the first priority risk, they do not concern much about the related investment figures such as IRR, ROI and so on. They usually use their experience, and concern only on the land location and prices of that land parcel. They can use the land price to estimate the amount or return from the investment, and they can adjust the number of outlets and income by calculating the land area. Actually,

they have the figures and expected return rate in their minds, if they do not satisfied with the guesstimated rate of return, they will not invest in that project.

As I told you, they had the figures and rate in their minds, those figures are calculated roughly by their experiences. The reason that they focused intensively on the land prices, because of this factor is non-controllable factor, the prices or any acquisition costs are depend on the negotiation between the company and land-owners. Prices of land parcel also influence the product prices, for example, if the land prices per 4 sqm are higher than 10,000 Baht/ 4 Sqm, our products prices would be upgraded to the middle-high class. If the land price is less than 7000 baht/ 4 sqm. , the products would be designed in a lower class. Thus, I conclude that key to success in real estate development project is controlling and negotiating the land prices.

In my opinion only, I believe that risk caused by the poor location of site is a most, because it could not be controlled. If the project was constructed in the poor location, the products could not be properly sold. The other factors such as marketing, product quality and company's reputation might become the lower priori.

Rather than the location factor, I think the second risk to be concerned is the marketing, particularly the promotion and advertising of the products. As you take a quick glance in any company's profit/loss statement, you would find that the marketing cost/expense became the second highest expense after salary and welfares. In this situation, if your marketing team and marketing plan do not effective enough, the customers will not consider to buy your project.

What would be happened if you have the numbers of customer less than expected, you would loss your profit certainly. More time you spend in selling period, that means you have to pay more interest than you expected, even you believe in your strong point in your financial status.

Then, if we clearly look into the project cash-flow, you would see that the marketing/promoting cost is approximately 5% of total expense. According to the current situation, if you have less than 5% promoting cost, your project would not attract the customers' attentions. Your past reputation and your quality of products do not matter for this regard.

Our risk committees had mostly assessed risks by their experience, but they are trying to be a professional, they had bought some useful information from the reliable sources such as AREA.

If you experience in this industry for a long time, this industry is not as such complicated as you may know. Actually there are only a few risks that strongly affect to real estate projects such as economic situations, customers' affordability. Now, even the political and economic situations are not so stable, however, there are still some customers who have the purchasing powers and money to buy a new property. Some developers could gain 10,000 million baht of their selling amount. I thought risk in this industry is not so complicated, to manage the real estate projects properly, it is necessary for the managers to have the solid experience, then, the keys to success of any project are good location, good project teams, well known reputation and never done any fraud. These could help the developers to sell their properties.

Risks in this industry are usually simple to assess or analyse, the professionals have the knowledge in buying the land parcel effectively as well as how to develop the raw land to gain the profit. For example, Thai developers may have a trick to buy "non-accessible" land parcel, because the price would be cheaper, and then find the gap of laws or try to make it profitable. If you do not buy the "non-accessible" land parcel, sometimes you cannot afford

the higher land price. Even you can buy that, but your products' prices must be higher, so no customers could afford that.

In regard to the development of risk assessment model, that is good and actually I suppose that somebody in this industry should do that. This would help the newcomers of this industry to tackle with risks, because of now I found that the experience of the practitioners could not be transferred properly, the model would help in knowledge transfer, hopefully. Particularly in the decision making process towards risks, it helps the new comers to focus of the high impact risks in this industry.

This model could gain the information from several sources such as financial information, land area and values. It is because of the developers may have the different sources of information and create their own models, even in the same company/project, each decision-maker may have their own model. Thus, my ideal risk assessment models must used information from the reliable sources and models must be accepted in their flexibilities and simplicities. Moreover, this model should help the decision makers in regard to plot the project layout and design the size of the housing plots and facility area. Then, this model analyse the feasibility of the plotted project layout, in regard to the number of the outlets, type of products, and so on.

I also have the other duty in helping the designer to form the project layout by providing the financial information and budget, cost to designers. However, the products designs concepts are the duties of our management and marketing teams. Then, I also need some models that help us in analysing the needs of customers or demand/supply, customers' affordability in the trade area. If there is no kind of this model developed, we have to used the survey or reports from the agencies only.

Now, our company had implemented in Information Technology (IT) in order to help the site persons to inspect the products quality. They had developed the quality checklist and then installed on the palmtop pc, to reduce the paperwork as well as provide the real time communication between the project participants.

We spent most of our budget on inspecting the products quality and developing the site-workers skills. It was because we did not want to outsource the consultants to do this duty. However, we still have some problems caused by the after sales services and claimants, thus, we have to develop the system to help ourselves tackle with this problem, and to reduce the products' deflects.

At this moment, we do not have our own construction workers, but we employed outsources sub-contractors, who had the close relationship and work alongside us for a long time. We do not have the policy to produce by our own staff, but focus on control and manage on our products. We have our in-house designers, but sometimes when we have too much workloads for ours, we also hire the outsources designers to handle the works. We have our own quality control, assurance team including our quality measurement standards. We do not have much problems from the contractors, because we have carefully selected them from our list of well-reputation contractors.

Then, we will use our site at Bang Yai (Bangkok Northwest) as the case study, because this site is the newest one of us. We have developed the IT system there because of the project management teams are ready for the changes in the management systems and prompt to development. Then, this site becoming our pilot case study for other projects in regard to

implement any new systems to help the decision-makers or project managers making-decision. This project land area is approximately 608,000 Sqm, and divided into 5 sub-phases, the project value was estimated at 2 Billion baht, the product prices are around 3-5 million baht/unit (detached house), thus the prices of our products scoped the type and affordability of the customers, too. The project duration was scheduled at 10 years, and divided into 5 phases as said, now it is proceeding to phase 3 only. This phase 3 was continuously running for 2 years. However, we manage this project on the phase basis, phase-phase, complete one by one, we also make a negotiation with the financial institution on the phases basis. We had already bought some land parcels to respond to the construction of the project (phase 1-2). Actually, we will expand our purchasing of the adjacent vacant land, if the demand and customer potential in this area high and feasible for us to develop more products. Actually our land acquisition strategy is to embed in any area for 10 years or more, and buy the adjacent land and expand our project.

Our project is approximately 50% completion, we had a load of customer order and could not build on time, because we use the just-in-time and make-to-order bases. This project is superb in its location, infrastructure, size of the project, there will be a mass transit system feeding to the site in a short future. The customers considered to buy us rather than the competitors because our potential in the aforesaid matters, which also included the reasonable prices of our products while compared to the others. We invested much in the project amenities and facilities area because we thought that is our trade secrecy, we have high quality clubhouse, swimming pools, better atmospheres, as well as the largest green area.

Actually this project is located in the green area reserved for agricultural purposes, in accordance with BMA land regulation 2005 (the latest announcement), because of we had bought the large parcel of land before this regulation announced, therefore we could develop this project without the limitation of laws. While, the following competitors will have some obstructions from this regulation, as well as the difficulty in buying land.

This company also has the standards of estimating the project budget, it is depend on the land prices and location. If we got the good location with the cheaper or reasonable prices, we would then invested more on the project infrastructure, approximately 30-40% of total budget.

Our major source of fund is our bond, we could issue our own bonds and sell in the Stock market, due to we have the acceptable potential to issue bond (SEC regulation).

The particular risks that obstruct our project progression could be categorized into 2 groups, internal risks, which caused by the selling volume and quality of products, we do not concentrate much on these, because of the project team could handle this project till complete, as well as we have adequate fund to support this project, thus, the internal risks affect less to this project vitality. The external risks, caused by the current political turmoil becoming the most concern factors, because of these would affect directly to customers' confidence to buy a new property, some of our customers postponed plan to buy our products, some of them might panicking to the unforeseen chaos or riots. I just hope this situation would be somehow end.

We have prepared the contingency plan to mitigate risks and always update this plan, this plan made by the risk committee. It was created after the thorough analysis of each project, in every dimensions, such as selling volume, products designs, trends of customers towards the products design etc. We updated and monitor these by quarter, for example, if we have 10 designs of detached house, each design will be analysed by using the customer trends and affordability, then we can continue to sell and marketing some of these designs or terminate the out-of-trend design from our production lists.

The risk committee held a monthly meeting in order to update and monitoring the current situations of this industry, and Thailand overall. However, the site meeting usually weekly held, the attendants are marketing, designers, construction, contractors, in order to analyse the site risks and seek for the mitigation methods. Sometimes, our executives will take a site visit to monitor the site progress as well to instruct the marketing or promotion strategy to the site managers.

INTERVIEW RECORD (CASE STUDY A)

The researcher will record all information in regard to participant's perceptions towards the risk assessment aspects in real estate projects. All interview process will follow to this structure accordingly.

The Participant's details

1. Position : Managing director of the consultant company
2. Educational background (optional) : Master of real estate finance, bachelor in architecture.
3. Are you the decision maker of risks?　　　(Y_ / N)
4. Working experiences 14 years
5. Do you have any risk management / assessment experience? (Y_ / N)
6. According to your opinion and experience in real estate development business, what kind of risk has the highest impact to real estate development projects being managed by the participant?

    The economic risks, particularly marketing risks portray the highest impact to the overall project progression since these are the uncontrolled factors, and affect to the overall project income/cost . Whereas the political risks (the regulations issue) also had the significant impact to the developers, because of the instability of the regulators (government change and react to the legislation issued).

7. The frequency (likelihood) of that such risk to real estate project.

    These marketing risks always occurred in every real estate projects, these may be caused by the mis-estimation of demand/supply by the marketing team

8. Consequence (impact) of that such risk to real estate project.

    The marketing risks delay the customers' decision making to buy/rent properties as these influence to the consumers' confident as well as the developers' willing to develop a new project.

9. Do you employ any risk assessment method to assess risks in his/her project? (Y_ / N)

    If yes what is the name of that method?   The risk ranking method.

10. How do you feel about the risk assessment method currently used?

    This method helps in specifying all risks, risks that could be controlled, risks to be avoided as well as the explain risky of the projects.

11. How efficiency of the risk assessment method that you currently used ? (rank 1 -5 from best to worst) <u>4 as it helps in minimising risks.</u>

12. Do you agree that risks could be only assessed by the quantitative only? (Y / <u>N</u>)

<u>It is because of risks are naturally contain subjective meanings, and each decision maker has his/her own individual perception towards risk. For example, each decision maker may have the different perception in economic risk (marketing risk) from me.</u>

13. Do you agree that experience or intuition could be used as a tool to assess risks? (<u>Y</u> /N)

<u>If yes, the experiences or intuition of the decision makers would support their decision making processes, their reaction to risks as well as help them mitigate or manage the further risks.</u>

14. Do you agree that the formal risk assessment methods are too much statistic/mathematical figures? (<u>Y</u> / N)

<u>If yes, there are too much figures in the current risk assessment model, each decision makers or model developers may have their own system of thinking. So, this risk assessment model needed to be standardised, in order to ease the decision makers towards risks.</u>

15. Do you agree that risks had the subjective meanings, and the decision makers shall use both quantitative and qualitative? (<u>Y</u> / N)

<u>If yes, however risks in this business contain the special characteristic that risk actually is a fear or panic of something uncertainty and it would affect to the future decision-making processes. Moreover, risk is difficult to assess or identify since it starts with the individual and subjective meanings, whereas the assessor needs to use the statistical devices to figure it, but risk needs to be interpreted individually when the decision maker need to assess in the real case.</u>

The participants' opinions towards the purposed risk assessment model

16. Do you agree that the purposed risk assessment model as shown is effective enough to assess risks in real estate projects ? (Y / <u>N</u>)

<u>I do not know the sources and the differences of these figures, for example 0.836 and 0.791, what does it mean and how can we justify the difference between each figure.</u>

17. Do you agree that the purposed risk assessment model as shown is efficient to assess risks in real estate projects ? (Y / <u>N</u>)

<u>As I mentioned above, the model creator shall specify the difference between these figures, or given some legend to explain the degree of each risk.</u>

18. Do you agree that the purposed risk assessment model provide more flexibilities to assess risks in real estate projects ? (Y / N̲)

> In my opinion, I do not understand the figures as shown beside each risk, as well as these figures did not specify the magnitude of risk. I recommend that you shall use some multipliers (i.e. Weight quality score, percentage) to indicate each risk clearer.

19. Do you agree that the order of risks magnitude as shown in the model is conform to the real occurrences in real estate projects ? (Y / N̲)

> The order of risks in real estate projects shall be reordered in the following manners.

> 1. Economic risks, you shall address the consequence of marketing risks.
> 2. Social risks, because of the developers need to concern the locality factors (local participation) before committing project.
> 3. Political risks, particularly the contradiction between the local regulations and the project plan/designs
> 4. Environmental risks. EIA actually not the barrier for the development process, but it is the assessment criteria to assess the impact of environmental aspects to the local community. If the projects' unit do not exceed the limitation of EIA and the developers follow the environmental regulations regularly, they do not need to panic of the EIA approval.
> 5. Technological risks, in my opinion, these risks are controllable and affect only a little to the project progression. Moreover, the contractors also take the responsibilities to manage and mitigate this kind of risk when the construction commenced, that means risks have been distributed regularly to the contractors.

20. Do you agree that the level of risks magnitude as shown in the model is appear in the similar way to the real occurrences in real estate projects ? (Y / N̲)

> See question 19 above

21. What are your suggestions towards developing the risk assessment models for the real estate development business?

> As I mentioned above, this risk assessment model has some pitfalls that need to be corrected. Firstly, you need to indicate the difference between each risk, as these figures were not understandable, thus the scale of risk measurement shall be improved such as create the multipliers. Secondly, you have to narrow down the

technological risks, it may be changed to "construction & execution" or "production" risks. Thirdly, as we known that there are various types of real estate project, and these project being affected by the different kind of risks. You need to clarify that this model is appropriate for which type of project, or even create the assessment model for each type of real estate project or making the solid assumptions to support this model.

The participants perceptions and judgement towards STEEP factor risks.

22. How are you thinking about the technological risks in real estate projects?

These risks are controllable, and then these had a little impact to the real estate projects as well as the developers can transfer the construction risks to their contractors, but these risks shall be concerned while starting the construction process, too.

How can you assess the technological risks?

We can assess the technological risks using the information such as suppliers/vendors Information, the variances between the actual works and the scheduled plan and budget.

23. How are you thinking about the economic risks in real estate projects?

These risks must be ultimately concerned, because these affect directly to the project's income stream, particularly the marketing risks (the forecasting of demand/supply)

How can you assess the economic risks?

The marketing risks could be assessed using the available indices such as Consumer Potential Index (CPI), Absorption Rate of properties, and the numbers of housing registered. Whilst we can assessing the financial risks by using the interest rate and cash-flow.

24. How are you thinking about the political risks in real estate projects?

Political risks affect the real estate industries in 2 manners, the violation of the related regulations and the political situation, respectively. The developers shall develop their project in according to the requirements of regulations in order to minimise these risks, then these are controllable risks and easy to minimise. Moreover, due to Thai regulations were complicated and hard to interpret, each regulation may have the individual interpretation. The political turmoil may have a

little impact to the developers and customers' potential to buy property, but both parties had already acknowledge this situation and also prepare the mitigation methods for this risk. However, they are panic on the changing of government's policies of real estate industry.

How can you assess the political risks?

We can assess the political risks by observing the frequency (numbers) of the regulations issued.

25. How are you thinking about the social risks in real estate projects?

The locality risks may be hard to assess in some situations such as the project located closed to the local community which has the strong relationship within the community, the residents may protest the new developed projects

How can you assess the social risks?

We have to observe the local community's characteristics by conducting survey or self-observation.

What information do you need to assess these social risks?

Sometime, we may use the secondary data from the reliable sources such as AREA or any other

26. How are you thinking about the environmental risks in real estate projects?

Actually, this kind of risks does not have the serious impacts to the project progression, unless the developers tried to violate the Environmental regulations. In my opinion, EIA is not the risk, but it is the assessment criteria for the developers to follow up this, if they follow the EIA requirements, they would not bear any risks.

How can you assess the environmental risks?

We can assess the environmental risks by the EIA reports and our observations.

The assessment checklists

Mode	Component	Risk	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Technological	Participants' conflict	Frequency of project participants' conflicts	X				
	Property management	Frequency of difficulty in property management			X		
	Constructability	Consequence of in-constructability				X	
	Project planning and design	Frequency in project design and amendment	X				
	Property management	Consequence of difficulty in property management				X	
Political	Project compliances	The consequence of contradiction between project plan objectives and local development policy		X			
	Project compliances	The frequency of contradiction between project plan objectives and local development policy		X			
	Government	The frequency of Thailand political situation.			X		
	Government	Consequences of the approval duration from the relevant authorities					X
	Government	The consequence of Thailand political situation.			X		

Category	Factor	Description				
Economic	Construction materials	Consequence of construction materials' price fluctuation				X
	Project income	Consequence of project cash-flow illiquidity				X
	Construction materials	Frequency of construction materials' price fluctuation			X	
	Marketing plan effectiveness	Frequency of demand and supply mis-estimation				X
	Project funding	Frequency of interest rate fluctuation				X
Social	Workforce availability	Frequency of workforce unavailable			X	
	Locality	Consequence of the local community do not accept the project			X	
	Workforce availability	Consequence of workforce unavailable			X	
	Locality	Consequence of the local community do not participate in the project				X
	Locality	Frequency of the local community do not participate in the project		X		
Environmental	External Impacts	Consequence of site inappropriateness			X	
	Approval from EIA	Frequency of delay in EIA Approval	X			
	Approval from EIA	Consequence of delay in EIA Approval	X			
	External Impacts	Frequency of site inappropriateness		X		
	Environmental risks likelihood	Frequency of pollution risks		X		

INTERVIEW RECORD (CASE STUDY B)

The researcher will record all information in regard to participant's perceptions towards the risk assessment aspects in real estate projects. All interview process will follow to this structure accordingly.

The Participant's details

1. Position : <u>The founder of Thailand real estate business school, and President of Thailand Valuation Association</u>

2. Educational background (optional) : PhD in Land Use Economic

3. Are you the decision maker of risks?   (<u>Y</u> / N)

4. Working experiences: 30 years

5. Do you have any risk management / assessment experience?   (<u>Y</u> / N)

6. According to your opinion and experience in real estate development business, what kind of risk has the highest impact to real estate development projects being managed by the participant?
   <u>The financial risks, these would affect to the project financial feasibility in terms of the scarcity of project funds and the illiquidity of project cash-flow.</u>

7. The frequency (likelihood) of that such risk to real estate project.
   <u>These financial risks always occurred in every real estate projects, when the developers or decision-makers conduct the feasibility analysis.</u>

8. Consequence (impact) of that such risk to real estate project.
   <u>The financial risks actually controllable, these would affect to the project's return of investment would not reach the expected level.</u>

9. Do you employ any risk assessment method to assess risks in his/her project? (<u>Y</u> / N)
   a. If yes   what is the name of that method?   <u>The sensitivity analysis.</u>

10. How do you feel about the risk assessment method currently used?
    <u>This method is flexible enough and easy to understand by my colleagues, however this need a solid research or analysed information to support the calculation process.</u>

11. How efficiency of the risk assessment method that you currently used ? (rank 1 -5 from best to worst) <u>1, I think this is suitable risk assessment model by now, it could help us monitor the consequence of risks or project financial status if the conditions, variables changes.</u>

12. Do you agree that risks could be only assessed by the quantitative only? (<u>Y</u>/ N)

> There are various data that formed in the tangible or quantitative format such as the supply of properties in the market, the occupancy/vacancy rate and the ownership registration. Anyway, these data need to be analysed before used in the real business.

13. Do you agree that experience or intuition could be used as a tool to assess risks? (<u>Y</u>/ N)

> Yes, but sometimes the decision makers may optimise their perceptions and avoid the actual consequence of risk (too good to be true). The decision makers shall be aware while using their own intuition to assess risks.

14. Do you agree that the formal risk assessment methods are too much statistic/mathematical figures? (Y / <u>N</u>)

> Even the formal risk assessment models are statistically created, however they are easy to understand because they are systematically developed. For example, sometime we also use the regression analysis to forecast the price or cost of developed projects. Actually we do not know the calculation process of this analysis exactly, but we just adapt this to support our assumptions, if we believe that the outcomes of this analysis were acceptable and provide the supportive reasons.

15. Do you agree that risks had the subjective meanings, and the decision makers shall use both quantitative and qualitative? (<u>Y</u>/ N)

> Yes, risks actually contain the subjective meaning, and not only assessed by quantitative approach only, the decision makers shall use both aspects to assess risks in order to enhance the overall risk assessment processes.

The participants' opinions towards the purposed risk assessment model

16. Do you agree that the purposed risk assessment model as shown is effective enough to assess risks in real estate projects ? (Y / <u>N</u>)

> I am confusing about the factor loadings as shown in the model, and I need some explanations. However, it is looking clear enough as it shown and order the magnitude of risks in the easy to understand diagram.

17. Do you agree that the purposed risk assessment model as shown is efficient to assess risks in real estate projects ? (Y / <u>N</u>)

> As I mentioned above, the model creator shall specify the difference between these loadings, or given some legend to explain the degree of each risk.

18. Do you agree that the purposed risk assessment model provide more flexibilities to assess risks in real estate projects ? (Y / <u>N</u>)

In my opinion, you shall use some multipliers (i.e. Weight quality score, percentage) to indicate each risk clearer.

19. Do you agree that the order of risks magnitude as shown in the model is conform to the real occurrences in real estate projects ? (Y / N)

The order of risks in real estate projects shall be reordered in the following manners.

6. Economic risks, the consequences of financial risks may have the highest impact to overall real estate development processes. We have to focus on the sources of project funding and cash-flow illiquidity.

7. Social risks, the unavailable of the skilled construction workers shall be emphasised in the construction stage. However, this risk must be seriously concerned by the contractors.

8. Political risks, particularly the contradiction between the local regulations and the project plan/designs

9. Environmental risks. The pollution during the construction process must not be overlooked by the developers.

10. Technological risks.

20. Do you agree that the level of risks magnitude as shown in the model is appear in the similar way to the real occurrences in real estate projects ? (Y / N)

See question 19 above

21. What are your suggestions towards developing the risk assessment models for the real estate development business?

This model needs some exact criteria or figures to describe the factor loadings, the loadings were so hard to foresee the actual some criteria such as "speculation of properties, occupancy/vacancy rate

The participants perceptions and judgement towards STEEP factor risks.

22. How are you thinking about the technological risks in real estate projects?

These risks are controllable, but these also had some affects to the real estate projects as well as the developers can transfer the construction risks to their contractors.

How can you assess the technological risks?

The technological risks can be assessed by using the suppliers/vendors Information, the procurement contracts and the contractors' performance monitoring reports.

23. How are you thinking about the economic risks in real estate projects?

> In normal situation, the economic risks (financial risks) shall be emphasised by the developers and decision makers in this business. However, in the abnormal situation, the perception of risks may be varied in according to the developers' attitudes.

How can you assess the economic risks?

> The marketing risks could be assessed by using the project cash flow, the bank interest rate and the fluctuation of interest rate (both loan and mortgage rates)

24. How are you thinking about the political risks in real estate projects?

> I think Thai customers may over-panic about the current political situation, therefore they would postpone their decision making towards buying properties. However, in the developers' point of view, they shall concern on the impact of the regulations and how these regulation influence to the project's design and planning schemes.

How can you assess the political risks?

> We can assess the political risks by observing the frequency (numbers) of the regulations issued.

25. How are you thinking about the social risks in real estate projects?

> Normally, these risks do not affect much to the real estate development processes, unless the project located in the sensitive area

How can you assess the social risks?

> We have to observe the local community's characteristics by conducting survey or self-observation, or use the secondary data from the reliable sources such as AREA.

26. How are you thinking about the environmental risks in real estate projects?

> The inappropriate conditions of project site shall be the highest impact risk that need to be focused by the developers. For example, some area in BMA had the poor soil conditions and needed the special treatment for site mobilisation, these would affect the project cost and time.

The assessment checklists

Mode	Component	Risk	Please indicate your agreement towards the degree of the following risks affected to real estate projects (see the established model)				
			Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Technological	Participants' conflict	Frequency of project participants' conflicts		X			
	Property management	Frequency of difficulty in property management		X			
	Constructability	Consequence of in-constructability				X	
	Project planning and design	Frequency in project design and amendment		X			
	Property management	Consequence of difficulty in property management			X		
Political	Project compliances	The consequence of contradiction between project plan objectives and local development policy				X	
	Project compliances	The frequency of contradiction between project plan objectives and local development policy		X			
	Government	The frequency of Thailand political situation.			X		
	Government	Consequences of the approval duration from the relevant authorities				X	
	Government	The consequence of Thailand political situation.			X		

Category	Factor	Description				
Economic	Construction materials	Consequence of construction materials' price fluctuation		X		
	Project income	Consequence of project cash-flow illiquidity			X	
	Construction materials	Frequency of construction materials' price fluctuation	X			
	Marketing plan effectiveness	Frequency of demand and supply mis-estimation				X
	Project funding	Frequency of interest rate fluctuation			X	
Social	Workforce availability	Frequency of workforce unavailable		X		
	Locality	Consequence of the local community do not accept the project	X			
	Workforce availability	Consequence of workforce unavailable			X	
	Locality	Consequence of the local community do not participate in the project		X		
	Locality	Frequency of the local community do not participate in the project	X			
Environmental	External Impacts	Consequence of site inappropriateness	X			
	Approval from EIA	Frequency of delay in EIA Approval		X		
	Approval from EIA	Consequence of delay in EIA Approval		X		
	External Impacts	Frequency of site inappropriateness		X		
	Environmental risks likelihood	Frequency of pollution risks	X			

INTERVIEW RECORD (CASE STUDY C)

The researcher will record all information in regard to participant's perceptions towards the risk assessment aspects in real estate projects. All interview process will follow to this structure accordingly.

The Participant's details

1. Position

2. Educational background (optional)   Chartered Surveyor

3. Are you the decision maker of risks?   (Y / N)

4. Working experiences 25 years

5. Do you have any risk management / assessment experience?   (Y / N) in development aspects, some on the public side (railways authority)

6. According to your opinion and experience in real estate development business, what kind of risk has the most impact to real estate development projects being managed by the participant? Time as this has the highest impact on the project construction progress, if you cannot get the time right, that would cause the project delay, cost, then the customers (occupiers). One important aspect of the development business is that development is about getting something on the right time and move forward on it. Time is actually a driving factor for the following aspects (cost, funding, quality)

7. The frequency (likelihood) of that such risk to real estate project. It would occurred in every single newly developed projects, when the developer started the project, particularly when he/she needs to contact with the planning/authority approval, that means every projects had been constrained by time.

8. Consequence (impact) of that such risk to real estate project. Time drive the following project activities including financial aspects of the real estate projects and cause many problems to the project progression.

9. Do you employ any risk assessment method to assess risks in his/her project? (Y / N) The normal financial appraisal techniques, such as sensitivity analysis, time-period analysis, cost benefit analysis or the simulation techniques (Argos Developers, Monte Carlo Simulation)

10. How do you feel about the risk assessment method currently used?

It was pretty good and reasonable to follow, it was one preference name Argos Developer (Circo), which was developed based on Monte Carlo Simulation theorem.

11. How efficiency of the risk assessment method that you currently used ? (rank 1 -5 from worst to best) 4 or almost satisfied, it gives you the necessary idea that enables for the decision making towards financial risks.

12. Do you agree that risks could be only assessed by the quantitative only? (Y / N)

No, it had to be both approaches, the developer had to clearly understand the whole real estate development process, the development cycle as well as the market. Therefore the risk assessment could not being relied only on the number, it also needs the experience or human intuition to be equipped in the assessment model.

13. Do you agree that experience or intuition could be used as a tool to assess risks? (Y / N)

It was about the understanding of the overall whole development processes, as mentioned above, the number or figure was great for the decision makers to make a decision. However , the developers always use their business knowledge or experience as the tools to assess risks.

14. Do you agree that the formal risk assessment methods are too much statistic/mathematical figures? (Y / N)

Most developers feeling there is not necessary for applying too much statistic to assess risks in this business and most of them do not have the mathematic background. Some developers may not have enough knowledge, they are not statistic orientation. That would become the barrier for them to use the formal or systematic risk assessment model, which was created based on solid statistical/mathematical devices.

15. Do you agree that risks had the subjective meanings, and the decision makers shall use both quantitative and qualitative? (Y / N)

It is necessary to appraise risk with both approaches

The participants' opinions towards the purposed risk assessment model

16. – 19 Do you agree that the purposed risk assessment model as shown is effective enough to assess risks in real estate projects ? (Y / N)

For the current UK development industry, it is necessary to include the financial risks into the economic risks mode. In this regard, the developer has to borrow fund from

some financial institutions to run his/her project, without adequate fund, the project could not run appropriately. For the recent years in UK development industry, there was a shortage of fund since the FI considered that the real estate industry was too risky, and they reluctant to lend money off. Then, the cost of borrowing fund (interest) and availability of fund shall be the major factor that needs to be included in this assessment model. If the money did not come in right time/place, the development would not continue smoothly.

The model shall add more concern on availability of fund as this would cause the crucial risk to the development scheme.

20. Do you agree that the level of risks magnitude as shown in the model is appear in the similar way to the real occurrences in real estate projects ? (Y / N)

Particularly in UK context, the social risks regard to workforce unavailability are not so high due to there is a high employment and availability of work, but this industry needs more skilled workers as UK has lack of construction skilled workforces and need to import from other European countries. Thus, the social risks in regard to workforce unavailable are not so high. It used to be the workforce risks related to the union power (i.e. to stop the job, protest), but now the unions power had been dissembled. So I don't think social risks in relation to workforce would be high.

In this country, the social risks in relation to the public outcry had more influence to the developers (i.e. Heathrow Airport runway). Sometimes the developers have to stop their projects due to the protestants of public or local community.

21. What are your suggestions towards developing the risk assessment models for the real estate development business?

In regard to the social side, the model shall be equipped with the risk of public outcry, protestants, and public opinions. Those types of "Social attitude" would be the higher consideration, since these would cause a termination of project, in case that the project did not meet with the local acceptance.

The participants perceptions and judgement towards STEEP factor risks.

22. How are you thinking about the technological risks in real estate projects?

The researcher shall clearly specified the definition of technological risks, whether these may be the risks occurred during the construction process or even the risks caused by the technology change. In regard to the construction process of each real estate project, planning permission shall be the biggest issue (in the UK context).

How can you assess the technological risks and what information need to assess this kind of risk?

Using planning regulations' frameworks or requirements, including the Urban development planning (UDP) knowledge to specify the project's design and planning scheme to comply with planning permission. In this case, the developers have to work with designer, architects to get the approving certificate to continue construction. Then, the developers needs to select the qualified contractors to handle with the project design. Thus, the contractor's qualifications (i.e. proven records or experience) shall be used as a tool to assess the construction risks and move the project smoothly.

In regard to the communication conflicts in the project, the experienced project manager could help in reducing these such disputes, so the proven record of project manager shall be used as the risk assessing tools as well.

23. How are you thinking about the economic risks in real estate projects?

Economic risks are tending to be an outside influences of the developer, these have an interlink with the political situation or policy changes. For example, the economic risk occurred when the interest rate or the cost of fund increased, the developers have to ensure that they have prepared some fund to response to the change of interest rate or using the hatchet interest techniques to avoid that risk. Economic risks shall have the extreme influence to this industry, so the developers shall assess risks in order to safeguard themselves from the severe market situation.

How can you assess the economic risks and information need for assessing risk ?

The developers can check on the legislation in regard to the economic policy changes (that have an impact to development). Also beware that the property market can be changed from the peak to the worst and the developers could lose their end-users, so the economic risks would be high. The developers could assess those marketing risks by analyse on the rent, yield, interest rate, vacancy/occupancy rate, how long the properties absorbed and tenant/investors demands so the developers could assess the market supply/demand, the suitable rental, and potential customers,

24. How are you thinking about the political risks in real estate projects?

Political risks tend to be a long time risk, since these political risks mostly related to the change in government legislations such as change in VAT or tax rate rather than the political unrest situation. Political risks in this country seemed to be a slow process

and tend to be related to change in government policies, but those have the massive impact on the development.

Political and economic had an interconnection together strongly, particularly the change of policy towards interest or tax rate. Economy would follow the politic, so in this sense, whenever the government policies change, these would affect to the economic system apparently, for example the UK government increased VAT to 20% that had a direct impact to the spending of the customers. On the other hand, if the government decreased their public spending, that also affect to the developers' activities, especially the developers who involved in public sector.

25. How are you thinking about the social risks in real estate projects?

See question 20 above.

26. How are you thinking about the environmental risks in real estate projects?

Environmental impact studies shall be input into the planning permission approval in every projects, and these shall be concerned while develop project as seen from the criteria given, the pollution risks had indicate the high level of concern that the developers have to consider during the construction processes.

The assessment checklists

Mode	Component	Risk	Please indicate your agreement towards the degree of the following risks affected to real estate projects (see the established model)				
			Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Technological	Participants' conflict	Frequency of project participants' conflicts				X	
	Property management	Frequency of difficulty in property management		X			
	Constructability	Consequence of in-constructability				X	
	Project planning and design	Frequency in project design and amendment			X		
	Property management	Consequence of difficulty in property management		X			
Political	Project compliances	The consequence of contradiction between project plan objectives and local development policy				X	
	Project compliances	The frequency of contradiction between project plan objectives and local development policy				X	
	Government	The frequency of political situation.		X			
	Government	Consequences of the approval duration from the relevant authorities		X			
	Government	The consequence of Thailand political situation.		X			

Category	Factor	Description				
Economic	Construction materials	Consequence of construction materials' price fluctuation		X		
	Project income	Consequence of project cash-flow illiquidity				X
	Construction materials	Frequency of construction materials' price fluctuation		X		
	Marketing plan effectiveness	Frequency of demand and supply mis-estimation		X		
	Project funding	Frequency of interest rate fluctuation		X		
Social	Workforce availability	Frequency of workforce unavailable	X			
	Locality	Consequence of the local community do not accept the project		X		
	Workforce availability	Consequence of workforce unavailable	X			
	Locality	Consequence of the local community do not participate in the project		X		
	Locality	Frequency of the local community do not participate in the project		X		
Environmental	External Impacts	Consequence of site inappropriateness			X	
	Approval from EIA	Frequency of delay in EIA Approval	X			
	Approval from EIA	Consequence of delay in EIA Approval	X			
	External Impacts	Frequency of site inappropriateness				X
	Environmental risks likelihood	Frequency of pollution risks		X		

INTERVIEW RECORD (CASE STUDY D)

The researcher will record all information in regard to participant's perceptions towards the risk assessment aspects in real estate projects. All interview process will follow to this structure accordingly.

The Participant's details

1. Position   Senior Lecturer, School of the Built Environment.

2. Educational background (optional)   Msc.

3. Are you the decision maker of risks?   (Y̲ / N)

4. Working experiences 30 years

5. Do you have any risk management / assessment experience?   (Y / N̲) in development aspects

6. According to your opinion and experience in real estate development business, what kind of risk has the most impact to real estate development projects being managed by the participant? Risks in the real estate projects are actually formed with various factors related to the environment that project taking place (in term of business, political etc.). In the UK context, the economic/financial related the project environment may be important, on the other hand, economic factor which related to politic aspects would be more important because of the procedures, and the government's intervention (particularly, some developing countries: Egypt etc.)

   Those are impact to the project overall environment in any such way. For example, the planning permission, or environmental impact these have some influence to the real estate projects. However, in this regard, economic risks caused by financial issues shall be the most aware risks while managing the real estate project. Furthermore, the hardest predicted risk is the risk related to the state of economic.

8. Consequence (impact) of that such risk to real estate project.
   The real estate business is directly related to the state of economy, real estate cycle is affected by the real estate cycle (local and global). The developers mostly deal with economic factors more than the political factors. The economic risks would certainly related to the future income of projects. If you make the **simple residual valuation** and try to work out on the certain profit, all future income (rental) would relied on the future income depend upon the economic stage. For example, if the developer developed a million sqm. office building, he would achieve the target if the economic

situation is booming. Vice versa, if developed this in the economic downturn situation, he might be affected by a few year and achieve the lower income. In this case, if he borrowed money to develop, he still have to repay the loan. So, he have to make sure that you have some kind of contingency and you can cope with this situation.

9. Do you employ any risk assessment method to assess risks in his/her project? (Y / N)

Actually, the participant does not involve in the industry, but he could give some opinions in regard to the risk assessment methods used in the real estate business.

The participant mentioned "the simple residual valuation method", thus the researcher asked about this from the participant.

Sensitivity analysis also being mentioned by the participant as this analysis gives the form of "what if" analysis, what would be a consequence or the impact on project if one or more variables changed.

12. Do you agree that risks could be only assessed by the quantitative only? (Y / N)

Some kinds of risk had the qualitative or subjective characteristics that difficult to quantify such as political or social risks. Even though someone develops the multi-criteria model to predict political risks, but these risks are a bit more qualitative so that needs the decision-maker's experience to help in assessing these risks. For the social dimension risks, obviously, the decision maker could use the demography, but he would need more than a basic probability measures. He need more qualitative assessments based on discussion with the expertises who has a lot experience dealing with the same situation. So the model developer could develop model based on the experts' experience.

13. Do you agree that experience or intuition could be used as a tool to assess risks? (Y / N)

See question 12 above.

14. Do you agree that the formal risk assessment methods are too much statistic/mathematical figures? (Y / N)

Actually the statistical techniques are helpful, but these could not 100% assurance of the risk free situation, so the developers cannot predict by the certain amount of risk that they are going to bear. The decision-maker needs to combine the risks together. Some kinds of risk such as financial would be more quantitative so that risk can be predicted by statistical methods to forecast some related figures such as interest rate, economic growth. However, in the reality, some risks are more qualitative, then the decision-maker could use his experience or expertise to assess risks. Hence, most of

the real estate investors, who are the risk takers always invest without assessing risks, and some of them even do not know the risks. They may use their own experience or discuss with other experts or experienced persons or their intuition.

15. Do you agree that risks had the subjective meanings, and the decision makers shall use both quantitative and qualitative? (Y / N)

Some kinds of risk contain the quantitative meanings, but number of factors had the subjective meaning. This depends on whom making a decision, each developers had the different perception towards risks. The way that each person perceives risk is different from the others, risk is ideally subjective matter. As well as the attitude towards risk (risk coverage) of each person also different, they are divided into the risk takers (higher risk-higher return), risk neutralists and risk averters (avoider), respectively. Then, the subjectivity is important as these three groups of people expect the different return (risk) and how to response risks from their investment. These are based in investment theory as a basis to assess the attitude towards risks of the investors.

The participant recommends the decision maker towards risk shall combine both approaches to assess risks. The decision maker shall concern on the other risks that occurred outside the "office environment" rather than using one model for the specific project. Basically, the developer of commercial/residential project may looking on the basic construction cost, rental income, gross development value, amount of money generated from the project or the certain project profit gained by income deducted cost. However, these are not enough, because of these calculations also contain some variables (construction, rental income variables etc.), that each single variable is affected by the environment within the project being operated. If consider on the methodology to assess risks, then we can combine specific mathematical quantitative methods that give some ideas about the prospects for cost implication. For example, the participant tries working out for the model for changing the construction cost in term of percentage, what is the probability if changing the materials. Then, we can assess these probabilities by making the "**sensitivity analysis**" it give an idea of "**what if analysis**" such as if the construction materials prices increased, what would be the outcome of this increment. It is interesting to combine these analysis with mathematic statistic to form the analysis model.

However, for the assessment of risk in wider context such as the project's stakeholders or the government action, they had the potential impact on project but we cannot apply the mathematical, sensitivity or probability methods to assess these risks. All we can do is to make an allowance for the government interaction in term of stakeholder. As well as the environmental and social community issues, these risks are not the quantifiable, we cannot make the sensitivity analysis then we have to use the qualitative assessment methods such as discussion with the experts about the impact of risks, what shall be the consequence of this risk to project return etc.

The participants' opinions towards the purposed risk assessment model

16. – 19 Do you agree that the purposed risk assessment model as shown is effective enough to assess risks in real estate projects ? (Y / N)

The researcher informed the participant that this model contains the factor analysis outcomes, the structure of model, the graphical presentation and the assessment checklist that used for model validation.

Generally speaking, this model seemed to be interesting one because of it has been developed in accordance with risks in this industry. It combines quantitative and qualitative information (not necessary measurable in qualitative terms) that enough for assessing risks, some variables in this model are quantifiable such as project funding, construction materials price fluctuation, but some variables such as political dimensions, political situation (frequency) are not quantifiable. Environmental impact is also the unquantifiable factor, particularly the natural environment of project, the only way to assess this is to elicit people's opinions in regard to the related regulations. This cannot be statistically calculated about its outcome or its impact on the development scheme.

17. Do you agree that the level of risks magnitude as shown in the model is appear in the similar way to the real occurrences in real estate projects ? (Y / N)

Showing in the assessment checklists.

18. What are your suggestions towards developing the risk assessment models for the real estate development business?

This model is considered as the useful model for the real business case, it given the wider aspect of risk in STEEP impacts on the project, the influences of these factors on the project' risks. According to the participant opinion, this model could actually be applied to any projects if some factors had been adjusted, not only the real estate

projects. We can use this model in other types of project such as energy saving project, and some elements shall be modified to suit with the project's requirements or characteristics. Then this model could be generalised and applied to various type of project (i.e. agricultural project whether the intensive or land expandable alternatives). Some interesting factors that shall be added to this model are such the quality of works (since it affects the customers' decision making to buy property, then the income stream of project-project overall finance and interest).

The participants perceptions and judgement towards STEEP factor risks.

19. How are you thinking about the technological risks in real estate projects?

According to the model's description, Thai developers perceived that the conflict between project stakeholder had the highest impact amongst other technological risks. that is because of each project stakeholder has his/her own objective in involving the project. To minimise this risk, the developers shall consider the participant and understand the objective of each stakeholder.

How can you assess the technological risks and what information need to assess this kind of risk?

The stakeholder analysis could be used in this regard. However, this is the qualitative method to collect the project participant's perceptions and objectives and then analyse these. The stakeholders' perceptions are varied whether positive or negative. For example, the local community may perceive the project positively because the project would bring the new business opportunities to the community, or negatively the project will bring more hassle (noise, pollution, car, traffic increased). Thus, it is need to assess this risk wider with the direct and non-direct participants about the performances of project.

20. How are you thinking about the economic risks in real estate projects?

All of the factors shown in model are important because of these has the potential impacts to project activity. However, the economic risks seemed to be the highest because of these directly involved with project, such as project cost, income etc. There are some external economic risks that had the linkage with the political dimensions such as interest rate, taxation, policies, that are non-quantifiable factors

How can you assess the economic risks and information need for assessing risk ?

For the quantifiable variables, the sensitivity analysis could be used to assess this kind of variables, this analysis based on the "what if" analysis (some variables changed would affect to the project overall incomes or cost).

For the non-quantifiable variables, it is recommend to use the "scenario analysis" . For example, based on the current political situation, it was expected that the project would operate smoothly without any restrictions, but if the political situation change (government change), what shall be the consequence of this change to the project. See details in question 24.

21. How are you thinking about the political risks in real estate projects?

The response of stakeholders (in this case mainly the government) has the potential impact on the development, the government influence the planning process of each project and that become one factor, which is hard to assess quantitatively. Government put some risk friction on the planning permission, that the project may not develop completely and this would affect to the project cash-flow and return on investment. Moreover, government also has another major impact of the development's taxation. Thus, the political dimension (current climate mayhem, riot) also had the high impact on development, but it is in the external environment of project (too far away from developers). In this regard, if the developers used the quantitative model, that would identify that the return was feasible, but the model could not identify the impact of political risks.

For example, the Egypt political dimension, there were a billion dollar invested in the development industry in Egypt, but according to the current situation, this has a highly affect on the investment and the developers may lost their expected return. However, this risk could not be predicted by the statistic/mathematical methods, the only way to assess this political risk is to discuss with the experts to gain their opinions about the political situation in the particular context.

Another case was the border's conflicts between Thailand and Cambodia, if this area is a beautiful and attract the investor, who has less knowledge about this area. this conflict will then influence to the withdrawal of investment in this area. Then again, there is no statistical technique to assess the impact of this situation unless to discuss this with the experts who has solid background in this area for his opinions.

22. How are you thinking about the social risks in real estate projects?

The risks caused by the locality or community factors becoming the risks that the residential/ commercial developers did not take into their considerations (ie. noise, pollution). These risks are hard to quantify in statistical term, because these are the effect of the community around the developed project, the assessor only do this by asking the experts' opinion, or use the demographic data, but these are for supporting the data analysis only. For example, how this development is going to affect the local community's livelihood.

See details in question 22 above.

23. How are you thinking about the environmental risks in real estate projects?

Environmental impact is also the unquantifiable factor, particularly the natural environment of project, the only way to assess this is to elicit people's opinions in relation to the impact of the project to external environment (according to the rules or regulations). This cannot be statistically calculated or determined about its outcome or its impact on the development scheme. Therefore, it is an important factor to consider in the project development that project might have environmental damaged, so it needs to make allowance (changes in design/planning, materials used) and then these will have the financial impact. To assess these risks, it is a making of judgement on the effect of project influenced to the external environment.

The assessment checklists

Mode	Component	Risk	Please indicate your agreement towards the degree of the following risks affected to real estate projects (see the established model)				
			Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Technological	Participants' conflict	Frequency of project participants' conflicts					X
	Property management	Frequency of difficulty in property management				X	
	Constructability	Consequence of in-constructability					X
	Project planning and design	Frequency in project design and amendment			X		
	Property management	Consequence of difficulty in property management				X	
Political	Project compliances	The consequence of contradiction between project plan objectives and local development policy					X
	Project compliances	The frequency of contradiction between project plan objectives and local development policy					X
	Government	The frequency of political situation.					X
	Government	Consequences of the approval duration from the relevant authorities			X		
	Government	The consequence of Thailand political situation.					X

Economic	Construction materials	Consequence of construction materials' price fluctuation			X	
	Project income	Consequence of project cash-flow illiquidity				X
	Construction materials	Frequency of construction materials' price fluctuation			X	
	Marketing plan effectiveness	Frequency of demand and supply mis-estimation	X			
	Project funding	Frequency of interest rate fluctuation			X	
Social	Workforce availability	Frequency of workforce unavailable	X			
	Locality	Consequence of the local community do not accept the project		X		
	Workforce availability	Consequence of workforce unavailable			X	
	Locality	Consequence of the local community do not participate in the project		X		
	Locality	Frequency of the local community do not participate in the project		X		
Environmental	External Impacts	Consequence of site inappropriateness			X	
	Approval from EIA	Frequency of delay in EIA Approval			X	
	Approval from EIA	Consequence of delay in EIA Approval		X		
	External Impacts	Frequency of site inappropriateness			X	
	Environmental risks likelihood	Frequency of pollution risks			X	

SEE THE SEPARATED DATA CODING SHEETS ATTACHED

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
15	the Characteristics of real estate business.	15.1	Risks in this industry are not so complicated and only a few had strongly affect	15.1.1	List of risks that had a strong affect	BC,NP, POS
				15.1.2	Political and economic instable situations	BC
				15.1.3	Customers with a bargain power and affordability could buy properties	BC, PW
				15.1.4	Experience is necessary for managers/decision makers to decide toward risks	BC
				15.1.5	Rather than experience of project manager, good location and project teams are other factors to make project success	BC
				15.1.6	Company brand, reputation also the factors for project success	BC
		15.2	Several kind of risks affect to every project stages	15.2.1	Risks in real estate project may caused by both internal or external factors	TT,NM
				15.2.2	Those risks may be unforeseen or even not controlled	PC, IB
				15.2.3	Risks in this industry are varied according to type, size and many related factors	PT
				15.2.4	According to the developers' experience, risks in this industry could be categorised into business risks, financial risks, legal & legislation and community risks	PT
				15.2.5	Thailand real estate industry has yet the indicators to measure the consequence of any risks	PT
				15.2.6	Overall Thailand real estate market is still stable, even there are several occurrences (economic/ political situation) , because there are some certain demands of the housing units	PW, BC
				15.2.7	Thailand real estate market is now concluded as "the buyer market", the customers take advantage in selecting the property, in accord to their selection criteria for buying house	PW
		15.3	This industry has a limitation in land attributions, then it doesn't have many options or alternative plans	15.3.1	The developers shall have some supportive information to select any development options. If they had chosen the wrong one, the risks in their project would be doubled risen up than normal	PP
		15.4	Risks in this industry are almost the subjective matters	15.4.1	Then, risks in this industry could not be measured by the statistical & mathematical devices alone.	PS, PC
				15.4.2	The degree of risk consequences are varied according to the developers' belief and risk management styles	PC
				15.4.3	The customers behaviours in one important factor in this business, but that could not be measured in terms of mathematical & statistical	PC
		15.5	One project manager/director could response for various real estate project types	15.5.1	They are overconfident in managing risks	NP
		15.6	That developers avoid or neglect the impacts of risks in their real estate projects	15.6.1	Risks are quite the new subject in this industry.	NP
				15.6.2	There are only a little researches (whether academic, commercial) focused on risks in Thailand real estate business.	NP
				15.6.3	Thailand real estate industry has the different contexts from the other industries, or the foreign real estate business and sometimes this also complicated	PT
				15.6.4	One nature of Thailand real estate industry is it enable the speculators to invest on purchasing properties	PW
		15.7	Some developers may not need innovation construction techniques	15.7.1	The construction processes are actually not so complicated and these are the conventional manufacturing industry	PC, PW
				15.7.2	The convention construction methods given more flexibility for the developers	PW
		15.8	Some developers also develop various type of real estate projects	15.8.1	These would help the developer to distribute risks rather than emphatically focus on one type of real estate project	PT
				15.8.2	It is good in market positioning as well, because of the customers would have more options to select/buy.	IB
		15.9	It is hard to compare each real estate projects characteristics	15.9.1	There are contraints by the location factors	PW
		15.10	The nature of real estate business	15.10.1	The real estate products are naturally big in its size	IB
				15.10.2	These are high value products	IB

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
7	Project location risks	7.1	land prices and location affect	7.1.1	The developers shall clearly specified the distance between the project to the closest infrastructure, transit system in order to reduce the location risks.	LW, NM, PS, NP, POS
				7.1.2	The developers shall set the crystal cleared project location as the first priority before project commenced.	LW
				7.1.3	The sufficient marketing study facilitates the decision makers to select the best project site.	NM
				7.1.4	The developers shall clearly specified the distance between the project to the closest core business area in order to absorb the target customers	NM
				7.1.5	Location is the most important factor affects the decision making process to develop real estate projects in any area	PC, PW
				7.1.6	Location also influence to the design of the products to match with the limitations of land such as land prices, land shape etc.	PW
		7.2	Land acquisition risks are also the important risks to be concerned while developing a project.	7.2.1	The wrong purchasing of land parcels would mismatch the customers' requirements of good location.	LW, POS
				7.2.2	The wrong purchasing of land parcels also cause a trouble in expanding project or future developing.	LW
				7.2.3	Land acquisition/purchasing processes also affect the project schedule, therefore the project manager had to include and concern the time spent in this regard	NP, POS
				7.2.4	Moreover, the wrong location also directly affect to the project financial aspects such as project cash-flow, income generated, and ROI	POS
		7.3	Scarcity of land	7.3.1	The scarcity of land cause a trouble in finding the best solution for development the projects	LW, PW
				7.3.2	The scarcity of land also affect to the project cash flow because of land prices in the expected area were rapidly increased.	LW, PW
				7.3.3	The scarcity of land reflects the positive impacts in marketing, especially for the developers who had the land parcel in the Core area or business area	SP
				7.3.4	Then, it also help the developers to sell the in-stock products faster.	PW
		7.4	Location also affect to property rental market	7.4.1	It generates the good yield in property renting, particularly to the expatriater.	LW
8	Land prices risks	8.1	land prices is a non-controllable factor	8.1.1	land prices and acquisition costs are depend on the negotiation.	BC
				8.1.2	Negotiation is a key to reduce land prices risk	BC, PT
				8.1.3	Land prices are varied in according to the location, and the scarcity of land in some business area	NP, PW
				8.1.4	Rather than negotiation, the experienced developers may have some tips to buy land with the reasonable prices	PT
				8.1.5	The property brokerages shall help the negotiation process keep on smoothly	PT
				8.1.6	The developers do not select land by the price wise only but they also concern on location wise and how to develop the future project	PW
				8.1.7	Although the increment of land prices affect strongly to the decision making, but it help the developers to faster sell the in-stock products as well	PW
		8.2	Prices of land affect to products prices	8.2.2	If the property located in a good location, and the prices were reasonably, that would be sold out.	LW, PT
				8.2.3	Buying a land parcel in a wrong location would increase the price of land	LW
				8.2.4	Expensive land prices may not affect the developers feasibility in build the project on this land unless this land is in the good location	POS, PW
				8.2.5	Price of the purchase land is a key to project succeed, because this price affect to the development cost and project cost as a whole	PW
		8.3	Buying the land in the wrong time (late bought)	8.3.1	Late buying of land affect to selling price and rate of the project	LW
				8.3.2	Timing in purchasing a land is a key factor for the marketing plan/strategy	LW, NM, PT
				8.3.3	The developer shall acquire the land earlier/faster than the competitors in order to make a best negotiation with landowners	LW, PT
				8.3.4	The faster the developers can acquire the land, the more bargaining power they have	LW

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				8.3.5	The developers could set the appropriate price of their product if they were the first hand in the market	LW
				8.3.6	This company could sell out its project as a result of coming at the first hand in the trade area	LW
		8.4	The fluctuation of land prices affected to the developers' marketing and investment strategy	8.4.1	The new face developers shall selected the appropriate time to start their projects	LW,PS
10	Poor location risk	10.1	Location is fixed, and a non-controllable factor	10.1.1	Poor location make the difficulty in selling project	BC
				10.1.2	Using knowledge in buying and developing the raw land to gain profit	BC
				10.1.3	Buying the non-accessible land to reduce and bargain the land prices	BC
				10.1.4	Buying the non-accessible land along with regulational gap to make the land profitable	BC
				10.1.5	The developers must spend more cost to improve the physical conditions of land, if some obsolescences existed	PW
		10.2	The difficulty in accessing the project site.	10.2.1	Projects may located on the narrow and winding road, which is hard to access in some circumstances.	PP
				10.2.2	The accessibility problems also included with the traffic of the vehicle and pedestrians to the project site or through the public road.	PP, NM, IB
		10.4	Infrastructures and utilities availability	10.4.1	Actually, this concept reflects nonsignificant risks to the projects, because of projects usually located in the fully provided utilities and infrastructures area.	PW
				10.4.2	Government or local office shall repsonsible to provide infrastructure and utilities for the community	PW
				10.4.3	The future mass transit system will affect positively to the real estate projects which located closed to the transit route.	IB
				10.4.4	It will provides more flexibility and punctuality to the customers if they want to do some business in BMA core area.	IB
20	Risks caused by the ample land area	20.1	the need to expand in the future.	20.1.1	The projects had been divided into phases to reduce risks of land area	BC, PC, PT, PW
				20.1.2	Negotiation with financial institutions on phasal basis	BC
				20.1.3	Purchase a huge land parcel in the suitable time (before the other competitors) to reduce risk	NM
				20.1.4	The project infrastructure or utilities must prioritised as the first phase to be completed while developing a large scale project.	PC, PW
				20.1.5	Project phasing methods also help the developers to monitor the overall project stage and using the first phase as a case study for the further phases	PT
				20.1.6	The phasing strategy also helps the developers to reduce marketing risks, by concern on phase to phase selling activities	PT, PW
				20.1.7	Construction regulations and planning laws also influenced directly to the phasing strategy	PT
				20.1.8	It is necessary to verify that the large parcel of land could be whether divided into small plots or not. the developers have to check the zoning and the land sub-divisional acts clearly	PW
				20.1.9	It is also difficult to control or monitor the project in the large land area	IB
		20.2	To expand project land area, the company must secure in the demand and customers potential.	20.2.1	The company stay in one area for a long time to make it easy when expanding.	BC
				20.2.2	The customers intended to buy this project because of these reasons.	BC
				20.2.3	Cost of project infrastructures must be concerned and took into account while developing the large scale project	PW
		20.3	A huge number of project outlets	20.3.1	The project managers shall have the proper methods to handle the large number of inventories in order to just-in-time sell to the customers	PC, POS
		20.4	The large size land area is suitable for residential projects.	20.4.1	This is appropriate for the high-ended residential projects (low rise, residential village)	PC
				20.4.2	Anyway, the commercial or retail development project may not need that such size of land area, due to the project feasibility	PC

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
19	Risks of workforces availability	19.1	Outsources contractors	19.1.1	Closed relationship of company and contractors would help in conflict reducing	BC,PP, NP, PC, PT
				19.1.2	Bidding and tendering are the method to select the qualified tenderers / contractors	LW, NP
				19.1.3	This company developed the contractors' performance measurement indicators by assessing the previous performances	LW, PT
				19.1.4	This qualification criteria also being applied to the project vendors	LW
				19.1.5	Rather than concerned on bid/tender prices, this company also considered the contractors' performance and ability to work in the limited time	LW
				19.1.6	The condition of payment/payment schedule is one of the outsources contractors/suppliers controlling methods.	LW
				19.1.7	The condition of contracts/agreements is one of the outsources contractors/suppliers controlling methods, such as Interim Payment schedule, damage and fine	PP, POS
				19.1.8	The developer shall prepare the substitutional contractors to response to the huge work load and non-conformanced contractors	
				19.1.9	Another useful contractors selection method is to assign them the on site works and observed there performances, to see whether their contracts could be renewed or terminated	PP
				19.1.10	Developers, the project managers may learn how to manage the project effectively from their contractors, outsources	SP
				19.1.11	The contractors shall manage their own workforces and responsible for this kind of risk solely	PW
		19.2	Do not build the products themselves	19.2.1	Size of the organisation is one criteria to select whether the in-house or outsources specialists	BC, SP, POS
				19.2.2	The fixed-cost of the developers may be dramatically increased if they employed their own staff, in-house workers	SP
				19.2.3	The developers shall hire the specialist to do the specific trade of their own rather than do everything by themselves	NM, PS, IB
				19.2.4	The developers shall focus on their competency	NM, PS
		19.3	Focus on the company strong points	19.3.1	Do the best for the own core business, in order to reduce risks from the trivia trade	BC, NM, PS
		19.4	The company has its own designer teams	19.4.1	Hired the outsources designer to reduce the time spend in designing the products (delay risks)	BC, NP, POS, IB
				19.4.2	In-house designers may reduce risks in design delay and conflicts between the developers and outsources designers	PP, PC
				19.4.3	The outsources designers could help in improving the quality of products design, particularly for the high-end projects	PC
		19.5	The contractors do not cause much problems to the company project manager	19.5.1	It is recommend to use more than 1 contractor to handle all project construction works, in order to distribute risks in this mode	BC, POS
				19.5.2	Using more than 1 contractors would boost the competitive situation between the sub-contractors to finish the work earlier to be rewarded	POS
				19.5.3	The developers must establish the contractors/suppliers controlling and monitoring manuals to control contractors to finish the works on time, within budget and good quality	PW
				19.5.4	The developers may have both in-house and outsource contractors in order to reduce risks in this mode	IB
		19.6	The quality of contractors/suppliers	19.1.5	Rather than concerned on bid/tender prices, this company also considered the contractors' performance and ability to work in the limited time	LW, PP, PW
				19.6.2	The non-qualified contractors/suppliers must be replaced by the qualifiers immediately to reduce the further risks	PP
				19.6.3	The work progress report in spreadsheet format help in monitoring and controlling the contractors' performances	PP
				19.6.4	Contractors shall be classified into the ranking system in order to assess their performances	PP
				19.6.5	Site inspector helps the project manager/decision –maker to assess the quality of products, contractors	PP
				19.6.6	Hiring the well-known or quality contractors (foreigned) is a key to project succession	NP
				19.6.7	The criteria to evaluate the contractor performance and quality of suppliers must be improved to suit with the real situation	PW
		19.7	This risk is a beyond-controlled risk.	19.7.1	The contractors can not manage their workers due to the number of responsible projects, and the affect of Thai festive/harvested seasons	PP, IB
				19.7.2	The non-credit contractors may have many problems so they can not complete the assigned works	PP
		19.8	The variety type of contractors: corporate or individual			PP
25	Particular risks that obstruct the project progress	25.3	Conflicts with local community	25.3.1	This problem also obstruct or delay the project progress, particularly in the construction stage.	PS
				25.3.2	The newly developed projects may enhance the better quality of life for the local community	PC, PW

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
					However, some local residents may not accept the new development, because of their own interests had been diminished	PC
				25.3.3	or burden (such as traffic jams, noise or pollution)	PC, PW
				25.3.4	These conflicts are concluded as the less priority and insignificant risks by some developers	PC
				25.3.5	The commercial or retail development have some positive impacts to the prices of surrounding land	PW
				25.3.6	However, if project is built in the agricultural area, or reservation area. That would be some protest from the local community	PW
				25.3.7	Sometimes the pollution during construction process may cause some conflicts with the local community, but this is a trivia risk	PW

COST MODE

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
3	Cost of production risks	3.1	the innovation construction techniques	3.1.1	the faster construction time	BC, POS
				3.1.2	Construction techniques Pre fabricate should reduce the construction time	BC,PC, POS, PW, IB
				3.1.3	For the real estate industry, cost of construction are varied in accordance with the building area, designs and quality of projects	NP
				3.1.4	Anyway, the innovation in construction/real estate industry is not something really new, and each developer can easily apply the existence construction innovation techniques	PC
				3.1.5	Each developer may apply the most suitable construction techniques for itself, but some of them may rely on the conventional techniques	PC, PW
				3.1.6	One key considered factor to apply new construction technologies is the "profitable" or "economic of scale"	PC, PW, IB
				3.1.7	Other limitation of the Pre fabricate techniques is that they could not reply the customers' behaviour in modifying/ extending houses	PW
				3.1.8	The Pre-fabricated technique is preferably for the lower prices housing units	PW
				3.1.9	The Thai labour cost is not so high, particularly in this industry.	PW
		3.2	Construction cost variation	3.2.1	Spare some of construction budget to response in case of construction cost variation	LW
				3.2.2	Frequently monitor the contractors' progress, using the interim payment schedule to control the contractors.	LW
				3.2.3	The project manager must control the variation of the construction work to be in accordance with the allowances	LW
				3.2.4	The construction cost must be controlled in the budget. Limited budget in a worst case scenario shall be an appropriate way to control the project budget.	LW
		3.3	Cost overrun	3.3.1	This is mostly affected by the fluctuation of construction materials and fuel prices.	TT, PS
		3.4	Pressure from the limitation of construction budgets	3.4.1	The developers can monitor on the construction budget and there might be some signs/indicators to help them assess risks	PC

TIME & SCHEDULE MODE

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
5	Project life cycle (turnover risk)	5.1	Actually real estate always not finished on time and within budget	5.1.1	Then, this would cost a property depreciation, if the property could not be sold in the expected time. The developers have to spend more cost in maintaining the property.	PT
	(to be merged with project schedule risk)			5.1.2	According to the customer's behaviour in regard to modify or extend the housing units, those caused the major problem to the developers. The developers could not control cost, schedule and quality	PW
14	Project Schedule risk	14.1	Selling period	14.1.1	Pay more interest because of more time consumption	BC
				14.1.2	Selling activities are directly affected by the long time spending in the construction processes.	PC
				14.1.3	The marketing teams have to forecast the selling volumes and returned incomes of the project in order to help the project manager to plot the appropriate project schedule	PW
		14.2	Long and tight schedule may caused risks	14.2.1	Manage the huge project by dividing into a series of sub- phase, and complete one by one.	BC, PP, IB
				14.2.2	Good construction practices, materials and well-prepared plan may help the developers to deal with the schedule tighten	PP
		14.3	Construction progress	14.3.1	Progress checklist shall be used by the project participants in order to provide the actual site progress and performances	PP
				14.3.3	Size of the project is one factor influence to the pre-construction process (i.e. Bidding/tendering)	NP
				14.3.4	Project manager may consider to cut some non productivity or trivia processes out of the project schedule in order to less time in development stages	NP

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				14.3.5	The project managers shall often compare the actual work progress with the planned schedule in order to see any constraints of the project	PW
				14.3.6	The construction managers/project managers have to calculate the pragmatism products life cyle/ and production rate in order to catch the sell project or schedule	PW
		14.4	Land acquisition/ purchasing time also affect to the project schedule	7.2.3	Land acquisition/purchasing processes also affect the project schedule, therefore the project manager had to include and concern the time spent in this regard	NP
22	Project completion risk	22.1	Project could not built on time	22.1.1	The marketing team has to clarified the actual completion date with the customers earlier or in the pre-sale period.	LW
				22.1.2	The company has informed the customers about the delay in construction in the earlier stage of project.	LW
				22.1.3	The customers also bear their own risks in regard to the project may not completed in the expected time.	PT
				22.1.4	The sterotype of Thailand real estate project is every single units had been modified from the designs, or time extend or cost overrun	PW
		22.2	The company use Just-in-time and make-to-order bases	22.2.1	The developers may build the mock-up houses/units/ to ensure the customers that the project will be completed on time	PT
				22.2.2	On the other hand, they might also build some units in the first phase of the project to ensure the completion of project	PT
				22.2.3	The customers orders or reserved records could be used as the benchmark, whether to build more or stop building and wait for the new orders	PT

QUALITY MODE

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
12	Quality of products risks	12.1	there are lower priority risks	12.1.1	to reduce risks caused by poor products quality, this company implemented IT to help in site inspecting.	BC
				12.1.2	Quality checklist have been implemented to help in site inspecting.	BC, PP
				12.1.3	The communication between participants help in reducing the products' quality risks.	BC
				12.1.4	The company concerns on products quality at all cost	BC, PW
				12.1.5	Developing the site workers' skills is a way to improve products 'quality	BC
				12.1.6	The company develops the quality assurance team to reduce the quality of products risks .	BC
				12.1.7	The developers need to improve the product's quality to appreciate more customers	PC
		12.2	The project teams are ready to change their working system	12.2.1	The developers shall renovate or redecorate the properties in order to improve the quality of services	PS
		12.3	The project teams have the responsible in monitoring the product's quality	12.3.1	Contractors reports in any interval shall be used as a tool to monitor their performances	LW
		12.4	Quality of the products is a major constraint to the project management scheme	12.4.1	The project team shall conduct some research to investigate of how to improve the products and designs quality	PW
				12.4.2	Then, the project manager can identify the standard of products quality as well as to specify the better working performance (cycle)	PW

FACILITY MANAGEMENT MODE

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
18	Property management consideration	18.1	Claimants are one of risks after project handover to customers	18.1.1	The proper system may helps this company to handle with the after sales service risks.	BC
		18.2	Some problems in the transferring of the property	18.2.1	The non credited customers would not be allowed to commit a loan with financial institutions	LW
				18.2.2	The developers shall spare some units to response to this problem and to make more profit in selling to the qualified customers.	LW
		18.3	Facility/property management	18.3.1	Developers may involve in maintaining the project's facility and amenity before hand-in the project to the facility/property managers.	PP, NM, PW

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				18.3.2	Clearly specify the requirements of customers/users and provide the appropriate services to suit with these requirements	NM
				18.3.3	In case of residential projects, the customers may seek for their own superior and privacy as much as the projects could provide.	NP, PW
				18.3.4	Cost in facility management is a major concern for the small/medium developers because of they may have more facility management cost than the larger projects, in prorata	NP
				18.3.5	Facility and amenity areas are the key necessary points to be maintained and concerned by the real estate developers (residential projects)	PT
				11.1.8	Project facility and common area could help boosting sell volume	BC, NP
		18.4	Multifunctional or special purposed buildings	18.4.1	The differences between each real estate type can be categorised by how the income/ revenue being recognised	NM, PS
				18.4.2	Real estate project can be categorised by the frequency of income/revenue being recognised	PS
				18.4.3	The multifunctional buildings shall be divided into portions in order to provide more security and privacy for the customers/users	PS, NP
				18.4.4	Multifunctional buildings are designed to serve as much as possible requirements of the customers	PS, NP
				18.4.5	The developers shall consider the size of project land as well as the feasible to develop the multifunctional buildings/projects. The related factors are such land regulations, the community profit etc.	PC
				18.4.6	Real estate products are the life-long one, they need maintenance and refurbished (if any)	PW, IB
		18.5	The old or out of fashioned buildings	18.5.1	Project managers may divided the facility management teams into a portion according to their specialty to serve each portion's customers properly	PS
		18.6	Quality of the services	18.6.1	The developers shall know their own specialty and improve that to enhance the quality of services	PS

CONSTRUCTABILTY MODE

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
25	Particular risks that obstruct the project progress	25.1	Internal risks	25.1.1	Selling volume less than expected is one source of internal risks	BC, PC
				25.1.2	Lack of product quality is one source of internal risks	BC
				25.1.3	The project team of this company could handle this kind of risk	BC
				25.1.4	Adequate fund to support project progress	BC, PW
				25.1.5	The internal risks affect less on project	BC
				25.1.8	Marketing risks can be identified as the internal risks for the developers	IB
		25.2	External risks	25.2.1	the current political turmoil	BC
				25.2.2	the current political instable situation affect to the customers potential to buy properties	BC
				25.2.3	the customers postponed plan to buy properties due to the current situation.	BC
				25.2.4	the customers panick to buy properties due to the current situation	BC
					Economic situation reflects both positive and negative impacts to the real estate and services industries	IB
				25.2.5	Political and economic instable situations	IB
				25.2.6		IB
28	Design risks	28.1	The limitation of Floor Area Ratio (FAR)	28.1.1	The limitation of regulation affect to the products design	IT
		28.2	The limitation of Open Space Ration (OSR	28.1.1	The limitation of regulation affect to the products design	TT
		28.3	Detailed designs	28.3.1	Detailed designs could be revised to suit with the customer requireqments and reduce conflict with suppliers and contractors.	LW, NP
				28.3.2	The sustainable design concepts could promote the property to the public attractions.	SP, PS
				28.3.3	Anyway, one key factor to consider the approprateness of sustainable design is "profitable" or "economy of scale"	PC
				28.3.4	Detailed design of property could be adjusted or amended to suit with the real requirements of customers, as well as the current marketing situation	PT, PW, IB
				28.3.5	Improvement of detailed designs also enhance the quality of products	PT
				28.3.6	The detailed design of the products had been affected by the location and land prices as the designs must match with the limitations of land	PW, IB

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
		28.4	Outsources designers/consultants	28.4.1	The in-house design specialists have the responsibility to control and monitor the outsource designers	IW
		28.5	The designed concepts mismatch with the customer's requirements	28.5.1	The designers shall understand the real requirement of customers and the functions of property	NM
				28.5.2	The developers shall specify the functions and purposes of their project clearly in order to reduce design risks	NM
32	Communication Risks	32.1	Conflicts with project supplier/contractors	28.3.1	Detailed designs could be revised to suit with the customer requireqments and reduce conflict with suppliers and contractors.	IW
		32.2	Conflicts with customers	32.2.1	Honestly inform the customers about the actual occurences before the customers buy the properties	PT
				32.2.2	Try anyway to solve problems with the customers, because of the developers have to keep their reputations	PT
				32.2.3	Conflicts with customers will lead to the worse risks in a future such as the company credit or image, fradulences against the related laws	PT
				11.2.5	The transparent in selling/marketing help the developers to promote themselves to the customers	PW

STEEP FACTORS : ENVIRONMENTAL RISKS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
23	Land regulation/policy contradiction	23.6	Environmental Impact Assessment approval	23.3.4	A delay in EIAR approval is one source of environmental/ regulation risk	PP, NP
				23.6.2	Large scale project is affected directly and strongly by this regulation	NP, IB
				23.6.3	Project located in some specific locations such as national reservation parks, beaches may affect by the most strictly EIAR, environmental regulation	NP, IB
				23.6.4	The developers may have some tips to avoid the EIAR acquisition	IB
10	Poor location	10.3	Site environmental aspects are necessary to be checked before construction commence	10.3.1	The possibility to flood is one criteria for the developers while conducting the site inspection	PW, IB
			(Site condition)	10.3.2	Moreover, other physical attributions including the ditches or drainages system must be clearly checked at the site inspection stage	PW, IB
				10.3.3	The thorough site inspections are the necessary tools to ensure that the land could be further developed.	PW
				10.3.4	This is to ensure that the customers will achieve the best standards of living	PW

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
29	Economic risks	29.1	Economic situation change	29.1.1	The developers shall have knowledge in the trade area and the overall situation in the macro level.	BC, LW
				29.1.2	Economic situation reflects both positive and negative impacts to the real estate and services industries.	PS
				29.1.3	Inflation or deflation rate could be implied as the economic indicator for the national or macro economic level	POS
				29.1.4	These changes are the consequence of the instable political situation	PW, IB
				29.1.5	This economic risk group affects to Thailand real estate market as a whole	IB
		29.2	Regional or global economic crisis	29.2.1	There was a global crisis in 1997, which ignited from the collapse of Thailand real estate and financial industry	PS
				29.2.2	The economic crisis also has the positive affect to the real estate project who aimed to serve the foreigners or expatriates	PS
				29.2.3	The decrement of some currency rate may encourage the foreigners to invest or buy properties.	PS
				29.2.4	On the other hand, the increment of some currency rate may postpone the foreigners potential invest or buy properties	PS
				29.2.5	Global economic crisis affects strongly to the leisure/services real estate properties	NP
		29.3	The viscosity of the financial market	29.3.1	The flow-ability of money in overall economic system was sticky.	PS
				24.3.6	The pressure from FI would be higher, in the case of unstable economic condition	PC
				29.2.2	The global or regional economic crisis has affect to the real estate development marketing and financing activities.	PS, TT
30	The increment of fuel price risk					
31	The variation of construction materials price	2.2	The risk assessment plan to suit with the variation of construction materials prices	2.2.1	The negotiation plan to deal with contractors is a plan to reduce risks	TT
				31.1.2	Cost checklists are the tools to help the project participants monitoring the variation of construction materials prices	SP
				31.1.3	Frequently monitor or check the contractor progress help in reducing the variation risks	SP
				31.1.4	In fact, that the construction materials prices always increase up	PT
		31.2	The variation of reinforcement steel prices.	31.2.1	Purchase a load of construction materials	TT
				31.2.2	His company increased the product's prices to response to the construction material prices increment	TT
				31.2.3	The quality of products also increased	TT
		31.3	This is a beyond-controlled risk	31.3.1	Current economic and political situation may affect to the fluctuation of construction materials and fuel prices.	TT
				31.3.2	This may be affected by the inflation	SP
				31.3.3	The completed before sell campaign may reduce risks from the fluctuation of construction materials price	PT

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
4	Financial Investment risks	4.1	Initial rate of return (IRR) expectation	4.1.1	IRR expectation affect to the project cash-flow	LW
				4.1.2	IRR expectation affect to the construction cost	LW
				4.1.3	IRR could be adjusted to suit with the current situation	LW
				4.1.4	The movement of IRR could be used as a tool to measure the performance of investment in real estate development projects	PC
		4.2	Return on investment (ROI) expectation	4.2.1	ROI also affect to the marketing activities in regard to sell the property in the limited time	LW
				4.2.2	ROI and IRR could be affected by various factors, land prices also one of key factors that affected to the ROI stream of any project	NP, POS
				4.2.3	The final products prices and time spending in selling influence the variation of IRR	NP, PT
				4.2.4	The ROI and IRR rate could be varied in according to the expectation of selling rate, as well as the amount of invested cost in each project	PC
		4.3	Net profit or Net Present Value (NPV) is one of financial indicator	4.3.1	If the net profit of any project indicated the higher value, that means this project has the higher probability to succeed in selling and financing	POS
				4.3.2	The appropriate discount rate could be derived by the estimation or assumptions that stated in the financial feasiblity analysis report.	IB
		4.4	Help the project managers to finalise their decisions towards investment in real estate project	1.6.11	The feasibility report also being used as the guarantor of the developers' promptness to develop the project. This actually submits to FI for the initial fund to commence projects	IB
				4.4.1	The financial feasibility of each project would be extend to be the condition of loan repayment in term of agreement	IB
21	Risks caused by the large project values	21.1	Higher values project may contained a variety of unit types of units or the mixed-used	21.1.1	Understanding of the customers' requirements help the project manager/ decision makers to specify the products types/services, including reduce risks caused by high project values	PP
				21.1.2	Some specific units/departments may be assigned to responsible for the large project value such as the financial and monetary department	POS
		21.2	The high value project may only suitable for the high class customers.	21.2.1	The larger real estate projects usually have the higher value than the small projects, but not always.	PT
				21.2.2	The larger real estate projects usually suffered from the risks in various types, because of they have to spend more time, cost, workforces and efforts in selling and approving more than the smaller projects.	PT
		21.3	The high value project may contain with a lot of outlets/units	21.3.1	The expectation of customers	PW
24	supportive fund and sources	24.1	The company bonds is a major source of fund of this project	24.1.1	The company has a potential to issue bond and sell in Stock market	BC
				24.1.2	Or the company may registered as the public company limited in stock market in order to accumulate as much sources of funds	PT
				24.1.3	However, these PCL companies have to spare some money to pay as dividend to the shareholders	PT
		24.2	Real estate projects could be fund by various sources such as equity, loan or down payment	24.2.1	Down payment from customers is a source of project funding/income.	LW, PT, POS
				24.2.2	Supportive funds from the partner/joint venture is an appropriated source of funds for the small/medium size projects.	SP, NP
				24.2.3	The leisure project may be funded by the membership fee (the specific characteristics of this trade)	NM
				24.2.4	Down payment also being used as the indicator to monitor the selling volume of the project	PC

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				24.2.5	The developers actually need the supportive funds from banks or financial institutions, in order to run the project smoothly	PW
				24.2.6	The working capital generated from the previous projects could be one source of the project supporting funds	IB
		24.3	Pressure from financial institutions	24.3.1	Project manager shall negotiated with financial institution to re-finance or reconsider the conditions of payment	BC
				24.3.2	More time spent in construction/acquisition process affect to the condition of loan/interest	TT
				24.3.3	New faced developers may be pressurised from FI because of their credits are not well-recognised	PS
				24.3.4	Interest rate is a key concerned factor when the developers seek for the supporting funds	NP, PT
				24.3.5	Developers may modify some construction techniques in order to reduce the construction time as well as the pressure from FI in regard to the interest repayment	PC
				24.3.6	The pressure from FI would be higher, in the case of unstable economic condition	PC, PT
				24.3.7	FI may force the developers to have the satisfied customers rate or down payment income before lending loan to developers	PT, IB
				24.3.8	In order to reduce the pressure from FI, developers may select to loan only some portion of total project costs	POS
				24.3.9	It is recommend to maintain the debt/equity ratio to be less than 0.5 in order to reduce risks of loan payment	IB
		24.4	Pressure from loan and mortgaging market	24.4.1	The small or medium developers have to suffer from this kind of risk more than the bigger developers	TT
				24.4.2	The customers also seek for the supporting from Financial Insitutions in terms of loand or mortgage	NP
				24.4.3	The developers may use their credit to guarantee the loan repayment capabilities of the customers	POS
				24.4.4	In order to buy a new house/property, the customer usually spend a large sum of money	PW
				24.4.5	This affects to the customers' confident to buy properties in term of loan/ mortgage pay back	IB
		24.5	Change in the payment condition would affect to the project cash-flow			SP
		24.6	Overseas loan is one financial supportive sources of the real estate project.	24.6.1	The related factor that needed to be concerned while making the overseas loan is the fluctuation of currency exchange rate	PS
				24.6.2	The fluctuation of currency exchange rate affected to the loan and debt structure directly.	PS
				24.6.3	The fluctuation of currency exchange rate affected strongly to the tourists, leisure and services industry	PS
				24.6.4	The developers may seek for the foreign shareholders in order to distribute risks, particularly the financial risks	PS
		24.7	Fluctuation of interest rates	24.7.1	The current interest loan rate is low and would be decreased in the near future, thus, that reflects only little impact to real estate industry	PT
				24.7.2	This affects to the mortgage market and customers' potential to buy property, respectively	IB
		24.8	The large sum of money required while the developers invested in real estate projects			

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
6	Risks of customers requirements (will merge with Concept 11.8)			6.1.1	Try anyway to solve problems with the customers, because of the developers have to keep their reputations	PT
9	The product prices risks	8.2	Prices of land affect to products prices	9.1.1	Higher product prices may affect to the selling rate/activities of the project	LW
				9.1.2	Land buying cost also accrued in the project development cost	NP
		9.2	Some developers are specialist in developing the high prices products.	11.1.6	Prices of the product could filter the type and affordability of ther customers	NP, PW
				9.2.2	The proper research could help the developers to assess or evaluate the affordability of customers, these may reduce the risk in this regard.	PC, PW
				11.1.7	The reasonable prices of the products may help reduce marketing risks.	BC, PT, POS, PW, IB
11	Marketing risks	9.3	The developers may be pressured by financial institutions during the development stages			
		11.1	The marketing plan/strategy management	11.1.1	The marketing team has to conduct the thoroughly marketing study/feasibility before project commencement	SP, NM, PC
				11.1.2	the poor marketing team and plan would not encourage the customers to buy the properties.	BC, PC
				11.1.10	The developers shall develop their project to suit with the real requirements of target customers in order to reduce marketing risks.	NM, PS
				11.1.11	The developers shall conduct some research to understand the real requirements of the customers	NM, PS, PW
				11.1.12	marketing plans/strategies could be modified to suit with the current situation	PS, PT, PW, IB
				11.1.14	Selling volume/rate could be used as tools to inspect the marketing risks	PC, PT
				11.1.15	Marketing risks can be caused by the mis-estimation of demand/supply of the similar properties type in the trade area.	PC
				11.1.16	Information in according to the marketing activities, demand/supply shall be analysed, collected in the database, which enable the project participants to use	PC
				11.1.17	Some selling activities/aspects such as number of visitors, booking could be used as a key to assess marketing risks	PC
				11.1.18	The marketing strategy help the developers to specify the product price, target customers, and the appropriate sell opening time	PT, PW
				11.1.19	The developers may build the mock-up houses/units/ to test the customer absorption rate or probability to sell before the project commence	POS, IB
				11.1.20	Marketing risks are hardly predicted, particularly in the instable economic/political situation	IB
				11.1.21	The marketing studies rarely provided the exact figures or exact numbers	IB

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				11.1.22	The completed marketing study package shall contain competitors analysis, deman/supply forecast, absorption rate, and customers behaviours	IB
		11.2	promotional and advertisement of products are the sub-factors of this risk	11.2.1	The property could be promoted by its designs and the functionalities	SP, PC
				11.2.2	Mouth-to-mouth is a fruitful property promotional techniques and less promotional/ advertisement cost	PS
				11.2.3	Sometimes the projects may not be communicated or advertised to the target customers	PC
				11.2.4	Do not establish the radical marketing campaigns such as 100% completed then move in, in order to reduce marketing and project completion risks	PT
				11.2.5	The transparent in selling/marketing help the developers to promote themselves to the customers	PT, PW
				11.1.4	marketing/promoting cost shall be in appropriate ratio.	BC
		11.3	the number of customers less than expected.	11.3.1	Clearly clarified the target or potential customers before project committed .	LW, NP,PC
				11.3.2	The marketing team has to conduct the marketing study to estimate the certain demand/supply of the project/customers	SP, NM , PW,IB
				11.3.3	Actually the demand/supply of this industry are difficult to predict	PT, IB
				11.3.4	Sale projection shall be conducted using the real demand of the customers in the trade area against the project timing	PW
				11.3.5	The customers prioritise the properties by their requirements, conveniences and location	PW
		11.4	The tight marketing schedule is one source of marketing risks	11.4.1	The revision of marketing plan is necessary when the selling rate/volume do not match the expectation.	LW
		11.5	The competitors in the similar trade area	11.5.1	The effective marketing plan will help the developers to deal with the competitive situation.	LW, PC
				11.5.2	The developers shall clearly define the target customers in the marketing strategy.	LW, PC, POS
				11.5.3	Real estate project shall have some strong points to promote itself as well as to provide more alternatives to customers.	LW, PS, POS, PW
				11.5.4	The substituted products are categorised as the competitors of the income-generating properties	PS
				11.5.5	Properties could be promoted by their own distinguished functions and services	PS
				11.5.6	The competitors characteristics such as numbers, the specialty, types of products, size of organisations & projects and so on shall be included in the competitors analysis.	PC, POS, PW, IB
				11.5.7	The other competition to this industry is the second-hand houses or any other substituted products such as rental or condominium	POS
				11.5.8	The customers who have less affordability may consider to buy the second-hand houses rather than buy from the projects.	POS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				11.5.9	The competitors who developed the similar kind of properties may pressurise the project manager in making decision towards marketing/selling	PW
				11.5.10	The developers may be competed by the affiliated companies. However, they have to classify the differences between their products and their cooperative partners	PW
				11.5.11	The developers shall not underrate any competitor in the similar trade area, because of they may have their own potential	IB
				11.1.9	The developers shall specify the differences between their projects and the other competitors	NM, NP
			11.6 the developers maintain their customers loyalty in products	11.6.1	The marketing plan/strategy could be adjusted or modified in the real case to suit with the current political or economic situations	PS, NP
				11.6.2	Vice versa, the developers must maintain their loyalty and reputation with customers as well	POS, PW
			11.7 Over-supplies situation in real estate business	11.7.1	This situation could be ignited by the unstable economic status	PT
				11.7.2	The developers have to modified their marketing strategy such as reduce products' prices in order to suit with the situation	PT
				11.7.3	There are some certain demand of houses in the market, even the current economic/political situations are still mess.	PW
				8.2.2	If the property located in a good location, and the prices were reasonably, that would be sold out.	PW
			11.8 Customers' criteria to select/buy properties		Quality of the products is a major constraint to the project management scheme	PW, IB
				11.1.7	The reasonable prices of the products may help reduce marketing risks.	PW
				13.3.4	The developers' brand awareness also become the criteria for selecting properties	PW
				15.1.3	Customers with a bargain power and affordability could buy properties	PW
				11.8.6	The customers usually spend a long time in making a decision to buy new properties	PW
				11.8.7	They may consider to buy a ready-made house, because they satisfied the products' quality, surrounding environment	PW
				11.8.8	House is a life-time investment for some customers, then they need the best as the developers can make.	PW, IB
				11.8.9	If the customers prefer hiring contractors to build their own house, they would suffer from risks in controlling budget, time, quality, as well as the surrounding environment	PW
				11.8.10	They did not concern only on the prices of products, but also concerned on the quality of life or quality of staying/dwelling.	PW
				11.8.11	The customers' confident is a key factor for them to make a decision towards buying a property	IB
				11.8.12	The customers could postpone their plan to buy property anytime until they find themselves ready or affordable	IB

Cat.	Category Name	Concept	Concept Name	Description Names	Desc.	Interviewee
				Lifestyles of the customers also a key factor to plan/limit the project marketing plan	11.1.13	NP, PW
		11.9	The market segmentation is considered as a source of marketing risks	Market positioning and segmentation are the fundamental activities in marketing	11.9.1	IB
				This is influenced by the competitors in the similar trade area.	11.9.2	IB
				Furthermore, this risk also caused by the instable economic and political situation	11.9.3	IB
				Prices of the product could filter the type and affordability of ther customers	11.1.6	BC, PW, IB
				The developers could adjust/modify their market segmentation to response to the real situation	11.9.5	IB
				The location constraints the developers to place their market segment	11.9.6	IB
				Wrong market positioning causes some troubles in the further development stage	11.9.7	IB
				Trade area also constraints the market positioning strategy/ plan	11.9.8	IB
13	Company's reputation risk	13.1	Company brand	Company credit in which never cheated customers or done any fraudulence also the key to project success.	13.1.1	BC, PT
				The customers' perceptions towards the developers' brand also a key to the marketing success.	13.1.1	PT, PW
				An interactive progress report shall encourage the customers to follow up the project progress.	13.2.1	LW
		13.2	Company credit in the completion of project	Try anyway to solve problems with the customers, because of the developers have to keep their reputations	32.2.2	PT
		13.3	The perceptions of customers towards the company's image	The marketing or organisational policies could whether boost or burst the company's image to the public and customers perceptions	13.3.1	NP, PW
				The thorough and thoughtful studies are necessary before the company launches any new policy which related to the company public image.	13.3.2	NP, PW
				The company could build their images by issue some customers' care policy	13.3.3	POS, PW
				The developers' brand awareness also become the criteria for selecting properties	13.3.4	PW
				The company's brand can be built by the sincerity of the developers in regard to provide more options to the customers	13.3.5	PW
				The company with the better brand awareness would take advantage in the furtive situation	13.3.6	PW
				Company brand, reputation also the factors for project success.	11.1.5	BC, PW
	The company may launch the policies, motto to enhance	13.4	their ethnic	The company policy would direct the good practices to the operational lines	13.4.1	PC, PW
				The developers shall strictly follow the construction regulations/laws in order to minimise many kinds of risks, particularly the business risk.	26.8.2	PT

STEEP FACTORS : ECONOMIC RISKS "MARKETING RISKS"

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				13.4.3	The developers shall develop their project under the limitation of laws/regulations in order to build their reputation, public image	PT

STEEP FACTORS : POLITICAL RISKS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
23	Land regulation/policy contradiction	23.1	BMA Land regulation 2005 (the most updated)	23.1.1	Foreseen the regulation and bought the land before an announcement of regulation	BC, LW
				23.1.2	This regulation also limit the design of building in BMA area such as the maximum heights, storey	TT, NP
				23.1.3	This regulation defines that each condominium project must accompanied with facility and amenity area	PT
				23.1.4	The developers must check the regulation thoroughly and clearly defined the limitations and the allowances of the regulations before the project commenced	PT, IB
				23.1.5	Violation of the rules cause some complicated risks for the developers, in case of the construction may not be approved and sell	PT, IB
				23.1.6	Some are of BMA had been announced as green area, permitted to develop many kinds of real estate project, only developed as detached houses with 400 sqm Land area	POS, IB
				23.1.7	Land regulation is a first priority attribution to be checked and verified before project commenced, in order to validate the limitation and allowance of the related regulations	PW, IB
				23.1.8	The violation of regulations cause deadly affects to the small or medium developers such as cause them bankruptcy.	IB
		23.2	Construction supervisor act	23.2.1	An approval of the relevant authorities affect strongly to the project progress	LW
				23.2.2	Red-tape characteristics of the relevant authorities affected to the approval of the construction processes.	LW, PP
				23.2.3	The justification of Thai construction laws are the subjective issues as there are no standards of justification at this moment.	LW
		23.3	Local regulations	23.3.1	Sometime project may be located closed to the natural/man-made obstructions.	PP
				23.3.2	Negotiations with the related authorities may help the project manager to reduce risks from the contradictions between project plan and local regulations	PP
				23.3.3	The project teams shall prepare the necessary project documents and the site to be ready for the un-expected inspections	PP
				23.3.4	A delay in EIAR approval is one source of environmental/ regulation risk	PP, NP
				23.3.5	The land subdivisional act had the strong influence the division of land parcel and the design of facilities, and project lay out	PW
				23.3.6	There are several hidden-agenda issues in Thailand land regulational system, thus the developers must check and verify everything carefully before commence the projects	IB
				23.3.7	Local regulations are necessarily checked before start the construction, in order to check the limitation and allowance of these rules	IB
		23.4	The delay in approving for construction/development process	24.3.2	More time spent in construction/acquisition process affect to the condition of loan/interest	PW
				23.4.2	Delay by this regard also affect to the customers' confident and potential to buy properties	TT
				23.4.3	Delay in this regard also react to the developers' overall construction processes, including construction budget, income stream etc.	IB
		23.5	Government policy has a strong impact on the real estate development industry	23.5.1	The government policy may have a non-direct impact to the project, but help to promote the project to the public.	NM
				23.5.2	For some industries like insurances, banking etc. The government policy also affects to the risk managerial activities/strategies of these companies	SP
				23.5.3	There is no current enforced law/regulations that mandate the developers to have the risk management/assessment plan	SP
				23.5.4	Thai government terminated the real estate industry tax holiday campaign, this would affect to developers and customers strongly	POS, PW, IB
				23.5.5	The termination of tax holiday policy will enable more tax burden to developers in case of they have to respond to the transfer tax solely	POS, IB
				23.5.6	Foreseen the government policy and adjust the marketing strategy, promotional plan to response to the change of government policy	IB
		23.7	Other related regulation	23.7.1	Residential project juristic person act has clearly specified the duty of juristic person and the developers	IB
				23.7.2	This juristic person act affect the resident in term of sharing facility/amenity and common area	IB

STEEP FACTORS : POLITICAL RISKS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				23.7.3	The developers have a duty to set up the juristic person to handle the project after every units transferred to the customers, according to JP act 2000	IB
33	Political risks	33.1	Political turmoil	33.1.1	The political situation portray the major impact to the developers' marketing plan/strategy	SP, PT
				33.1.2	The current political situation might pause the financial institutions to lend a loan for new-faced developers, particularly in the riot area	PS
				33.1.3	Foreigners investors or tourists are panicking in Thailand political situation and may terminate their plan to invest or visit Thailand.	PS
				33.1.4	Real estate projects which aimed to serve the local people may have a less impact than the projects that aimed to serve the foreigner or expatriates	PS
				33.1.5	Some investors/developers may avoid the political risks by investing in the other countries	PS
				33.1.6	The instable political situation affects strongly to the leisure/services real estate properties	NP
				33.1.7	The instable political situation also affects strongly to the future reservation/booking volumes of the leisure/hotel projects	NP
				33.1.8	Leisure/hotel project is different from the other type of project in term of revenue receiving and selling activities	NP
				33.1.9	The protestant group/mob may be the obstruction for the project accessiblity/ construction process / infrastructures and utilities	NP, PW
				33.1.10	The protestant group/mob also affect to the real estate rental market.	NP
				33.1.11	Coup etat or political revolution is one of key factor in this political risks mode	PT
				33.1.12	These affect to the customers' confident to buy property and the developers' selling rate	PW
				33.1.13	The government have to issue the anti-terrorist or anti-mob campaign to handle the political turmoil	PW
		33.2	Beyond forecast and hard to predict	33.2.1	The political situation affect to the customers' potential to buy properties.	SP, PT, POS

THE CURRENT RISK ASSESSMENT PRACTICES

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
1	Current risk assessment practices	1.1	Financial risk assessment tools	1.1.1	Discount rate as one of financial risk assessment tools	BC
				1.1.2	Risk committee	BC
				1.1.3	avoid the investment if less ROI	BC
				1.1.4	Company financial statement such as Profit/loss, cash-flow could be used as tools to assess the financial risks	SP
				1.1.5	For the leisure or hotel projects, the reservation records could be used as tool to assess financial risks	NP
				1.1.6	Due to the characteristics of real estate projects, the developers always focus on financial risks especially, as well as develop many tools to assess financial risks	PW
		1.2	Experience is one of current risk assessment tool	1.2.1	Using information form 2nd data to support decision making towards risks.	BC
				1.2.2	Using the experience in the previous/current project as a benchmark for the future project	TT,NM, IB
				1.2.3	Conduct the simulations or using the information from the previous project to assess risks in the current project.	NM
				1.2.4	Using experience alongside with site inspections to inspect the physical aspects of the land being purchased	PW
		1.3	The difference in each company risk assessment models	1.3.1	Some company frequently assess risks, particularly the new developed projects.	LW
				1.3.2	Some company on the other hand, may use the meeting to solve the problems and risks in the project	PP
				1.3.3	Some company using the panel discussion to solve the risks occurred in the projects	PP, PT
				1.3.4	The project monthly reports which indicated progress, problems on site is one of the risk identify tool.	PP
				1.3.5	Some company may merge the risk assessment processes with the risk prevention/control processes	SP
				1.3.6	Risk assessment techniques shall be easy to understand and communication with every project participants	SP
				1.3.7	Conduct the self-research or survey to find out as much as possible information to support decision makings	NM
				1.3.8	Some developers applied the theoretical basic of risk is consequence against frequency to development the risk assessment tools	PT
				1.3.9	That consequence against frequency theory of risks enable some developers to establish the risk matrix to assess risks in their projects	PT
				1.3.10	Some developers may employ the self-made programme to assess risks in real estate projects	POS
		1.4	Lack of systematic risk assessment or management techniques	1.4.1	The spreadsheet applications (Ms Excel) has been applying as the tool to present and calculate risks	TT, PP
				1.4.2	The current systematic risk assessment models are full of mathematical/statiscal figures that note encourage the practitioners to use in the real project case	PP
				1.4.3	The project managers may have no knowledge in the systematic risk assessment models/techniques	NM
				1.4.4	There are some individual reasons that obstruct the decision-makers to learn the systematic risk assessment models/ techniques	NM, PS
				1.4.5	The developers do not have the especially made programme for assessing risks, but the programme is used for evaluating the project feasibility instead	POS
		1.5	The panel discussion to analyse risks	1.5.1	This method is appropriate because it provide the concrete and tangible outputs including the suitable direction for the project participants	PP
		1.6	Project feasibility analysis	1.6.1	Feasibility analysis shall help the decision makers to identify risks in their project as well as indicate the appropriate project plan.	PP,NM,PC, IB

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				1.6.2	The completed feasibility study package shall include the marketing studies, customers behaviours and competitors in the trade area.	PP, NP, PW
				1.6.3	If the results of feasibility analysis are trustworthy. Then these results may distributed to the design and construction teams to start their works.	PP, IB
				1.6.4	Data used in the feasibility analysis could be obtained by the projects database	PC
				1.6.5	Secondary data could be also used in the project feasibility analysis, but it need to be clearly understood and confirmed before applying.	PC
				1.6.6	The data used in feasibility analysis must be rechecked in order to clarify the precision of data	PC
				1.6.7	Theoretically, feasibility analysis shall be included with physical, marketing and financial study	PC, IB
				1.6.8	The actual project may be distorted from the expectations stated in the feasibility analysis reports, but FE is a theoretical safeguard for the developers to do before project comments	PC
				26.3.1	The sensitivity analysis that included 3 options from worst to most optimistic is a tool for ad-hoc risk management plan	TT, PC
				1.6.9	Moreover, the completed feasibility analysis also help the developers to monitor their own workforce, project schedules, materials schedules including any other development issues.	PC
				1.6.10	Feasibility analysis help the decision makers to specify the target customers, customers potential and affordability	POS
				1.6.11	The feasibility report also being used as the guarantor of the developers' promptness to develop the project. This actually submits to FI for the initial fund to commence projects.	PW, IB
				1.6.12	The external factors which are economic, social and political situations shall be considered in the feasibility analysis package.	IB
				1.6.13	Systematical feasibility analysis could help in reducing the consequences of non-controllable risks in real estate industry	IB
				1.6.14	The paramount aim of feasibility analysis is to identify whether the project shall be continued, or terminated before the construction stage begin	IB
				1.6.15	Marketing aspects shall be paid more attention while the developers conduct the feasibility analysis	IB
		1.7	Using the intuition to assess risks	1.7.1	However, he/she must use the reliable information and working experiences alongside with the intuition to assess risks.	PS
				1.7.2	The decision making towards risks shall be equipped with the decision-makers clear vision of the current situation/context	PC
2	Preliminary Risk assessment	2.1	Pre-feasibility analysis	2.1.1	Initial gross profit as one of pre-feasibility analysis	BC
				2.1.2	land price could estimate the amount of return	BC
				2.1.3	land plot adjustment	BC
				2.1.4	Pre-feasibility analysis help the decision maker to understand the overall market situation, the trade area to whether invest in the project or not	NP, IB
				2.1.5	Some developers may conduct preliminary risk assessments by survey their own competence, capital and marketing	NP
				2.1.6	Pre-feasibility analysis may take a shorter time and lower cost, but it provides some useful initial information for the developers before project commence	IB
				2.1.7	Raw data such as construction cost (per unit), condition of time and contracts etc., are essential for conducting the pre-feasibility analysis	IB
				2.1.8	It helps the developers to identify risks, and provides some information to set up the contingency plan	IB
		2.2	The risk assessment plan to suit with the variation of construction materials prices	2.2.1	The negotiation plan to deal with contractors is a plan to reduce risks	TT

THE IDEAL RISK ASSESSMENT METHODS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
16	The new risk assessment model	16.1	This model will especially help the newcomers in this industry	16.1.1	The sources of information to develop this model are such financial, land values, land area	
		16.2	The experience of the practitiooners could not be transferred to the newcomers properly.	16.2.1	The intuition of the decision makers could not be transferred to the next generation and not transferrable	BC, PS
		16.3	The new model will help newcomers to focus on the higher impact risks in the real estate industry	16.3.1	The model programmer shall have the solid background or knowledge in Thailand real estate industry nature and contexts	TT
		16.4	The formal risk assessment techniques	16.4.1	Mathematical figures/variables could be used alongside with the subjective judgement of the decision makers in order to justify the priority of risk's consequences and affect to project's progress.	LW
				16.4.2	ANP and AHP are sharing the same principles in regard to compare the weighted criteria against the assumed alternatives.	LW
		16.5	Every new projects shall use the risk assessment model to assess risk before project commenced	16.5.1	The model shall be flexible enough to use whether, in the specific or generally used	TT, PT
				16.5.2	Risks in the real estate projects shall be assessed frequently at every critical stages of projects, for example, the construction stage	PW
		16.6	Suitability for the small or medium size developers	16.6.1	It is more flexible to implement the novel risk assessment models in SME according to the flexibility of the organization.	SP
				16.6.2	Some developer may avoid using the risk assessment applications due to the size and type of projects. It may not feasible to purchase expensive software for risk assessing only	NP
17	The idealistic risk assessment models	17.1	The reliable information could be used for the ideal model	17.1.1	Model shall help the decision-makers to plot the project layout	BC
				17.1.2	Model shall help the feasibility analysis of the plotted layout.	BC
				17.1.3	Model shall help in planning the number of outlets	BC
				17.1.4	Model shall help in planning the type of products	BC
				17.1.5	Model shall help in analysing the needs of customers and demand/supply	BC
				17.1.6	Model shall help in analysing the customers' affordability	BC
				17.1.7	Information of the land, acquisition, construction cost shall be concerned in this new RAM	TT, PT
				17.1.8	Information of the financial cost or necessary financial ratio shall be indeed included in this new RAM	TT
				17.1.9	The condition and requirement of construction regulation shall be featured in this RAM.	TT
				17.1.10	Some new regulations shall be concerned while developing the RAM	TT
				17.1.11	The information obtained to develop this model shall be in-depth investigated information	PT
		17.2	Model shall be more flexible	17.2.1	The model shall be fast in calculating in order to provide the real-time information to the users.	PP,PS,PC, PT, POS, IB
				17.2.2	This shall be used in every computer machines, in every operational systems	POS
				17.2.3	This model should provide more flexibility in data collecting and analyse	POS, IB
		17.3	Model shall be simple.	17.3.1	The ideal risk assessment model shall provide the easy-to-understand figures/graphic in order to interpret by every participants.	PP,SP,PS
				17.3.2	This model shall be simply as the programme that the developers familiar with such as MS Excel	POS
		17.4	Model shall be practical in using in the real business	17.4.1	The accuracy of the collected data is a criteria to justify the model's practicable	PP
				17.4.2	The ideal risk assessment model shall equipped with simply as possible methods	PS
				17.4.3	The model shall provide the up-to-date information, which in necessary for the decision makers	PC, PT
				17.4.4	The reliability of model shall be validated before committed to use in the real business case	PT
				17.4.5	The model shall be linked with the database or feasibility analysis programmes in order to provide more reliable information of calculation	PT

THE IDEAL RISK ASSESSMENT METHODS

Cat.	Category Name	Concept	Concept Name	Desc.	Description Names	Interviewee
				17.4.6	In order to make this model practical, it should be tested in the real business case before the official launches	POS
				17.4.7	The current risk assessment software caused some troubles to the developers/ users, because of the complicacy and the difficulty to understand and use	POS
				17.4.8	The easy programmes like MS Excel also have some weak points such as they could not link with the database and sources of information and could not be compared with previous project	POS
				17.4.9	MS Excel also used for one specific project, could not be applied for other type (One file per one project)	POS
	17.5 Model shall be equipped with the reliable risk assessment criteria			17.5.1	The criteria shall be modified to suit with the current real estate business context	PP, PC
				17.5.2	The criteria shall be easy to understand and avoid the confusions in wording or language used	PP
				17.5.3	Risk assessment criteria shall cover on major risks that occurred in the real business case.	PP, PC
				17.5.4	The criteria could be then developed for the other purposes such as for filtering the customers	PC
				17.5.5	In order to develop the assessment criteria, the researcher shall have some knowledge in real estate development and shall prioritise the important of each factor/criterion	PC
				17.5.6	The feasible of project shall be significant consider while developing the risk assessment criteria	PC, PT
				17.5.7	The assessment criteria must be practically use in the actual real estate business	PC
				17.5.8	Some trivia factors such as the cultural diversification, religion background may be attached into the risk assessment criteria	PC
				17.5.9	The related regulations shall be included in the risk assessment criteria to be developed as the risk assessment model in the future	PT
		17.6 Hierarchy Process (AHP)	Application of Analytic Network Process (ANP) or Analytical	16.4.2	ANP and AHP are sharing the same principles in regard to compare the weighted criteria against the assumed alternatives.	PC
				17.6.2	ANP and AHP are quite new in Thailand real estate business, then the developers who interested in these models shall be provided with more knowledge and information.	PC, IB
				17.6.3	The developers may less their confidents in applying ANP & AHP to use in the real project cases (i.e.. the precise of data, how complicated of these models, the attributions of model), including the complexity of the model	PC, IB
				17.6.4	ANP and AHP may not be use properly in case of the developers had no other alternative choice of development	PC
				17.6.5	In some situation, particularly the variation of land purchasing cost, that forces the developers to consider for only one choice of development. They cannot develop the other type of real estate project in the same land parcel	PC
				17.6.6	The alternatives of development schemes are depend on the constraints and conditions of each developer	PC
				17.6.7	Some developers may not need any kind of new risk assessment programme because of they might have the practical tools in hand	POS
				17.6.8	These ANP and AHP are being expected to help the Thai developers assess risks in their projects	IB