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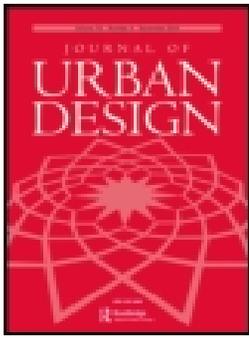
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Consideration of human centred emotional design and cultural strategy in urban regeneration in China

Fang Bin Guo ^a, Emma Roberts^b, Xiaochun Zhan^a and Kevin Johnston^a

^aFaculty of Engineering and Technology, Liverpool John Moores University, Liverpool, UK; ^bFaculty of Arts, Professional and Social Studies, Liverpool John Moores University, Liverpool, UK

ABSTRACT

Many renovations of former industrial sites in China have failed to respond to the different contexts of location within their design. Resulting from an international funded research project, this paper considers Human-Centred Emotional Design and cultural strategy as urban renovation tools that can attract capital, mark the city as a distinctive brand and encourage interaction and sensual engagement from citizens. This paper pinpoints the project's initial discoveries and captures a range of personal narratives reflecting the real experiences of Chinese people. The findings unlock potential opportunities for culturally coherent regeneration strategies.

Introduction

Rapid development in China's economy has led the country from factor-driven and investment-driven phases into the innovation-driven and wealth-creation stages of economy (Porter 1998). In seeking new drivers of growth, China has switched from a model of expansion to one of revitalizing its urban areas. Post-industrial city landscapes are being redeveloped in the struggle for economic recovery and advantage in national and international markets. Most aged factories and manufacturers are in city centres and are supplied with suitable public transportation, service facilities and plenty of consumers. Relocation of these industries to more modern situations elsewhere has resulted in an increasing demand for renovation projects of their former sites. Therefore, restructuring post-industrial areas has great potential to improve the city's image and provide better public service.

Seeking new modalities for economic growth is a topic that is discussed constantly in the East and the West amongst industries, academics, and government bodies. In order to achieve the highest sustainable economic growth, raise levels of employment and raise standards of living, regions in Europe have undergone industrial transformations from the 1980's onwards. For example, Canary Wharf in London has altered from being derelict docklands to an important international financial centre and is named as one of the landmark regenerations 'Prestige Projects' by Loftman and Nevin (1995, 303) and Bilbao has witnessed 'the Bilbao effect' due to the siting of the Guggenheim Museum Bilbao in the city as a conscious act of urban regeneration (González 2010, 1397).

CONTACT Fang Bin Guo  f.b.guo@ljmu.ac.uk

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Bearing in mind these and other valuable precedents, locations such as Beijing, Shenyang, Dalian, and Wushan in China have been the focus of this research project to ascertain if similar successful urban regenerations are possible. These places offer particular histories, social demographics, economic characteristics, and cultural identities that afford distinctive opportunities for regeneration through a diversity of activities involving the creative economy. Therefore, the conclusion of the research is expected to benefit a broad scope of beneficiaries who may include government bodies, universities, local residents, and further may extend to artists, designers, researchers and the general public. However, duplicating the blueprint successful European model of redevelopment for regeneration of post-industrial sites in these Chinese cities is ill-advised. Such a tactic fails to adapt and respond to the different context-based considerations of each location. Previous imitative urban renewal projects have focused heavily on the commercial and practical aspects of implementation and creative practice, lacking consideration of local trading histories, cultural heritage, and the social narratives, and therefore limit the delivery effect of regeneration strategies. Even though factories and other industrial sites are being decommissioned, many of these areas live on today in the form of cultural heritage and memory (Oevermann et al. 2015). People have begun to realize the value of industrial buildings (Swensen and Skrede 2018), and perceive that industrial heritage is the major link between sustainability and urban regeneration (Walljes and Ball 1997). The unique architectural style of industrial zones demonstrates an aesthetic and a culture (Berg 2017) which also provides usable space for new activities, supporting sustainable local development and regeneration processes (Ferretti and Degioanni 2017). In view of its social, historical, cultural, and technological importance, industrial heritage can be seen as a catalyst for future urban regeneration, and this is the approach being advised for the three case study cities in China (Martinović and Ifko 2018).

Human-Centred Design (HCD) is an ideal approach when generating concepts for human-centred opportunities. Norman (2005) stresses the importance of creating fun and pleasurable products instead of those that are dull and dreary. He confirms that products should evoke an emotion when the user is interacting with it. This is also applied to urban and architectural design. A good design should address three levels: visceral, behaviour and reflection. This concept can be used as a tool to better connect with the people for whom it is being designed. Visceral design concerns itself with the appearances, aesthetic form of buildings, comfortable temperature, light, and size of a space. Behavioural design has to do with the pleasure and effectiveness of use, the convenient functionality and enjoyable experience. Finally, reflective design considers the psychological satisfaction of people: if the place or environment appeals to their self-image and/or to their pride. Reflective architectural and environmental design incorporates the symbolic meaning of the shape, local characteristics, cultural significance, and historical heritage. Architectural space not only presents the form of entity, but also unique emotional significance. Consequently, in order to make people experience the best sense of living, designers should translate the emotional needs of users into architectural language and reflect these in the creation of space (Zheng 2019).

Therefore, this paper outlines the nature of an international funded research project and pinpoints the initial discoveries. Location-based focus groups and questionnaire surveys have formed the basis of the studies and captured a range of personal narratives of the experience of people who are living and working in Chinese cities. Focus groups of design practitioners supply insights from designers and academic researchers and educators: the individuals who are forging the changes. Questionnaire surveys to a more general group of participants

provided the researchers with a deeper understanding of culturally held values, social histories, attitudes towards regeneration, and insights into urban characteristics that informs how an understanding of how place and identity may unlock potential opportunities for culturally coherent regeneration strategies.

Literature review

In responding to the thematic areas of design and heritage this research considers the application of the Human-Centred Emotional Design method to achieve socially inclusive insights that will inform critical understanding of identity and cultural values within urban regeneration strategies. Approaches to urban renewal can then build from a deeper understanding of the social and cultural capital of a region, city or place, affording the opportunity for future 'designed' interventions to contribute to and enhance existing models of social value.

The cultural importance of heritage in urban regeneration

'City regeneration' refers to the strategy for urban revival within declining aged industrial areas in Western countries after the transformation of the global industrial chain. In order to achieve the highest sustainable economic growth, employment rate and rising standard of living, regions in Europe have undergone industrial transformations from the 1960s. Major industries have either become redundant or moved abroad, which led to a development potential for changing the character of former industrial sites from derelict, redundant areas to residential, commercial or cultural locations (Swensen and Skrede 2018). The creative industries have become increasingly important in stimulating economic growth. Advocators agree that attracting the 'Creative Class' is critical, as 'capitalist development today has moved to a new distinctive phase, in which the driving force of the economy is not simply technological or organizational, but human' (Vanolo 2008, 370).

Culture-led urban regeneration is often viewed as a panacea for the problems of cities. Politicians internationally consider creativity as the 'magic bullet' (Hall 2000, 640) for economic development, which provides new jobs with few or no investments from municipal budgets (Zielke and Waibel 2014). Cultural policy has become a kind of 'new orthodoxy' for cities to enhance competitiveness (Miles and Paddison 2005, 833) and cultural venues can be used as a form of 'magnet' to attract new functions to areas under development (Hospers 2002, 398). Industrial heritage is usually defined as the physical remains of former industrial sites and their preservation or reuse, especially those tangible remains of industry, i.e., buildings, infrastructure, and landscapes (Pirke 2010). Focusing on the cultural and heritage value of the industrial past, industrial culture has been identified in numerous European Union strategies as an important initiator of change, such as the European Parliament DG IP 2013 (Harfst, Pizzera, and Simic 2016). This is mainly in relation to the tourism sector, but also in the context of creating a joint European identity (Soyez 2006). Various scientific articles prove this relation, having observed a trend by towns and cities to 'rediscover' their industrial heritage (Fleiss and Strelow 2008) despite the, often underestimated, value of industrial heritage as a tourism product.

The concept of cultural heritage represents different things to different groups of scholars and to the public interested in reclaiming traditions – and landscapes – presented as part of shared, remembered pasts. Many even believe that the 'whole' city is our

'heritage', regardless of its size or history- old or new. Cultural landscapes provide us with a sense of place and demonstrates our relationship with the land over time. They are special places that contain aspects of our origin and development through their forms, features, and history of use (Loures 2008, 687).

Successful examples of urban regeneration in Europe, such as Ruhr region in Germany and Liverpool in the UK, can provide valuable paradigms for city transformations around the world (Figure 1). These projects act as a vehicle for understanding how local cultural heritage and economic histories have informed regeneration. The Ruhr was formerly Germany's largest traditional industrial zone and was well-known for its heavy industry. Historically, the Ruhr contributed 40% of industrial output to the country and was known as the 'heart of German industry'. However, during the decline of many traditional heavy industries through the mid- to late- twentieth century, abandoned industrial buildings have been repurposed to fulfil new roles as homes for museums, theatres, and office space for creative businesses (Chmielewska and Otto 2013, 32). This reimagining of the Ruhr's post-industrial sites has made it one of Europe's most densely populated areas and one of its most fashionable and cultural places (Taylor 2015). Similarly, Liverpool grew to greatness in the nineteenth century when the port thrived, carrying to the New World the manufactured goods of Lancashire and the Midlands. Having endured many years of economic hardship through industrial decline in the mid- to late- twentieth century, today, the city has invested billions of pounds in regeneration projects. Liverpool's Albert Dock areas is now home to bars and shops; its museums and galleries are nationally recognized, and its architecture forms a UNESCO World Heritage Site. This fuels the Liverpool economy and has made the city highly attractive to entrepreneurs, to creative industry sector businesses and social innovation projects (Hughes 1999).

Both the developments in the Ruhr and in Liverpool have also received criticism. For example, workers employed on the Albert Dock regeneration were often brought in from outside of the region, thereby not improving opportunities for locals, (Avery 2007), and it has suffered from 'the removal of traditional working and living waterfront practices: the "working waterfront"' (Jones 2007, 147). In the Ruhr, in many cases, 'community projects have not been encouraged' (Percy 2003, 163) leading to an overemphasis on state-led activities and state control. Nevertheless, there are multiple instances in both examples of good practice and innovation which can provide exemplars to curious Chinese industrial cities.

The industrial restructuring pressures facing China are similar to the restructuring pressures, impacts and emerging renewal agendas that the West has faced. Often, over-commercialized regeneration projects in China pursue economic interests blindly and cater to market demand, which results in over-development and high capacity, so as to produce significant pressure on to the transportation and infrastructure of cities. Ignoring heritage protection and cultural



Figure 1. The Ruhr Region in Germany (left & middle) and Liverpool in the UK (right).

value is a common phenomenon. In addition, current design solutions, often focusing heavily on commercial and business requirements, do not value user experience and expectation. For example, Dalian Wisdom Park in China: designs lack the renovation of public facilities and greening of the environment, and thereby do not provide opportunity for the user to interact with building, space, and environment. Therefore, learning from successful Western design solutions and experiences may help China in reducing risk and minimizing mistakes during the transformation process.

Human-centred emotional design

The role of design has shifted from the technology-driven stage with an emphasis on functions and forms to the human-centred design-driven phase in recent decades. Although these utilitarian designs work effectively, they however might not please people emotionally. Contemporary design values not only the function and form of a product, a system, or an environment, but the shaping of the nature of environments in which humans are moving and operating, and further creates the basis that enables communication and interaction (Philips 2019). As a problem-solving method that concerns human needs, the design that applies Human Factors Theory considers how humans behave physically and psychologically in relation to environments, products, or services.

Caroline Roberts suggests that humans are animate beings with feelings and emotions and that factoring this into design will lift any project beyond a place or space in which humans merely function (Callahan 2019). Employing Human-Centred Emotional Design (HCED) as a concept in user experience can create long-lasting, delightful user experiences through emotions and can also generate a sense of security and safety. Delight creates desire; employing the element of delight in design will enable a product to become more likable to its audience. The HCED articulates the positive emotion that people experience after seeing a product (Saraswat 2019). In fact, all design produces an emotion. People experience an emotional reaction to the environment such as like or dislike, elation, joy, frustration. In industrial design, for example, interaction with any product produces an experience and leads to an emotion from the consumer, regardless of whether it is good or bad, pleasing, or frustrating (Philips 2019).

HCED is characterized as a multi-stage problem-solving process that anticipates and accommodates the needs and responses of people in their interactions with products or services. HCED concerns all the people who are involved in the process, taking account of the history, culture, beliefs, and environment of the community (Norman 2019). As mentioned previously, Norman divided HCED into three levels: the visceral, behavioural, and reflective (Choi and Kim 2016).

The 'visceral level' of design refers to the first impression of a design: the physical appearances of products such as material, structure, colour, form, and how people perceive the product and how it makes the user feel (Norman 2005). This is an immediate, deep-level reaction to a product or system; thus, the visceral level of design is critical, as people never obtain a second chance at making a first impression (Philips 2019). Research indicates that aesthetics affects perceived usability. Attractive interfaces are perceived to be easier to use, which means that the well designed and good-looking product is more enjoyable and can lead to a degree of customer satisfaction. People will forgive minor frustrations when encountering imperfections with those products (Philips 2019). In

architectural or environmental design, the structure, dimension, and form of a space are the elements to create the environment aesthetically; well-designed colour, light and temperature influence the feelings of people. This is particularly the case in the transformation of factories: taking account of abundant buildings and facilities with industrial heritage features and cultural or historical symbols as valuable elements, good visceral-level HCED is likely to attract people, thereby generating an intrinsic motivation to interact with the environment created.

The 'behavioural level' refers to the experience of the product in use, focusing on the function and operation or interaction mode of products and services. The behavioural level emphasizes the individual's physical or psychological characteristic, personal preference, cognitive capacity, and behavioural ability (Norman 2005). At the visceral level, people do not usually have 'interactive relationships' with products, systems, or environments, but at the behavioural phase, people expect to communicate, interact, and form an emotional relationship with products and/or environment (Philips 2019). Good behavioural-level design will evoke the emotion of trust in people that eventually creates the desire to use the product or space more often and to maintain it for a long period (Saraswat 2019).

A successful behavioural-level design usually results in a strong reflective phase of design. The reflective level refers to the user's reflections about a product or service, both before, during, and after use. In this phase, people still think of the product even when it is not in use. If people share and contribute to the product, this means that the designer can build a relationship with the user at an emotional level. All three levels combine to form the entire product experience; however, the reflective level is the most difficult to achieve. It is the function of the first two levels, which produce more in-depth emotions in the user's mind. The reflective level is a complex emotion intertwined with a variety of factors such as the consumer's personal consciousness, experience, and cultural background (Norman 2005). In architectural design, the reflective-level design is related to the symbolic meaning of the shape, local characteristics, cultural significance, and historical heritage.

A person's emotional memory is activated as a public timeline incorporating all sorts of rich emotional combinations. If the design expects to achieve public emotional resonance, it must be in accord with the public's collective memory. There is a delay between these levels: first it is visceral; second it is behavioural and lastly it is reflective. The three levels complement and influence each other, and each level will affect the user's psychological experience.

Given the above, HCED improves not only the aesthetics and functionality of a product, environment, or services, but offers solutions to enhance the performance of users interacting with interfaces. Research into human factors from the perspective of stakeholders of urban regeneration projects will contribute to the field of HCED expanding into architectural and urban design, consequently providing competitive solutions to distinguish the renovation solutions and outcomes in cities. Therefore, this is one aspect of the originality of this research project.

An ongoing research project in urban regeneration

A current long-term research project is being conducted currently by an international cross-disciplinary team. The project focuses on a methodological study to seek alternative strategies for sustainable urban renewal of post-industrial areas in China. An evidence-based investigatory research methodology is employed for this research. As a part of a government-funded

project, location-based focus groups specifically comprising designers and design educators were undertaken, along with a targeted questionnaire for that same group, with the addition of an online questionnaire for general stakeholders, such as business owners, local residents, customers, and interested members of the general public. A series of prepared and structured primer questions were posed to generate initial responses and to promote relaxed, natural dialogue amongst participants. The resulting discussion sought to establish recognition of the different stakeholder agendas and viewpoints that exist as perspectives among, for example, visitors, residents, and business practitioners, and in particular designers and design educators who have connections with post-industrial regenerated sites. The findings aim to establish the development of a shared understanding that respects the diversity of concerns amongst the wider constituency of voices on the research topic. Naturally, the questionnaire, and indeed the focus group questions and processes, were considered and approved by the University Ethics Committees of the universities associated with the project.

Focus groups of designers and design educators

Focus groups are now well-established as a traditional qualitative method. Although used initially in market research (Morgan 1998) they now have applications in many fields. Defined as 'a research technique that collects data through group interaction on a topic determined by the researcher,' (Morgan 1997, 6) they are a valuable way in which to elicit perceptions of experts or invested persons: a small and preselected group of people (Martin and Hanington 2013). The group discussion seeks to encourage spontaneity in expression, as it reflects natural human communication. The research method also enables the identification of the priorities of the participants, thereby enabling the essential issues to be highlighted for the researcher. This is because, 'In the group interview, people speak only when they have definite feelings about a subject and not because a question requires a response.' (Stewart and Shamdasani 1990, 19). A well-moderated focus group discussion encourages participants to share personal experience, opinions, and views in the equal, interactive, and dynamic atmosphere. In this research project, two focus group discussions were organized in Beijing and Shenyang respectively. The focus group of designers in Beijing consisted of eight senior architectural designers of national importance. In Shenyang, the focus group of design educators invited six university lecturers from Architecture Environment Design programmes. In both cases, the participants were invited to share their experiences in and knowledge of urban regeneration. They were questioned on and discussed specific architectural design and urban planning projects, with a special focus on the renovations of noted post-industrial areas. The discussions were facilitated by a moderator who was careful not to direct the conversation. Indeed, a purposeful 'non-directive, structured moderating approach' (Debus 1986, 30) was employed, as recommended by experts in arranging focus groups.

Targeted questionnaire for designers

The advantage of the focus groups results on one hand from the diversity of the insights, and on the other hand the possibility for deriving a pattern of high importance from recurring elements. However, the findings may be biased, due to limitations of participants' numbers, background, experience, time consumption, and geographical or ethnographic difference. Moreover, participants' personalities, enthusiasm and emotion may also impact on the result.

Therefore, in avoiding this weakness, and to obtain a broader and perhaps more personal, less biased insight from the design practitioners, as mentioned, a targeted and semi-structured questionnaire was also developed and distributed (Sarantakos 2005), aiming to offer greater freedom for participants when answering questions, so as to acquire a broader and greater variety of feedback. The questionnaire was available in both English and Mandarin and was provided initially to a mixed group of designers who were targeted from the architectural, environmental, product and graphic design sectors. Shortly after, it was also made available publicly for downloading from the research project website. Potential participants to the questionnaire on the website were alerted to its existence and encouraged to supply answers via the Chinese and UK social media that is linked to the research project. This targeted questionnaire attracted twenty-four sets of feedback from both the UK and China: nine from the UK, eight from Shanghai and Beijing, and seven from other Chinese cities.

An online questionnaire for general stakeholders

In seeking a quantity of interrelated subjective and objective data and gaining insights from a range of general stakeholders such as residents, visitors, municipal and civic service providers, an online questionnaire was developed and published on the project website and across social media, aimed at capturing a range of personal narratives of individuals experience of current regeneration projects offered in China. The primary statistical data provides researchers with an underpinning knowledge of current Chinese users' expectations and attitudes towards regeneration, and insights into urban characteristics that will inform urban renovation. In total, 116 sets of feedback were received from the Chinese cities of Shenyang, Dalian, Beijing, and Shanghai.

These questionnaires allowed for both quantitative and qualitative information to be gleaned. The former was gathered from the questionnaire responses in terms of facts and figures (Thomas 2003). For example, the percentage of answers to the multiple-choice question in the online questionnaire, 'What is your daily mode of transport?' was useful in indicating how likely participants were to interact with a renovated post-industrial site by walking or by public transport. Qualitative information was collated due to the free-text sections of the questionnaire which enabled respondents to elucidate their more variable values, opinions, motivations, and feelings (Auerbach and Silverstein 2003). For instance, from the responses to the question, 'Is there anything about the characteristic visual appearance of regenerated buildings that you particularly like or dislike?' researchers were able to ascertain emotional and psychological reactions to design features. The results thereby informed the researchers as to the ideal designs and aesthetic features of future regeneration of post-industrial sites and ensures that the HCED method is employed as best practice.

In terms of the questionnaires distributed to participants, in some fields there have been criticisms of this method for data gathering. In particular, concerns are raised frequently during analyses of the method over partial completion, survey fatigue, inappropriately designed questionnaires, or careless completion by respondents. (Blasius and Thiessen 2012) However, this research team had considered carefully the known methodological concerns over questionnaire distribution. The questionnaire format was employed 'only when there is no other feasible means of obtaining the data' (Phillips 1941, 531) and was prepared with much assessment and analysis in advance, so as to result in only the most appropriate range of questions which consequently lead to ease of completion for the participant.

Findings and discussions

The expectations of audiences from urban regeneration

After being polled on their desires and expectations, participants' responses were collated and assessed. It was ascertained that cultural experience and entertainment concern people as the most desirable functions of the renewal of former industrial sites, which resulted in figures of 78.45% and 48.28% respectively. However, the demand for family activities and space for small businesses were of lesser concern at 33.62% and 24.14% respectively. (Figure 2).

Preserving historical elements is ranked the most important concern at 76.72%; thereafter 74.14% of people believe that highlighting or respecting a building's original features and styles is critical. This is interesting in terms of HCED: clearly there is the desire to retain the connotations of the former purposes of the buildings. People wish to dwell on the resulting emotions and nostalgic feelings. Meanwhile, 69.83% people value functionality and convenience and 53.45% desire convenient services for the local community. Only 38.79% of respondents hope that the projects can create new jobs, which surprisingly indicates a level of altruistic or community-focused feeling and not just self-interest. (Figure 3).

Audiences' impressions of current projects

DIY studios and boutique shops (68.1%) and cultural industrial centres (65.52%) are the most popular forms of services offered in current renovation projects; thereafter are restaurants at 50.86% and conference/exhibition centres at 46.55%. Office space and children's playgrounds are less valued, which are 29.31% and 28.45% respectively (Figure 4). Again, spaces that emphasize functionality are not prioritized by users, which demonstrates the desire for HCED.

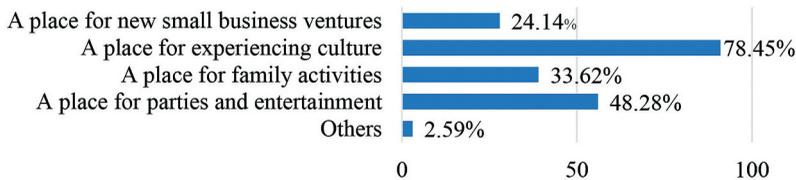


Figure 2. The ideal form of renovation expected by users.

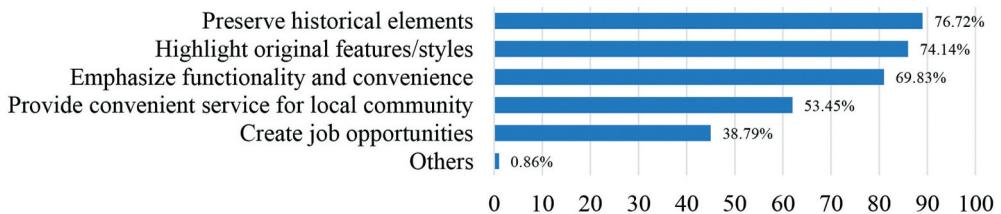


Figure 3. Expectations of renovation projects.

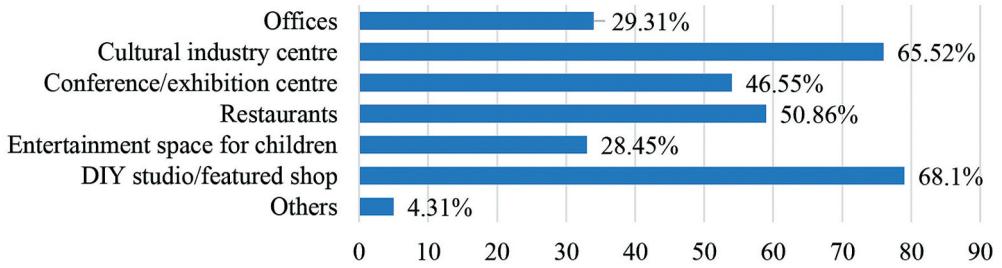


Figure 4. Services or facilities offered in renewal projects.

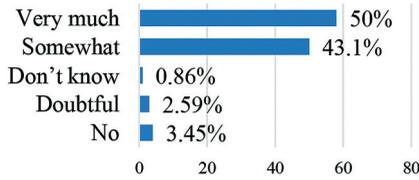


Figure 5. Enriched local tourism resources.

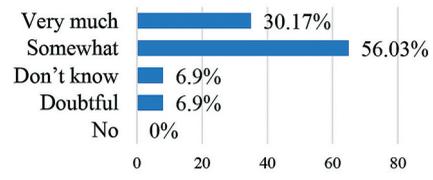


Figure 6. Stimulated local economy.

Most people approve of current renovation projects and believe that these projects enrich the local tourism offering because the spaces provide unique identity and remind users of their personal connection to the place. Indeed, 50% strongly agree and 43.1% agree respectively (Figure 5). Meanwhile, 30.17% and 56.03% of people believe that the projects significantly or slightly stimulated the local economy (Figure 6).

Compared with new development projects, people believe that renewing existing projects added extra value in terms of protecting industrial heritage (52.59%), endowing the city with special features, preserving the history (58.62%), enriching local tourism resources (48.28%), blending traditional and modern features together (53.45%) and helping with environmental protection efforts (43.1%) (Figure 7).

The results above indicate that Chinese people respect industrial heritage and cultural value in transformation of former industrial sites. Most audiences expect the redevelopment to preserve historical elements and highlight the original features and appearances of former factories, buildings, or facilities, so as to offer distinctive experience and enrich the city's tourism offering. This corresponds with findings from the literature review, which were that cultural policy and/or strategy plays a significant role in urban regeneration. In addition, people also expect renovations to offer creative industry services and they desire the opportunity of interactive activities from the new service provision. These findings clearly demonstrate a demand for HCED not only at visceral level (the appearance of design), but behavioural (the functionality and convenience of services) and, further, the reflective levels. This is a conclusion that has resulted from the research project and these are therefore the new factors that are proposed to be fundamental in the funded project.

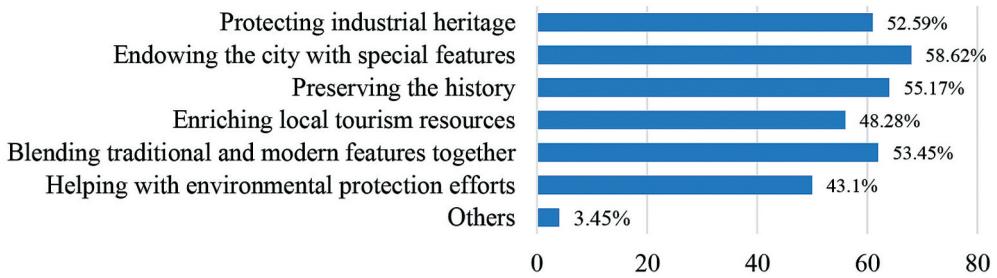


Figure 7. Renewal projects added extra value compared to new development projects.

Design practitioners' insights from renovations

A variety of topics regarding industrial heritage protection, cultural policies and the new demand for services and functions in post-industrial sites were discussed during the focus group meetings. Eight architects/designers from the Idea Latitude/Urban Planning and Design Institute, Beijing, participated in the focus group of designers on 20 December 2019, and six lecturers from a leading university in Shenyang, were invited to take part in the focus group of design educators on 29 November 2019. Additionally, design experiences, such as the applications of materials and technology, construction issues and design solutions were shared. Combining with the answers from the online questionnaire, broad feedback was acquired that enriches understanding of the practises of Chinese designers. The findings are highlighted as follows:

There is no specific policy regarding post-industrial factory renewal in China, which results in the fact that massive amounts of heritage resources have been destroyed permanently. All designers and educators expect to retain former factory components as much as possible, in particular those with architectural spatial features and retaining historical symbols, or which have elements which are valuable for social development, and those demonstrating the potential for designers to express their creativity and to apply new technology. However, old components with fewer industrial features and having safety risks that cannot be repaired should be removed. The ideas of combining technology and intelligence with historical and cultural heritage will be the future trend of urban regeneration.

Environment-friendly and ecological solutions, as well as landscaping of architecture and spatial functionalisation should be considered. New materials and technologies will be used to strengthen the foundation of old buildings and release the capability of former industrial space. In addition, applying green energies, such as solar or wind power and natural ventilation and water recycling technologies is essential, and interactive, smart, and ecological design concepts can improve the user's experience.

As mentioned, industrial heritage and cultural value are the most significant factors of renovation. However, practicality, functionality, ecology and spatial characteristics take priority when designing. Geographic features are one of the cultural factors that must be considered in design, as it enhances the image of a city in terms of the topography, climate, environment and humanity. Local industrial heritage represents historical value and meaning to users. Integrating local culture and lifestyle can attract both residents and visitors and adds meaning to the reflective level of the HCD experience. Apart from those

sites heavily polluted by poisonous chemicals, all historical buildings and facilities deserve renovation if the process is considered from different perspectives. Those with distinctive period characteristics and occupying excellent locations are precious. Components with unique structures will stimulate creative application scenarios and offer unique value.

Contemporary design is a team-based activity. When working within a multidisciplinary team, designers are sharing knowledge in the field of structural engineering, architectural design, and transportation. Following relevant law, regulations and expert advice to fully understand local culture and heritage, the design needs to combine current functions to retain the maximum continuation of local cultural heritage. The lead designer of Beijing 751 D-Park, Yonggang Wang, introduced a concept example, merging the design and cultural heritage protection by connecting roofs and walls through bridge corridors and ponds without changing their original appearance, so as to form a sharp contrast between old and new buildings (Figure 8). He also suggests that categorizing different protections and applications should be undertaken in order to enable every piece of equipment, facility and spatial layout to reflect production information, so as to indicate characteristics of the period, and to form the transformation based on cross-disciplinary evaluation (Yonggang Wang, interview with the author, 2019).

Structural dimensions, ventilation, insulation, fire suppression systems and safety are construction issues that need to be considered when restructuring former industrial sites. Different types of business have different laws and regulations. Following national standards, successful regenerated designs will improve infrastructure, create new functions, reform structural framework and the appearance of buildings. The characteristics and value of industrial space must be protected whilst complying with laws and regulations.

Compared with designs for general new projects, regeneration is based on consideration of the current conditions of sites and focuses on preservation and protection of traditional buildings and the reuse of old facilities. It is not about reconstructing after a complete destruction of the original. Instead, designers need to retain the current resource and rebuild without damaging its original appearance and respecting and valuing the history, culture and building texture so as to enhance the reflective level of HCD. The suggestion is to design with specificity, beyond general projects, to have broader impact and create extra emotional value.

All the participating design professionals believe that renovation can develop and improve the stock of the urban construction industry, upgrading current industries, achieving functional diversification and urban cultural continuation. Other advantages include resonating with local culture so as to enable the 'sense of place', preserving old industrial characteristics,



Figure 8. Beijing 751 D-Park. (Photo: Y. Wang).

releasing the environmental intrinsic sense of spatial power, and taking the opportunity to stimulate the overall improvement of the surrounding environment.

The functional difference for designers when renovating rather than building anew, is the disadvantage of transforming industrial buildings to civil use. Integrating new businesses with old industrial environments is a challenge, as poor infrastructure will lead to many uncertainties. Unsuccessful renovation may result in various hazards, for example, lack of fire escapes or weak foundations, which have an impact on users and the surrounding environment. In addition, renovation must be based on the current volume of space, otherwise it will cause waste.

Successful Western examples impact on Chinese solutions as most Chinese design professionals value positive Western experience; in particular, the attitude of Western designers to geographic location, transportation, and history. Most Chinese clients are interested in new forms of space with creative appearances and expect to retain their initial characteristics to the maximum and to add new value. Clients hope to utilize the original characteristics to the maximum and achieve environmental advantage to create a novel, practical and effective space that can form a sustained attraction. However, there are still some differences between the two cultures. Chinese investment policy and the level of attention paid to nature, culture and the system are different from the West. Chinese developers place great emphasis on commercialization, whereas those in the West value the reuse of old industrial sites and cultural continuation. In addition, renovation costs in China are higher than the cost for new developments. However, designers argue that post-industrial designs are laden with local features, therefore, their regeneration preserves public memory and forms ideal venues for cultural and sports activities. In another words, the renovation can create a new product that combines the characteristics of both industrial resources and new formats.

Discussion

Having conducted secondary and primary research into assessing the value and benefits of renovating post-industrial sites using the HCED method, this paper proposes that it is necessary to consider the meaning and implications of the results. Discussion has focused on understanding the correlation between the findings of secondary and primary research, to clarify if the resulting data collected from those focus group discussions in China support the views promoted in the secondary sources that generally have Western origins, and further if the needs and desires of participants reveal new thoughts on the possible value of HCED in the context of post-industrial sites.

The literature review assessed key established texts in the field by British, European, and American scholars. Authors on subjects such as city regeneration and sustainability focused on issues like cultural policies, marketing, and the creation of business opportunities. For example, Keating and De Frantz (2004) believe that, serving as a marketing tool in a competitive market, culture attracts visitors, evokes memories for the public, and promotes unity and co-operation and Gerkan (2004) relays how cultural policies also attract capital and investment and create new business opportunities. In fact, social and cultural values as development tools to transform the uses of post-industrial sites are seen to be an ideal option for urban regeneration. However, does this relate to the concerns of authors on the topic of HCED and the specifics of design? In fact, authors were united in their focus on the operation of the three levels of HCED,

but also in their belief that HCED strives not only to create usable and functional spaces/environment, but also generates certain emotional effects on people while they interact with the interfaces, and further acts to maintain it throughout the user journey (Philips 2019; Norman 2005, 2019). Yet, such authors writing about HCED, also highlighted the value of the method for enhancing a city's image, establishing it as a brand and attracting revenue, which corresponds with scholars who were considering urban regeneration more generally. This indicates much scope for HCED to be used as a tool in urban regeneration and that the positive emotional effects on the community and site users are stimulated by retaining industrial heritage and the traditional cultural values of the respective communities.

It is important to consider if the findings of the primary research (site visits, analyses of focus group discussions and questionnaires by both Western researchers and the Chinese participating counterparts) conflicted or corresponded with the outcomes of secondary research. Participating Chinese design practitioners all agreed that retaining industrial heritage and cultural value are essential in enabling successful renovation projects, because these valuable elements provide designers with a distinctive opportunity to express their creativity when conducting HCED. However, design issues such as providing environmentally friendly solutions and ensuring sustainability and functionality also concern most designers. Moreover, questionnaires provided to general members of the public confirmed that the users of regeneration projects, like designers, value local history, industrial heritage, and creative activities. One difference, however, arising from data from public responses is that they also expect that regenerations will create additional entertainment resources and public facilities in city transformations. Therefore, to satisfy the users, integrating the practicality, ecology and retention of cultural heritage will need to take priority when designing.

Interesting cultural differences arose when examining Western secondary sources on urban renewal strategies compared to comments made during focus groups in China. In the West, texts report that complex strategies were developed by the European Union and/or national governments for the benefit of transitioning economies. For example, the Federal Government of Germany worked closely with local Ruhr institutions during its regional regeneration. In contrast, focus group participants indicate that China lacks national policy. Instead, each city has its own ambition for renovations. Conversely, the redevelopment plans for factories impact on local city planning strategies, which reflects the cultural difference of investment policy and the level of attention paid to nature and culture. This therefore indicates why Chinese investors or developers place great emphasis on commercialization compared to Western counterparts who value the moral and symbolic aspects of the reuse of old industrial sites and cultural continuation. Learning from successful Western solutions, such as highlighting geographic location, regional history, and preserving original characteristics whilst gaining a refreshed appearance, will therefore no doubt benefit Chinese urban regeneration projects.

Conclusion

It can be concluded that industrial heritage and cultural strategy play an active role in contemporary urban regeneration; in particular, in reshaping the post-industrial landscape. As a driver of culture-led renovation, cultural heritage is defined as using the tangible remains of industry, such as buildings, infrastructure, and landscapes, to promote the renewal of the physical environment. Meanwhile, it provides also valuable elements for a designer to fulfil HCED by achieving all levels. As a powerful renovation tool, HCED generates concepts for

human-centred opportunities and takes account of the history, culture, beliefs, and environment of the community. HCED anticipates and accommodates the needs and responses of people in their interactions with the environment or services. Adopting successful approaches from the West will enhance the competitiveness of each city and avoid imitative Chinese projects. Consequently, the resulting redevelopments will enhance the images of cities, attract investment and prestige.

The primary insights into the views of many interested and invested users of regenerated post-industrial sites, including designers, tourists, residents, and business-owners, which were obtained from the two focus groups and both the targeted and online questionnaires, are thought to be reliable based on their consistency. However, it is acknowledged that there are still some limitations with methods used in this project for gathering data, even though great effort was put in place to reduce bias due to intrinsic weakness of these approaches. A potential concern with the focus groups is that these were conducted from only the two locations in China. Results might not be generalized due to the limited cases and geographical/ethnographic difference and lack of validity of population representation. Therefore, implementing extra focus groups in multiple locations will be desirable to strengthen the research outcomes. However, it has not yet been feasible to undertake a wider study due to the impact of the 2020–21 global Covid-19 pandemic on travel and communication.

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ORCID

Fang Bin Guo  <http://orcid.org/0000-0002-7442-7344>

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