



LJMU Research Online

El-Adaileh, N and Foster, S

Successful business intelligence implementation: a systematic literature review

<http://researchonline.ljmu.ac.uk/id/eprint/11367/>

Article

Citation (please note it is advisable to refer to the publisher's version if you intend to cite from this work)

El-Adaileh, N and Foster, S (2019) Successful business intelligence implementation: a systematic literature review. Journal of Work-Applied Management, 11 (2). pp. 121-132. ISSN 2205-2062

LJMU has developed **LJMU Research Online** for users to access the research output of the University more effectively. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LJMU Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain.

The version presented here may differ from the published version or from the version of the record. Please see the repository URL above for details on accessing the published version and note that access may require a subscription.

For more information please contact researchonline@ljmu.ac.uk

<http://researchonline.ljmu.ac.uk/>



Successful business intelligence implementation: a systematic literature review

Journal:	<i>Journal of Work Applied Management</i>
Manuscript ID	JWAM-09-2019-0027.R1
Manuscript Type:	Research Paper
Keywords:	Business intelligence, Critical success factor (CSF), Literature review, Implementation

1
2
3
4 **Title: Successful business intelligence implementation: a systematic literature**
5 **review**
6
7
8
9

10 **Abstract**
11

12 **Purpose:** The purpose of this paper is to present a systematic literature review to
13 determine the factors that relate to successful Business Intelligence (BI) system
14 implementation.
15
16

17 **Design/methodology/approach:** The study has a collecting of literature that
18 highlights potential references in relation to factors for system implementation in
19 relation to BI. There is the employment of 'content analysis' given that the study
20 purpose is the achievement of deep understanding of the variety of factors of
21 implementation that other researchers have previously identified.
22
23

24 **Findings:** An initial investigation of 38 empirical studies on the implementation of BI
25 led to 10 factors being compiled. Difficulties in implementation were found to exist in
26 relation to the operationalisation of large numbers of factors within organisations. The
27 implementation factors were analysed and then sorted into descending order based
28 upon their frequency of occurrence.
29
30

31 **Research limitations/implications:** The research is limited to consider BI
32 implementation factors. Moreover, Literature is collected from selected databases and
33 journals from 1998 to 2018.
34
35

36 **Practical implications:** Researchers of BI may, within the future, develop models for
37 the measurement of the implementation level of BI within industries along with the
38 sustaining of them. Moreover, work-based learning industries can benefit by adopting
39 the results of this study for the effective implementation of BI. The implementation
40 factors can be seen as key constructs upon which there may be the undertaking of
41 more statistical analyses.
42
43

44 **Originality/value:** The original output from this research can help researchers' in the
45 future in enhancing identification of studies that are relevant for the review of literature
46 for their research.
47
48

49 **Keywords:** Business intelligence, Critical success factor (CSF), Literature review,
50 Implementation
51
52

53 **Paper type:** Literature review
54
55
56
57
58
59
60

Introduction

Organisations tend to own a tremendous volume of data. However, as noted by Williams and Williams (2010), much data is poor in quality or inappropriate whether or not there has been a big investment in information technology (IT) within an organisation. business intelligence (BI) can, however, help in delivering substantial amounts of information that is useful in a manner that is accurate and timely; such systems, therefore, can enhance decision-making processes (Williams and Williams, 2010; Yeoh and Koronios, 2016). During the last decade, significant numbers of organisations of varying sizes and within a broad range of industrial sectors, from manufacturing to health services to the financial sector, have been implementing systems for BI in order to support decision-makers and help achieve improvements in the performance of organisations (Kappelman et al., 2016).

Whilst, it seems that BI has been accepted broadly and employed by many leading organisations across the world, there has been little research to examine the factors that lie behind successful implementation of BI (Yeoh and Popovič, 2016). The suggestion from within the literature is that various factors, such as strategy, a project champion, the approach of top-level managers, organization resources and change management, can have a significant impact. However, there is no consensus upon what factors in particular account for success (Yeoh and Popovič, 2016; Dooley et al., 2017; García and Pinzón, 2017; Nasab et al., 2017). In general, most studies have undertaken explorations of the issue within the developed world in countries such as the United States of America or within western Europe. As such, there is just a limited range of such studies conducted within developing countries (Acheampong and Moyaid, 2016; Bakunzibake et al., 2016; Hatta et al., 2017; Owusu et al., 2017). As such, this research has the aim of identifying, in empirical terms, which factors may have a bearing upon BI implementation through the use approaches from multiple perspectives, the study seeks to address this current gap within the knowledge and understanding of the issue. The research output has the potential of helping researchers in the future in the clearer identification of studies from the review of literature relevant to their research. Furthermore, reviewers and editors of journals require systematic reviews when examining the degree to which a submitted article has been undertaken with a review of the research available that is sufficiently inclusive. Within the sections that follow, there will be an explanation of the chosen

1
2
3 research methodology for the preparation of the compiled studies. There will be
4 searching of databases and journals through the use of key terms that have been
5 identified within a preliminary review of literature. In order to identify how important
6 each of the factors is, there will be the conducting of an analysis of frequency for the
7 factors. In doing so, there will be a critical discussion around the factors that have been
8 identified and presentation of the relationships that exist between implementation-
9 related factors and dimensions of success for BI. Lastly, this paper puts forward some
10 conclusions as well as potential implications for research in the future.
11
12
13
14
15
16
17

18 **Research methodology**

19 This research offers a thorough review of potential references in relation to factors
20 having a bearing upon the implementation of BI. Since this study has the purpose of
21 achieving an in-depth understanding of the variety of factors of implementation that
22 other researchers have identified already, the correct approach was considered to be
23 the undertaking of 'content analysis'. It was claimed by Harris and Attour (2003) that it
24 was appropriate to use the content analysis method when the observed phenomena
25 relate to communication, i.e. contact, message and statement, as opposed to physical
26 objects or behaviour. For Patton (1990), content analysis could be seen as a process
27 for the identification, coding and categorization of the primary data pattern. There was
28 the following of a systematic approach in order to select relevant publications with an
29 initial search of the literature taking place in March of 2018 through the use of 11
30 search engines/databases. As such, to ensure that every relevant article was identified
31 from the previous twenty years, i.e. from 1998 to 2018, the following search
32 engines/databases were utilised: Elsevier's, ProQuest, Emerald Insight, EBSCO host,
33 SwtsWise, Taylor & Francis, JSTOR, Ingenta Connect, Wiley Interscience, Google
34 Scholar and Meta Press. Before conducting the search two more criteria were applied
35 to determine the target publications. The first criterion is the publication language
36 should be in English, Second criterion to assure the quality of the publication only
37 peer-reviewed articles were adopted. To conduct the search, the key words used were
38 'business', 'intelligence' and 'implementation'. Those key words were selected as they
39 aligned with the primary research object concepts and various combinations and
40 variations were used. A variety of chains of key words were tried so that there could
41 be identification of a version that would give results that were most effective without
42 involving a high number of irrelevant publications. Finally, the chains of key words that
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 were chosen for the systematic review of literature were as follows: BI and success,
4 BI and implementation, business intelligence and implementation, business
5 intelligence and success, business intelligence and critical success factors, business
6 intelligence and success factors, BI and critical success factors, BI and success
7 factors. The key words chosen for the search were selected from those supplied by
8 authors of a number of relevant articles that had been identified within the preliminary
9 review of literature. Finally, the total downloaded articles from the databases were 38
10 articles.
11
12
13
14
15
16

17 **Results and discussion**

18 A total of 38 articles were reviewed for this study, of which 9 were conference
19 proceedings and 29 were journal articles. It was revealed that the research interest
20 related to BI within SMEs had been gradually increasing; in 2016, there was a
21 maximum of six publications. Figure 1 shows the distribution of research methods.
22 From the studied articles, it could be seen that surveys were obviously the methods
23 used the most; other types of method are less frequent though comparable in level of
24 use.
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

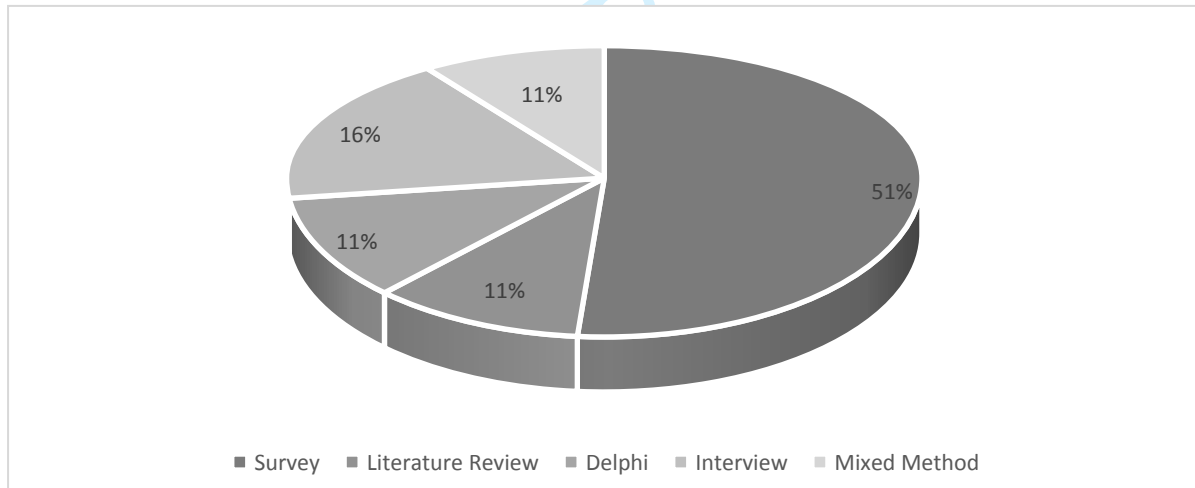


Figure 1: Research methods

As Figure 2 showed, within the literature, developed and western countries are those that have been targeted the most.

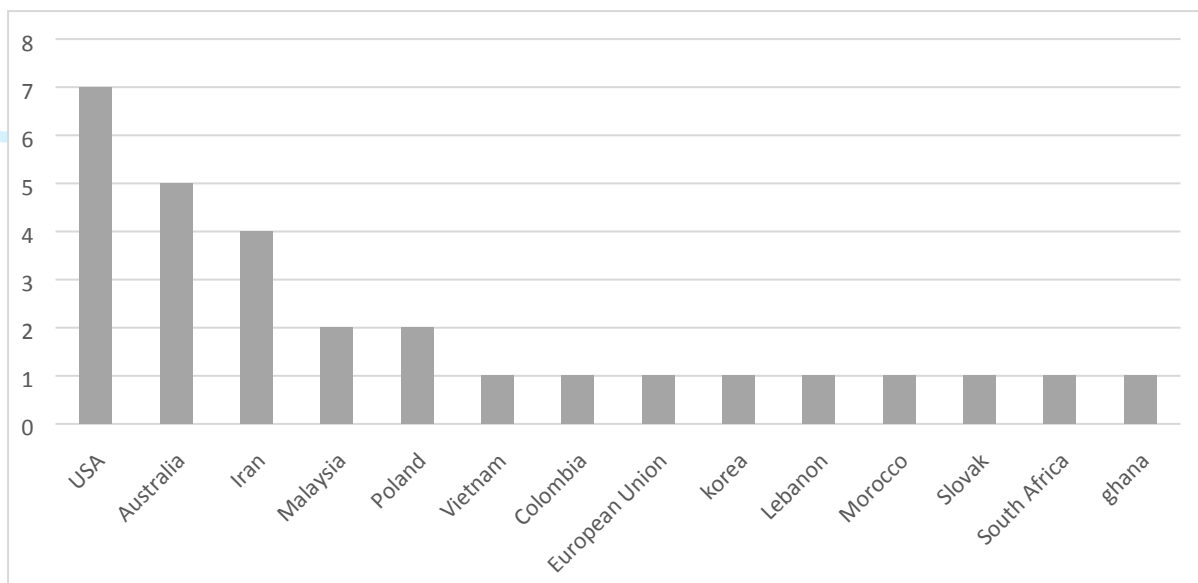


Figure 2: Research targeted countries

Figure 3 depicts frequency statistics for a variety of factors of implementation from papers attempting to provide an analysis of success in implementation of BI; the implementation factors that are most common can be seen, with clarity provided in Figure 3. Within the literature there are 10 factors of implementation reported repeatedly, and these may be considered as essential factors for the implementation of BI. Those practices, as well as a selection of studies that support the relationship lying between dimensions of success and factors of implementation are briefly discussed below.

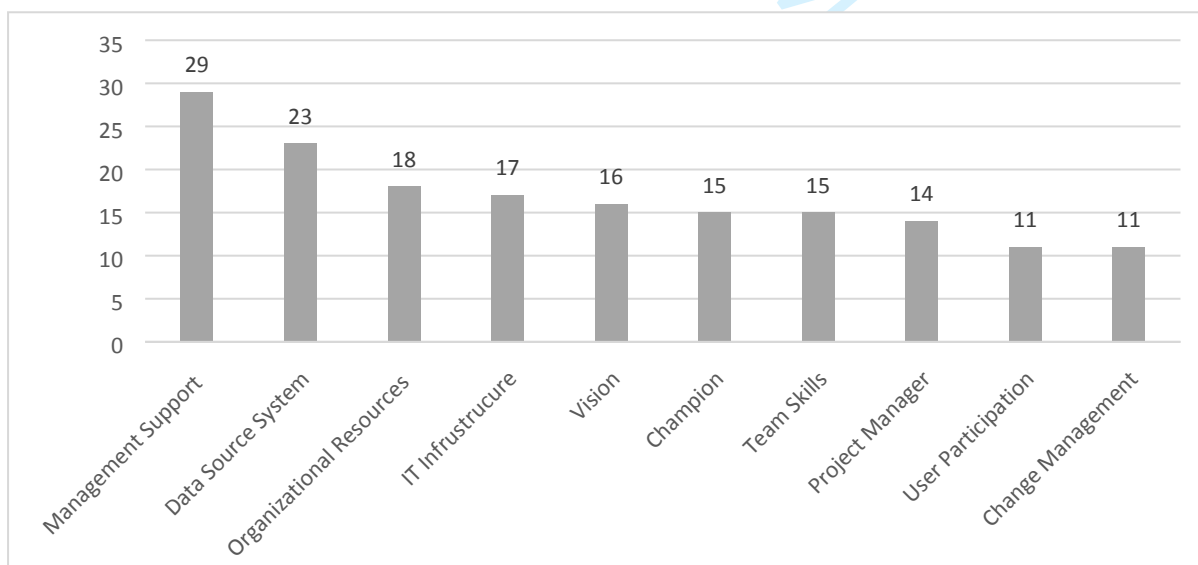


Figure 3: Most common implementation factors

Management support

Management support was one of the most widely cited implementation factors. The variable is a reflection of the level of support that the management offers in promoting, sponsoring or championing the use of IS, as well as a willingness to ensure sufficient allocation of resources (Petter et al., 2013). However, the gaining of commitment within an organisation and from the management can also be seen as one of the greatest challenges that a BI implementation team faces (Yeoh et al., 2008). It was noted by Olbrich, et al. (2011) that strong support from the management is the factor that has most importance for success of BI; they also noted its controllability. Management support may however vary considerably over time. Moreover, organisational strategy from top management may transform BI (Olszak and Ziemba, 2012). Overall success in the implementation of BI is affected significantly by management support (Arnott, 2008; Yeoh et al., 2008a; Yeoh et al., 2008b; Yeoh and Koronios, 2010; Woodside, 2011; Olszak and Ziemba, 2012; Anjariny and Zeki, 2013; Dawson and Van Belle, 2013; Sangar and Iahad, 2013; Puklavec et al., 2014; Grublješič and Jaklič, 2015; Nasab et al., 2015; Acheampong and Moyaid, 2016; Mesaros et al., 2016; Pham et al., 2016; Yeoh and Popovič, 2016; García and Pinzón, 2017; Lautenbach et al., 2017; Rezaie et al., 2017; Puklavec et al., 2018). Other dimensions of BI success are also affected by management support such as the following: organizational implementation (Wixom and Watson, 2001); system use (Xu and Hwang, 2007); system quality (Hwang and Xu, 2008); decision making (Hasan et al., 2012); productivity (Hasan et al., 2012) and user satisfaction (Hung et al., 2016). Overall, it is considered that there cannot be effective implementation of BI if the management does not offer sufficient support.

Data Sources Systems

Data sources may be defined as places where data employed in analysis is kept and from where it is drawn for use (Hostmann et al., 2007). Data sources employed for retrieval of information are technological BI capabilities that may be either external or internal (Harding, 2003). Conventionally, there has been a reliance of BI upon data that is numerical and/or structured that is measurable upon a numerical scale which

1
2
3 may be analysed through the use of methods of statistics and/or the use of computing
4 equipment (Baars and Kemper, 2008). It was summarised by Yeoh et al. (2008) that
5 assurance of the integrity and quality of data from the systems from which it is sourced
6 impacts heavily upon BI implementation success. Numerous studies support this idea
7 and show that sources of data positively and directly affect the success of
8 implementation of BI (Wixom and Watson 2001; Xu and Hwang 2007; Arnott 2008;
9 Hwang and Xu 2008; Yeoh and Koronios 2010; Olszak and Ziemba 2012; Anjariny
10 and Zeki 2013; Dawson and Van Belle 2013; Işık et al., 2013; Puklavec et al., 2014;
11 Grublješič and Jaklič 2015; Nasab et al., 2015; Mesaros et al., 2016; Pham et al.,
12 2016; Salmasi et al. 2016; Yeoh and Popovič 2016; Rezaie et al., 2017; Puklavec et
13 al., 2018).

23 24 *Organisational Resources*

25
26 As Grandon (2004) noted, the term 'organisational resources' refers to the degree of
27 technical, financial and human resources within an organisation. It was explained by
28 Puklavec et al. (2014) that BI systems tend to involve a greater degree of voluntary
29 action which leads to greater sensitivity for the availability of resources and can be a
30 significant aspect for the adoption of systems for BI. For Owusu et al. (2017),
31 enhancement of the resources of an organisation may influence the implementation
32 of BI systems. Numerous studies have, in fact, supported that idea, see, for example,
33 Wixom and Watson (2001), Arnott (2008), Yeoh et al. (2008a), Yeoh et al. (2008b),
34 Yeoh and Koronios (2010), Woodside (2011), Dawson and Van Belle (2013),
35 Boonsiritomachai et al. (2014), Puklavec et al. (2014), Grublješič and Jaklič (2015),
36 Acheampong and Moyaid (2016), Salmasi et al. (2016), Yeoh and Popovič (2016),
37 Hatta et al. (2017), Rezaie et al. (2017); these studies help to show the direct and
38 positive impacts that organisational resources have upon the success of a BI system
39 overall.

50 51 52 53 *Information Technology (IT) infrastructure.*

54
55 IT infrastructure relates to ability for users to be provided with information and data to
56 suitable levels of reliability, timeliness, accuracy, confidentiality and security, as well
57 as capability for tailoring processes to emergent business directions and needs and
58
59
60

1
2
3 provision of universal access and connectivity with enough range and reach (Fink et
4 al., 2007). BI systems have a number of characteristics in common with traditional
5 development lifecycles for IT projects with their various phases (Moss and Atre, 2003).
6 Implementation of systems for BI does not solely entail the buying of combinations of
7 hardware and software but rather it is an undertaking that has greater complexity with
8 requirement for suitable resources and infrastructure over longer time periods (Yeoh
9 and Koronios, 2010). It has been noted by many authors that IT infrastructure impacts
10 directly upon BI implementation success; for example, Arnott (2008), Yeoh et al.
11 (2008a), Yeoh et al. (2008b), Yeoh and Koronios (2010), Olszak and Ziemba (2012),
12 Nasab et al. (2015), Pham et al. (2016), Salmasi et al. (2016), Yeoh and Popovič
13 (2016), García and Pinzón (2017), Lautenbach et al. (2017) and Rezaie et al. (2017).
14
15
16
17
18
19
20
21
22
23
24

25 *Vision*

26
27 Clear visions help organisations to strategise their missions. In addition, there is a
28 requirement for organisational visions to be disseminated throughout the different
29 organisational levels (Prijetelj, 1999). It was noted by Adamala and Cidrin (2011) that
30 a system for BI has to be tied closely to the strategic vision of a company. A clear
31 vision enables BI implementation to be successful. Furthermore, a vision that is long-
32 term, in terms that are primarily organisational and strategic, is essential for
33 establishing a business that is robust and has alignment to the strategic vision in order
34 for the needs and objectives of the business to be met (Yeoh and Koronios, 2010).
35 Several studies have shown that the success of a BI system is greatly influenced by a
36 vision that is clear; see, for example, Arnott (2008), Yeoh et al. (2008a), Yeoh et al.
37 (2008b), Yeoh and Koronios (2010), Dawson and Van Belle (2013), Sangar and Iahad
38 (2013), Nasab et al. (2015), Pham et al. (2016), Yeoh and Popovič (2016) and Rezaie
39 et al. (2017). It was empirically shown by Hwang and Xu (2008) that business needs
40 and a vision that is clear impact significantly and positively upon the quality of system.
41
42
43
44
45
46
47
48
49
50
51
52
53

54 *Project champion*

55
56 The requirement for a champion of the project is also considered as a relatively
57 significant element in successful BI implementation. As Mandal and Gunasekaran
58
59
60

(2003) note, such a project champion ought to have strong skills in leadership. In addition, such a person ought to have managerial competencies in a range of personal, technical and business-oriented ways (Kraemmergaard and Rose, 2002). Project champion is defined here as an individual at management level who recognises ideas that are useful for his/her organisation and leads with adequate authority and resources during all the phases of development and implementation (Meyer, 2000). A champion was described by Yeoh and Koronios (2010) as a person who has high levels of enthusiasm along with an in-depth knowledge of business processes within his or her organisation, in addition to a good awareness of the technological innovations under discussion and requiring commitment. The research that exists in the area shows that project champions, when present, are able to impact upon successful BI system adoption significantly (Arnott, 2008; Yeoh et al., 2008a; Yeoh et al., 2008b; Yeoh and Koronios, 2010; Olszak and Ziemba, 2012; Anjariny and Zeki, 2013; Dawson and Van Belle, 2013; Sangar and Iahad, 2013; Puklavec et al., 2014; Nasab et al., 2015; Acheampong and Moyaid, 2016; Pham et al., 2016; Yeoh and Popovič, 2016; García and Pinzón, 2017; Owusu et al., 2017; Rezaie et al., 2017; Puklavec et al., 2018).

Team skills

Implementation of BI calls for a balance of technical skills within a team, interpersonal abilities and the capacity to work skilfully in the undertaking of tasks in ways that involve good interaction by users (Wixom and Watson, 2001). Furthermore, a project team ought to consist of members from various areas within a business in order for the sharing of ideas and so that standardisation can be potentially increased, particularly if, as part of the initiative for BI, there is to be a data warehouse that is enterprise wide (Goodhue et al., 2002). Innovation and learning are stimulated by the coming together of team members that have a diverse range of perspectives and competencies, and this can help in the generation of a greater amount of alternative solutions to problems that are complex (Campion et al., 1993; Lee and Xia, 2010). In addition, engaging project team by managers in the strategic planning and vision will produce an environment of employee satisfaction and enhancing the leading skills (Wall et al., 2017a; Wall et al., 2017b). The skills of a team significantly affect the

1
2
3 overall success of implementation of BI (Arnott, 2008; Yeoh et al., 2008a; Yeoh et al.,
4 2008b; Yeoh and Koronios, 2010; Olszak and Ziemba, 2012; Anjariny and Zeki, 2013;
5 Sangar and Iahad, 2013; Nasab et al., 2015; Mesaros et al., 2016; Yeoh and Popovič,
6 2016; García and Pinzón, 2017; Rezaie et al., 2017). The skills of a team also have a
7 bearing upon other dimensions of success of BI, such as productivity, project
8 implementation, decision-making and information quality (Wixom and Watson, 2001;
9 Xu and Hwang, 2007; Hwang and Xu, 2008).

17 *Project management*

20 The term 'project management' is in reference to ongoing management of the plan for
21 implementation. As well as stages of planning, it involves, therefore, the allocation of
22 responsibilities to a variety of stakeholders, definition of critical paths and milestones,
23 human resource planning, determination of success indicators and training (Nah and
24 Delgado, 2006). At first, modern project management methods were intended for their
25 application within big organisations that had systems of complexity that needed such
26 systematic processes (Baccarini, 1999). More recently, however, they may be altered
27 and adapted to make them suitable for addressing the needs of organisations that are
28 smaller (Fedouaki et al., 2013). As several authors have noted, the project
29 management can have a considerable impact upon the implementation of a BI system
30 (Arnott, 2008; Yeoh et al., 2008a; Yeoh et al., 2008b; Yeoh and Koronios, 2010;
31 Woodside, 2011; Anjariny and Zeki, 2013; Sangar and Iahad, 2013; Pham et al., 2016;
32 Rezaie et al., 2017).

45 *User participation*

48 The term 'user participation', related to developing specific IS, was defined by (Kearns
49 and Sabherwal, 2006) as behaviours, tasks or assignments that users or user
50 representatives perform whilst within the development project for IS. Accurate capture
51 and communication of user requirements the members of the project team are ensured
52 by good user participation; these properties have particular importance if there is an
53 initial lack of clarity with regard to system requirements (Wixom and Watson, 2001). It
54 was noted by Audzeyeva and Hudson (2016) that adequate involvement of users
55
56
57
58
59
60

1
2
3 within adjustment of the BI, within its exploitation over the long-term, is likely to make
4 a contribution to its usability within the future as well as helping match it to other
5 processes within the organisation. Moreover, organisational change that has been
6 enabled by BI can, in turn, help in the introduction of changes to processes for
7 organisational control and coordination. In general, user participation has a great deal
8 of significance for the implementation of IS projects (Hwang and Thorn, 1999). Also,
9 in particular, user participation is significant for BI system (Wixom and Watson, 2001;
10 Xu and Hwang, 2007; Hwang and Xu, 2008; Yeoh et al., 2008a; Yeoh et al., 2008b;
11 Koronios, 2010; Dawson and Van Belle, 2013; Grublješič and Jaklič, 2015; Nasab et
12 al., 2015; Mesaros et al., 2016; Yeoh and Popovič, 2016; Rezaie et al., 2017).

23 *Change management*

24
25 The term 'change management' is in reference to procedures for managing change in
26 an organisation; such changes both reinvent and revolutionise the functions and
27 processes of government (Ndou, 2004). A program for change management has
28 importance since it enables there to be a reduction in any resistance to implementation
29 that may be encountered and so it helps facilitate adoption (Hawking and Sellitto,
30 2010); this is especially the case if technological development is ongoing since, at
31 these moments, the possibility for change happening are greater (Fourati-Jamoussi et
32 al., 2016; Garcia and Pinzon, 2017). They went on to note that the absence of this
33 factor, i.e. effective change management, from the implementation processes for BI
34 could help provide an explanation for failure of BI projects (Williams and Williams,
35 2003). Numerous studies support this notion; see, for example, Yeoh et al. (2008a),
36 Yeoh et al. (2008b), Yeoh and Koronios (2010), Sangar and Iahad (2013), Grublješič
37 and Jaklič (2015), Yeoh and Popovič (2016), García and Pinzón (2017) and Rezaie et
38 al. (2017), all of which indicate the direct and positive impact that change management
39 has upon the implementation of BI systems.

40
41 The compilation above, cited from the literature, offers a basis for considering the
42 range of factors of success and associated frequencies for each of them. Additional
43 analyses, however, undertaken with the aim of uncovering clear and obvious gaps
44 within the relevant literature have made it apparent that there has been a lack of deep
45 consideration given to the factors that have a bearing on implementation. In addition,
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 there seems to be a variety of definitions for implementation factors and the concept
4 of resources and change management. Likewise, there seems to be little explanation
5 put forward of the particular tactics that may be employed in implementing such
6 systems. Lastly, a further noteworthy observation was that, from the cited
7 implementation factors, there was a lack of perspective taken on user characteristics
8 and work-based learning. Wall (2017) stated that work-based learning enhances
9 employee's well-being and increase organisational performance. There was either
10 presentation of implementation factors without explaining from whom the perspective
11 was being shown or there was provision of a user perspective though only in relation
12 to one single factor of implementation. All too often researchers have tended to focus
13 upon just one particular implementation factor or one particular aspect of the process
14 of implementation. As a result, little research has been recorded that manages to
15 encompass all significant considerations with regard to factors of implementation.
16
17
18
19
20
21
22
23
24
25
26
27
28

29 **Implications of the study**

30 This study has drawn a lot from the already existing literature related to the
31 implementation of BI into one single piece of research. This allows for taking stock of
32 the current state of play with regard to knowledge in the field and helps the
33 identification of appropriate practice and areas for further study. The study
34 demonstrates that there is a good theoretical understanding of the background or
35 framework for the implementation of BI. In addition, the paper can benefit researchers
36 through the provision of case study contexts. Through aggregation of this information
37 into one paper, researchers may now more easily identify a focus for their own studies
38 based upon the contexts that they can see have been explored or not. It has been
39 argued in this study that 10 distinct factors are required for successful implementation
40 of BI as shown in figure 3. These factors are constructs that may be used within
41 practice for the analysis of needs and the design of a BI initiative, as well as its
42 implementation, monitoring, control and assessment. Consolidation of factors within
43 the practical stages of implementation are an accurate representation of the
44 procedures and behaviours within industry within a more clear picture on collective
45 trials undertaken. Work-based learning industries may focus upon an exploration of
46 these factors to establish the scenario likely to be more successful for their particular
47 contexts. Literature related to implementation of BI is much more focused upon
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 organisations within developed countries within Europe, Australia and the United
4 States of America. As yet little research has been undertaken into organisations based
5 within developing countries. Studies have shown that there are additional challenges
6 for BI systems within developing countries along with increasing levels of dependency
7 (Owusu et al., 2017). It appears that certain factors of implementation are prioritised
8 differently within different countries. Whilst 'resources' are ranked at the middle of the
9 frequency analysis of this study, when trying to implement a BI system within a
10 developing country, it could be a factor that is highly critical. From study of over thirty-
11 eight relevant case studies within various contexts, the identified implementation
12 factors outline the various factors created through a combination of factors scattered
13 throughout the literature. In practical terms, this has provided a thorough overview of
14 the factors of implementation present within the existing literature. Furthermore, since
15 the factors were compiled through the use of existing case studies, the factors are
16 based upon practical experience in real industrial settings. These factors may be used,
17 therefore, by practitioners in relation to their particular industry, with concentration
18 upon those elements that have greater prevalence in their field. This paper, then,
19 offers an industry-oriented and practical framework to help ensure BI implementation
20 success.

35 **Research recommendation and limitations**

36
37 Research recommendations are as useful for researchers as they are for
38 organisations wishing to implement systems of BI successfully. The review of
39 literature, in relation to factors that have an association with research of the
40 implementation of BI, ought to have analysis of the factors that are used most
41 commonly with respect to BI system implementation; this would provide researchers
42 with a path towards proper analysis of what factors lie behind success. This review of
43 literature can also serve as a guide for organisations seeking to take preventative
44 measures for avoiding some of the challenges that are potentially faced whilst trying
45 to implement a BI system successfully.

46
47 This research paper is not without limitations. Firstly, the study can be considered as
48 only looking at factors behind the implementation of BI; as such, lots of other themes
49 of research related to the implementation of BI systems are overlooked. Secondly,
50 there has not been exploration of the research paradigms in this study in
51 methodological and theoretical terms. Further empirical research of that area could

1
2
3 discover other facts in relation to factors and their impact upon success. There ought
4 to be careful consideration and assimilation of these concerns in any further related
5 studies.
6
7
8
9

10 11 **Conclusion**

12 This research has involved the review of literature published from 1998 to 2018 and
13 discovered that the subject of implementation of BI was limited. Further research on
14 the implementation of BI may be very useful for enhancement of the likeliness of
15 success in implementation of BI. The review of the literature with regard for BI
16 implementation shows that in lots of cases, the factors of implementation put forward
17 are based upon review of a limited case study example or literature already published.
18 Previous research does not provide clear guidance in relation to which factors of
19 implementation ought to be adopted however, because of inconsistencies and the
20 nature of relationships for BI success dimensions. This paper has had the purpose of
21 analysing the literature on BI implementation with particular regard for implementation
22 factors. The study aim has been achieved through selection of thirty-eight papers
23 related to BI implementation. The research findings are potentially useful for those
24 who are in the process of implementing a BI system or those who have failed to
25 implement a BI system initiative successfully. In addition, the use of the BI system is
26 required to enhance the work-based learning process. This research has brought a
27 degree of clarity on the topic and offers useful contributions and guidelines from and
28 to the literature for both researchers and managers alike. The paper makes a
29 contribution to development and understanding in the field of implementation of BI and
30 appreciation of the impacts of particular practices upon success. Despite the
31 inconsistencies that were identified, the literature review shows that the particular
32 implementation factors result in significant levels of success in the implementation of
33 a BI system figure 3.
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

References

- Acheampong, O. and Moyaid, S.A. (2016), "An integrated model for determining business intelligence systems adoption and post-adoption benefits in banking sector", *Journal of Administrative and Business Studies*, Vol. 2 No. 2, pp. 84–100.
- Adamala, S. and Cidrin, L. (2011), "Key success factors in business intelligence".
- Anjariny, A.H. and Zeki, A.M. (2013), "The important dimensions for assessing organizations' readiness toward business intelligence systems from the perspective of malaysian organization", *Advanced Computer Science Applications and Technologies (ACSAT), 2013 International Conference On, IEEE*, pp. 544–548.
- Arnott, D. (2008), "Success factors for data warehouse and business intelligence systems", *ACIS 2008 Proceedings*, p. 16.
- Audzeyeva, A. and Hudson, R. (2016), "How to get the most from a business intelligence application during the post implementation phase? Deep structure transformation at a UK retail bank", *European Journal of Information Systems*, Vol. 25 No. 1, pp. 29–46.
- Baars, H. and Kemper, H.-G. (2008), "Management Support with Structured and Unstructured Data—An Integrated Business Intelligence Framework", *Information Systems Management*, Vol. 25 No. 2, pp. 132–148.
- Baccarini, D. (1999), "The logical framework method for defining project success", *Project Management Journal*, Vol. 30 No. 4, pp. 25–32.
- Bakunzibake, P., Grönlund, Å. and Klein, G.O. (2016), "E-Government Implementation in Developing Countries: Enterprise Content Management in Rwanda", *15th IFIP Electronic Government (EGOV)/8th Electronic Participation (EPart) Conference, Univ Minho, Guimaraes, Portugal, September 5-8, 2016*, IOS Press, pp. 251–259.
- Boonsiritomachai, W., McGrath, M. and Burgess, S. (2014), "A research framework for the adoption of Business Intelligence by Small and Medium-sized enterprises", *Proceedings of the 27th Annual Conference on Small Enterprise Association of Australia and New Zealand, SEAANZ*, pp. 1–22.
- Boyton, J., Ayscough, P., Kaveri, D. and Chiong, R. (2015), "Suboptimal business

1
2
3 intelligence implementations: understanding and addressing the problems”,
4 *Journal of Systems and Information Technology*, Vol. 17 No. 3, pp. 307–320.

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Campion, M.A., Medsker, G.J. and Higgs, A.C. (1993), “Relations between work group characteristics and effectiveness: Implications for designing effective work groups”, *Personnel Psychology*, Vol. 46 No. 4, pp. 823–847.

Dawson, L. and Van Belle, J.-P. (2013), “Critical success factors for business intelligence in the South African financial services sector: original research”, *South African Journal of Information Management*, Vol. 15 No. 1, pp. 1–12.

Dooley, P., Levy, Y., Hackney, R.H. and Parrish, J.R. (2017), “Critical value factors in business intelligence systems implementations”.

Fedouaki, F., Okar, C. and Alami, S. El. (2013), “A maturity model for Business Intelligence System project in Small and Medium-sized Enterprises: An empirical investigation”, *IJCSI International Journal of Computer Science Issues*, Vol. 10 No. 6, pp. 61–69.

Fink, L., Yogev, N. and Even, A. (2017), “Business intelligence and organizational learning: An empirical investigation of value creation processes”, *Information and Management*, Vol. 54 No. 1, pp. 38–56.

Fourati-Jamoussi, F. and Niamba, C.N. (2016), “An evaluation of business intelligence tools: a cluster analysis of users’ perceptions”, *Journal of Intelligence Studies in Business*, Vol. 6 No. 1.

García, J.M.V. and Pinzón, B.H.D. (2017), “Key success factors to business intelligence solution implementation”, *Journal of Intelligence Studies in Business*, Vol. 7 No. 1.

Goodhue, D.L., Wixom, B.H. and Watson, H.J. (2002), “Realizing business benefits through CRM: hitting the right target in the right way”, *MIS Quarterly Executive*, Vol. 1 No. 2, pp. 79–94.

Grandon, E., Systems, J.P. the A. for I. and 2004, undefined. (n.d.). “E-commerce adoption: perceptions of managers/owners of small and medium sized firms in Chile”, *Aisel.Aisnet.Org*, available at: <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=3226&context=cais> (accessed 15 July 2019).

- 1
2
3 Grublješič, T. and Jaklič, J. (2015), "Business intelligence acceptance: The
4 prominence of organizational factors", *Information Systems Management*, Vol. 32
5 No. 4, pp. 299–315.
6
7
8
9 Harding, W. (2003), "BI crucial to making the right decision: business intelligence is all
10 about collecting useful information from multiple sources and then presenting it in
11 an easy to understand format.(Special Report: Business Intelligence)", *Financial*
12 *Executive*, Vol. 19 No. 2, pp. 49–51.
13
14
15
16 Harris, G. and Attour, S. (2003), "The international advertising practices of
17 multinational companies", *European Journal of Marketing*, Vol. 37 No. 1/2, pp.
18 154–168.
19
20
21
22 Hasan, H.M., Lotfollah, F. and Negar, M. (2012), "Comprehensive Model of Business
23 Intelligence: a Case Study of Nano's Companies", *Indian Journal of Science and*
24 *Technology*, Vol. 5 No. 6, pp. 2851–2859.
25
26
27
28 Hatta, M., Natasha, N., Miskon, S. and Syed Abdullah, N. (2017), "Business
29 Intelligence System Adoption Model for SMEs".
30
31
32 Hawking, P. and Sellitto, C. (2010), "Critical Success Factors of Business Intelligence
33 (BI) in an ERP Systems Environment", *Onference on Research and Practical*
34 *Issues of Enterprise Information Systems (CONFENIS)*, No. 1996.
35
36
37
38 Hostmann, B. (2007), "BI Competency Centres: Bringing Intelligence to the Business",
39 *Business Performance Management*, Vol. 5 No. 4, pp. 4–10.
40
41
42 Hung, S.-Y., Huang, Y.-W., Lin, C.-C., Chen, K. and Tarn, J.M. (2016), "Factors
43 Influencing Business Intelligence Systems Implementation Success in the
44 Enterprises", *PACIS*, pp. 297.
45
46
47
48 Hwang, M.I. and Thorn, R.G. (1999), "The effect of user engagement on system
49 success: a meta-analytical integration of research findings", *Information and*
50 *Management*, Vol. 35 No. 4, pp. 229–236.
51
52
53
54 Hwang, M.I. and Xu, H. (2008), "A structural model of data warehousing success",
55 *Journal of Computer Information Systems*, Vol. 49 No. 1, pp. 48–56.
56
57
58
59 Işık, Ö., Jones, M.C. and Sidorova, A. (2013), "Business intelligence success: The
60

roles of BI capabilities and decision environments”, *Information and Management*, Vol. 50 No. 1, pp. 13–23.

Kappelman, L., McLean, E., Johnson, V. and Torres, R. (2016), “The 2015 SIM IT Issues and Trends Study”, *MIS Quarterly Executive*, Vol. 15 No. 1.

Kearns, G.S. and Sabherwal, R. (2006), “Strategic Alignment Between Business and Information Technology: A Knowledge-Based View of Behaviors, Outcome, and Consequences”, *Journal of Management Information Systems*, Vol. 23 No. 3, pp. 129–162.

Kraemmergaard, P. and Rose, J. (2002), “Managerial competences for ERP journeys”, *Information Systems Frontiers*, Vol. 4 No. 2, pp. 199–211.

Lee, G. and Xia, W. (2010), “Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility”, *MIS Quarterly*, Vol. 34 No. 1, pp. 87–114.

Mandal, P. and Gunasekaran, A. (2003), “Issues in implementing ERP: A case study”, *European Journal of Operational Research*, Vol. 146 No. 2, pp. 274–283.

Mesaros, P., Carnicky, S., Mandicak, T., Habinakova, M., Mackova, D. and Spisakova, M. (2016), “Model of key success factors for Business Intelligence implementation”, *Journal of Systems Integration*, Vol. 7 No. 3, p. 3.

Meyer, M. (2000), “Innovation roles: from souls of fire to devil’s advocates”, *The Journal of Business Communication (1973)*, Vol. 37 No. 4, pp. 328–347.

Moss, L. and Atre, S. (2003), *Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications*, available at: https://books.google.com/books?hl=en&lr=&id=ZV8jeV4a9_AC&oi=fnd&pg=PR7&dq=Business+Intelligence+Roadmap:+The+Complete+Project+Lifecycle+for+Decision-Support+Applications,+Boston,+MA:+Addison-Wesley.&ots=LuoBLEHPE0&sig=b1pux1oR1GOxJZHza3UQ9W3TMqk (accessed 14 August 2019).

Nah, F.F.-H. and Delgado, S. (2006), “Critical success factors for enterprise resource planning implementation and upgrade”, *Journal of Computer Information Systems*, Vol. 46 No. 5, pp. 99–113.

Nasab, S.S., Jaryani, F., Selamat, H. Bin and Masrom, M. (2017), “Critical success

factors for business intelligence system implementation in public sector organisation”, *International Journal of Information Systems and Change Management*, Vol. 9 No. 1, pp. 22–43.

Ndou, V. (2004), “E–Government for developing countries: opportunities and challenges”, *The Electronic Journal of Information Systems in Developing Countries*, Vol. 18 No. 1, pp. 1–24.

Olbrich, S., Poppelbuß, J. and Niehaves, B. (2012), “Critical contextual success factors for business intelligence: A Delphi study on their relevance, variability, and controllability”, *System Science (HICSS), 2012 45th Hawaii International Conference On, IEEE*, pp. 4148–4157.

Olszak, C. M. (2016), "Toward better understanding and use of Business Intelligence in organizations". *Information Systems Management*, 33, 105-123.

Olszak, C.M. and Ziemia, E. (2012), “Critical success factors for implementing business intelligence systems in small and medium enterprises on the example of upper Silesia, Poland”, *Interdisciplinary Journal of Information, Knowledge, and Management*, Vol. 7 No. 2, pp. 129–150.

Owusu, A., Agbemabiasie, G.C., Abdurrahman, D.T. and Soladoye, B.A. (2017), “Determinants of business intelligence systems adoption in developing countries: An empirical analysis from Ghanaian Banks”, *The Journal of Internet Banking and Commerce*, pp. 1–25.

Patton, M. (1990), *Qualitative Evaluation and Research Methods*, available at: <http://psycnet.apa.org/record/1990-97369-000> (accessed 15 July 2019).

Petter, S., DeLone, W. and McLean, E.R. (2013), “Information systems success: The quest for the independent variables”, *Journal of Management Information Systems*, Vol. 29 No. 4, pp. 7–62.

Pham, Q.T., Mai, T.K., Misra, S., Crawford, B. and Soto, R. (2016), “Critical success factors for implementing business intelligence system: Empirical study in vietnam”, *International Conference on Computational Science and Its Applications*, Springer, pp. 567–584.

Prijatelj, V. (1999), “Success factors of hospital information system implementation: what must go right?”, *Studies in Health Technology and Informatics*, pp. 197–202.

- 1
2
3 Puklavec, B., Oliveira, T. and Popovic, A. (2014), "Unpacking business intelligence
4 systems adoption determinants: An exploratory study of small and medium
5 enterprises", *Economic and Business Review for Central and South-Eastern
6 Europe*, Vol. 16 No. 2, pp. 185.
7
8
9
- 10 Puklavec, B., Oliveira, T. and Popovič, A. (2017), "Understanding the determinants of
11 business intelligence system adoption stages: an empirical study of SMEs",
12 *Industrial Management and Data Systems*, No. just-accepted.,
13
14
15
- 16 Rezaie, S., Mirabedini, S.J. and Abtahi, A. (2017), "Identifying key effective factors on
17 the implementation process of business intelligence in the banking industry of
18 Iran", *Journal of Intelligence Studies in Business*, Vol. 7 No. 3.
19
20
21
- 22 Salmasi, M.K., Talebpour, A. and Homayounvala, E. (2016), "Identification and
23 classification of organizational level competencies for BI success", *Journal of
24 Intelligence Studies in Business*, Vol. 6 No. 2.
25
26
27
- 28 Sangar, A.B. and Iahad, N.B.A. (2013), "Critical factors that affect the success of
29 business intelligence systems (BIS) implementation in an organization",
30 *International Journal of Scientific and Technology Research*, Vol. 2 No. 2, pp.
31 176–180.
32
33
34
- 35 Wall, T. (2017), "A manifesto for higher education, skills and work-based learning:
36 through the lens of the manifesto for work". *Higher Education, Skills and Work-
37 Based Learning*, 7, pp.304-314.
38
39
- 40 Wall, T., Bellamy, L., Evans, V. & Hopkins, S. (2017)a, "Revisiting impact in the context
41 of workplace research: a review and possible directions". *Journal of Work-
42 Applied Management*, 9, 95-109.
43
44
- 45 Wall, T., Russell, J. & Moore, N. (2017)b. "Positive emotion in workplace impact: the
46 case of a work-based learning project utilising appreciative inquiry". *Journal of
47 Work-Applied Management*, 9, 129-146.
48
49
- 50 Watson, H.J. and Wixom, B.H. (2007), "Enterprise agility and mature BI capabilities",
51 *Business Intelligence Journal*, Vol. 12 No. 3, pp. 4.
52
53
- 54 Williams, S. and Williams, N. (2010), "The Profit Impact of Business Intelligence,
55 Morgan Kaufmann".
56
57
- 58 Wixom, B.H. and Watson, H.J. (2001), "An empirical investigation of the factors
59 affecting data warehousing success", *MIS Quarterly*, pp. 17–41.
60
- 60 Woodside, J. (2011), "Business Intelligence Best Practices for Success", *International*

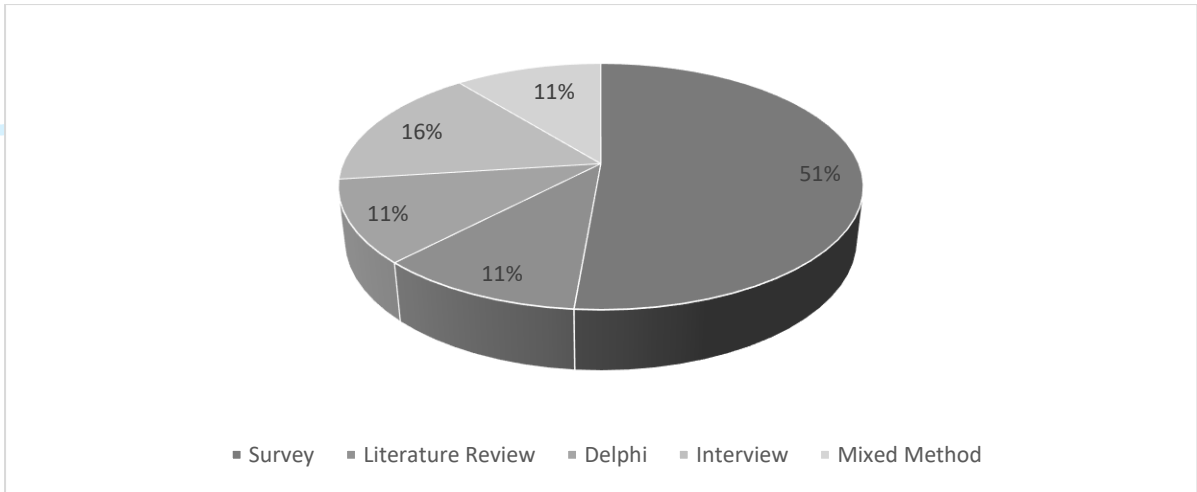
1
2
3 *Conference on Information Management and Evaluation*, Academic Conferences
4 International Limited, p. 556.

5
6
7 Xu, H. and Hwang, M.I. (2007), "The effect of implementation factors on data
8 warehousing success: An exploratory study", *Journal of Information, Information
9 Technology, and Organizations*, Vol. 2, pp. 1.

10
11
12
13 Yeoh, W. and Koronios, A. (2010), "Critical success factors for business intelligence
14 systems", *Journal of Computer Information Systems*, Vol. 50 No. 3, pp. 23–32.

15
16
17 Yeoh, W., Koronios, A. and Gao, J. (2008), "Managing the implementation of business
18 intelligence systems: a critical success factors framework".

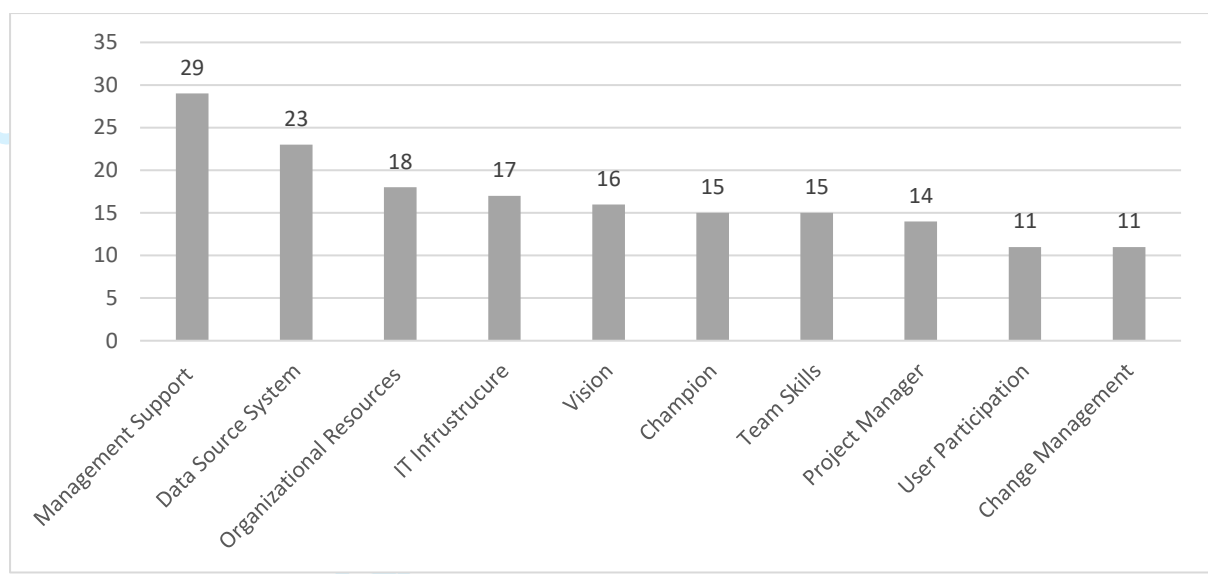
19
20
21 Yeoh, W. and Popovič, A. (2016), "Extending the understanding of critical success
22 factors for implementing business intelligence systems", *Journal of the
23 Association for Information Science and Technology*, Vol. 67 No. 1, pp. 134–147.
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



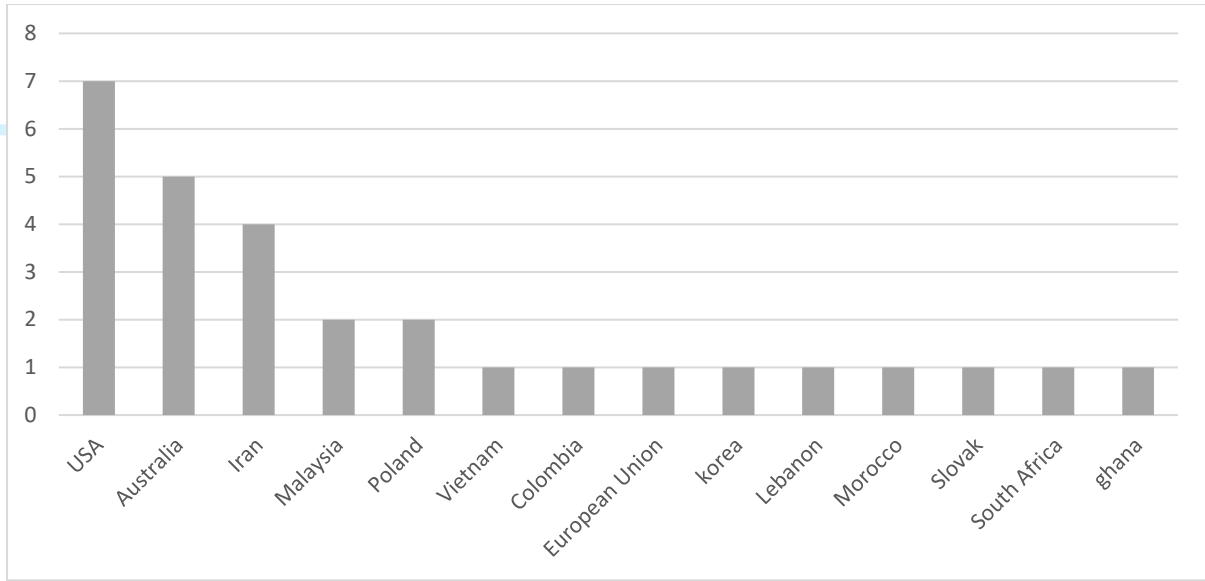
Journal of Work Applied Management

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60



Work Applied Management



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60