

Salisu, Isyaku; Sappri, Mazlan Bin Mohd; Omar, Mohd Faizal Bin

## Article

# The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review

Cogent Business & Management

## Provided in Cooperation with:

Taylor & Francis Group

*Suggested Citation:* Salisu, Isyaku; Sappri, Mazlan Bin Mohd; Omar, Mohd Faizal Bin (2021) : The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review, Cogent Business & Management, ISSN 2331-1975, Taylor & Francis, Abingdon, Vol. 8, Iss. 1, pp. 1-22,  
<https://doi.org/10.1080/23311975.2021.1935663>

This Version is available at:

<https://hdl.handle.net/10419/245050>

### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by/4.0/>

# The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review

Isyaku Salisu, Mazlan Bin Mohd Sappri & Mohd Faizal Bin Omar |

To cite this article: Isyaku Salisu, Mazlan Bin Mohd Sappri & Mohd Faizal Bin Omar | (2021) The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review, Cogent Business & Management, 8:1, 1935663, DOI: [10.1080/23311975.2021.1935663](https://doi.org/10.1080/23311975.2021.1935663)

To link to this article: <https://doi.org/10.1080/23311975.2021.1935663>



© 2021 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



Published online: 18 Jun 2021.



Submit your article to this journal [↗](#)



Article views: 1664



View related articles [↗](#)



View Crossmark data [↗](#)



Received: 19 February 2021  
Accepted: 23 May 2021

\*Corresponding author: Salisu Isyaku,  
School of Quantitative Science,  
Universiti Utara Malaysia  
E-mail: [Salisu\\_isyaku@ahsgs.uum.edu.my](mailto:Salisu_isyaku@ahsgs.uum.edu.my)

Reviewing editor:  
Albert W. K. Tan, Asia Pacific  
Graduate Institute, Shanghai Jiao  
Tong University, SINGAPORE

Additional information is available at  
the end of the article

## MANAGEMENT | RESEARCH ARTICLE

# The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review

Isyaku Salisu<sup>1\*</sup>, Mazlan Bin Mohd Sappri<sup>1</sup> and Mohd Faizal Bin Omar<sup>2</sup>

**Abstract:** In this era of industrial revolution (IR 4.0), coupled with the emergence of the deadly global pandemic of COVID-19, healthcare organizations are compelled to embrace new technologies for their routine decision-making. The Business Intelligence System (BIS) is one of the emphasized innovations, and due to its potential to provide more intellectual information for decision-making processes, has attracted the interest of industry analysts and policymakers. Literature suggests that the BIS is integrated by organizations in different sectors, but most BIS initiatives struggle to produce the anticipated outcomes. Moreover, the adoption of BIS in SMEs generally and healthcare specifically is rather insignificant. This is due to numerous factors. It is therefore necessary to discover and analyze the essential determinants affecting the adoption of BIS in healthcare SMEs. Therefore, this study tries to tackle this gap by exploring the relevant factors for BIS adoption using a systematic literature review (SLR) and an expert-ranking survey of 63 studies that were published in Scopus and WoS databases from 2011 to 2020. A total of 22

## ABOUT THE AUTHORS



Isyaku Salisu

Dr. Salisu Isyaku is a lecturer in the Department of Business Administration, Umaru Musa Yar'adua University, Katsina. He received his Ph.D. in Entrepreneurship from University Utara Malaysia (UUM). He obtained his B.Sc. M.Sc. at Bayero University, Kano. He is currently pursuing another Ph.D. in Decision Sciences/Operation Research at UUM. His research interest is entrepreneurship and business analytics.

Dr. Mazlan Bin Mohd Sappri is a lecturer in Decision Science, School of Quantitative Science, UUM. He holds a bachelor's and master's degree in information technology from UUM and UKM in 2001 and 2004 respectively. He also obtained his Ph.D. in Computer Science at USM. His work is mainly in Management Information System, Performance Metrics

Dr. Mohd Faizal Bin Omar is an Associate Professor of Decision Sciences, School of Quantitative Sciences, UUM. He received his PhD at Queensland University of Technology, Australia. Currently, he is a Director of Innovation and Commercialisation Centre, UUM and he is also a Research Fellow at Centre for Testing, Measurement and Appraisal (CeTMA)

## PUBLIC INTEREST STATEMENT

One of the major challenges for business executives is effective decision-making. Owing to the need for greater precision and coherence of the decision, the adoption of technological solutions to get information more simply and intuitively is evolving. In this regard, BI is tool that extracts, transforms, and enables data to be traversed to support managers in making a coherent and sound decisions. Similarly, in today's healthcare market producing hugely increasing data volumes, there are serious pressures on private healthcare organizations to adopt BI solutions. It is believed that sensible and maximum use of business intelligence systems can transform data into desired knowledge that can boost operational efficiency and patient outcomes. Therefore, there are numerous articles identifying the anticipated benefits of BI reinforcing the need for study in this domain. This study conducted systematic literature to identify the most relevant factors influencing the adoption of BI in the healthcare SMEs.

determinants are identified and sent to 15 experts. The data that were gathered from these experts were analyzed using SPSS. The results of the analysis indicated 15 determinants were significant, and one determinant was added by an expert. Consequently, a theoretical structure has been developed based on technology, organization, environment, and CEOs determinants and theories. The results of the current study will deepen the current BIS literature and advance the understanding of the significant elements of BIS adoption decision.

**Subjects:** Management of IT; Machine Learning - Design; Management of Technology & Innovation

**Keywords:** Systematic literature review; business intelligence systems; TOE; SMEs; healthcare

## 1. Introduction

In the age of IR 4.0, coupled with the emergence of COVID-19 which has affected almost every part of our daily lives, business environments are becoming dynamic. Therefore, businesses need advanced developments in technological innovation for rapid response to the competitive markets (Ahmad & Miskon, 2020a; Hojnik & Ruzzier, 2016). The advent of BIS was propelled by swift technological development and internet proliferation in the mid-90s (Ain et al., 2019; Xia & Gong, 2014). BIS is widely recognized as a comprehensive collection of methods, systems and methodologies that empower organizations to combine and evaluate broad data sets to determine their vulnerabilities, strengths, and possibilities (Chang et al., 2015; Combata Niño et al., 2020; Harrison et al., 2015). As an information system (IS), BIS promotes decision-making through the control, collection and incorporation of unstructured and organized data; the handling of massive databases such as big data; the provision of ad-hoc searches, forecasting, monitoring, and analysis solutions; and the support of advanced computing technologies for new knowledge discovery by end-users (Ishaya & Folarin, 2012; Ain et al., 2019) by processing, summarizing, screening and data convergence from various channels (Veeramisti et al., 2020). Due to hyper-competition and technical developments in Big Data in contemporary trade (Cheng et al., 2020; Zhao et al., 2014), a number of decision-making bodies, including company leaders, chief information officers and chief executive officers (CEOs) have identified the BI technology as among the best technological priority (Arnott et al., 2017; Ain et al., 2019; Yeoh & Popovic, 2015).

BI technologies have gained considerable interest from the industry (Trieu, 2017). This is reflected by a dramatic growth in the global BIS industry, which rose by almost 7.3% in 2017, with sales of up to 18.3 USD billion and is projected to hit 22.8 USD billion by the end of 2020 (Ul-Ain et al., 2019). Despite its extreme significance, wide market growth and increasing investment, the planned outcomes were not achieved by more than 70 percent (Boyton et al., 2015; Puklavec & Oliveira, 2014; Puklavec et al., 2018; Ul-Ain et al., 2019) and previous investigations have shown that businesses are not able to benefit from the actual benefits of the implementation of BIS (Boyton et al., 2015; Liang & Liu, 2018; Ain et al., 2019; Yeoh & Popovic, 2015). Further, so many corporations, particularly in developing economies are yet to employ BIS initiatives because of a paucity of knowledge of the advantages, a dearth of skills and knowledge, and a scarcity of budget. Such enterprises are striving hard to find the right determinants for efficient convergence of their BIS (Liang & Liu, 2018; Sun et al., 2018). Further, academic investigations have flourished in relation to data analytics such as BIS (Sivarajah et al., 2017; Zheng et al., 2014). The tactical, and strategic approaches to the effective establishment and implementation of BIS (Ahmad, Miskon, Alabdian et al., 2020; Zheng et al., 2014) are still being addressed by practitioners and academics in a wide number of published studies. Thus, a broad stream of BIS research has been published to date on review and bibliometric studies on BI and analytics (Grublješić & Jaklič, 2015b; Liang & Liu, 2018). For instance, a comprehensive literature review was established by Hatta et al. (2015) on BIS adoption in SMEs from 2009 to 2015. Further, a two-decade systematic literature review

(2000–2019) was recently published by Ain et al. (2019) who comprehensively explored the implementation, usage, and effectiveness of BIS. However, from this viewpoint, the current body of information is incomplete.

The literature shows that BIS adoption decisions are strongly affected by the consideration of the relevant determinants (Magaireah et al., 2019; Yeoh & Popovic, 2015). Yet, there is no systematic analysis available on the adoption/acceptance perspective of the most relevant determinants, theories and models at the level of individual or organization. This SLR therefore attempts to fill the current gaps through the lens of technological, organizational, environmental (TOE), and CEO's perspectives. This review offers a detailed summary of BIS studies from 2011 to 2020, presenting the recent evolution of BIS-relevant theories/framework/models and critical determinants that contribute to the substantive recommendations. The suggested structure would direct business practitioners to consider what kind of determinants and theories are required to take the highest priority into account in order to maximize the true meaning of BIS. It can also help to enhance the capacity of academics and practitioners to work within the theoretical field adequately and effectively (Alter, 2017). The goal of this paper is to discuss the BIS and explore the factors influencing its adoption in the healthcare sector. As such, the paper answers the following questions: "What are the factors that influence BIS adoption in the Healthcare SMEs sector?" and "What are the most relevant theories/framework/models in literature regarding the significant factors influencing the for the BIS adoption?"

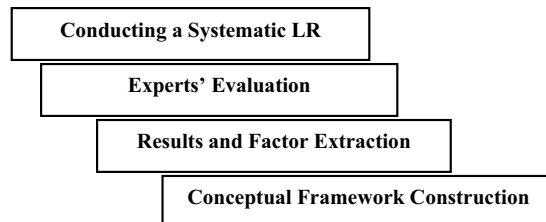
This article introduces the results of BIS adoption in SMEs in the healthcare sector in an attempt to add to the sparse literature on BIS in emerging economies and to compare trends to those in other areas of the world. The article comprises seven sections, deliberating the concepts and tenets that shape the BIS adoption. The first section provides the background of the study and reviews literature generated in developing countries, on BIS adoption and implementation over the past decade. The second section describes the methodology of the study, including an outline of the research methodology used, as well as analysis of the results of the systematic literature review (SLR) used in identifying factors, supported by experts' evaluation. The third section details the results of the survey conducted to evaluate the factors. The fourth section discusses the construction of a conceptual framework, including a description of the TOE dimensions and CEO's characteristics and their factors. In the fifth and sixth sections, the theoretical and practical implications are discussed, respectively. The research limitation and possible recommendations for research are discussed in section seven. Finally, section eight provides the conclusion.

## 2. Methodology

Literature review is a thorough method that serves as the basis for every research which helps to advance science incrementally based on prior findings (Al-emran et al., 2018). SLRs are a method of synthesizing empirical data to address a specific research issue in a straightforward and reproducible manner, while attempting to incorporate all published evidence on the subject and evaluate the validity of this evidence (Lame, 2019). Basically, knowledge advancement must be built on prior work. Therefore, to push the knowledge boundary, we must know where this boundary is. By reviewing important literature, we recognize the width and intensity of the current body of work and pinpoint gaps to explore (Xiao & Watson, 2019). This method aims to uncover references relevant to a subject under review and provides a vital contribution to the research significance.

This systematic review follows Xiao and Watson (2019) guidelines for conducting SLR. The primary explanation for adhering to these guidelines is due to the fact that these guidelines offer evidence-based support for the issue under investigation, and it served as a well-known guide for directing a vast number of systematic reviews (Manz, 2019). This current study conducted an SLR aimed at identifying the important factors that affect BI adoption/acceptance in SMEs in the healthcare sector, and suggests a framework encompassing the relations among the pertinent determinants. An SLR was adopted to accomplish this as it reveals all the pertinent subject matter on a given topic to be examined deeply, as well as letting other unknown concepts to be

**Figure 1. SLR methodological steps followed.**



discovered. Figure 1 shows the methodological steps followed to construct the framework of the study through SLR and experts' evaluation.

The process followed in this SLR is specified in the following sub-sections.

### **2.1. Data collection for SLR**

This study used seven databases as data sources (Emerald, Sage, Elsevier, IEEE, Taylor & Francis, Inderscience, and Springer). These databases are regarded as the major and all-inclusive existing databases of peer-reviewed high impact journals. In the beginning, the study used the following keywords and search terms, both combined and separate, using the Boolean operators “AND” and “OR” and advanced search: “business intelligence system adoption;” “business intelligence system acceptance;” “business intelligence system;” “factors influencing business intelligence system;” “factors affecting business intelligence system;” “business intelligence system in SMEs;” and “business intelligence system in healthcare”.

### **2.2. Inclusion criteria**

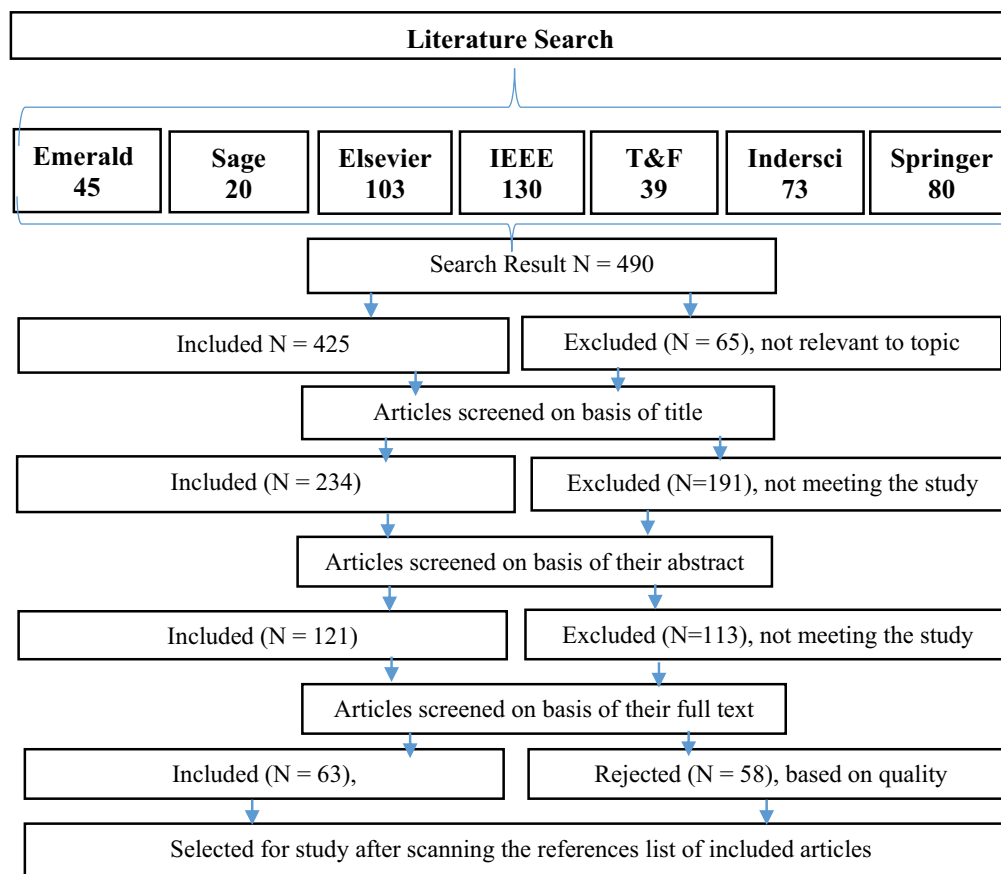
The articles, carefully chosen, provide data that is considered substantial enough for inclusion in the review. The amount of BI adoption study has grown considerably owing to the need to make good decisions in the organization. Thus, the review includes only articles published since 2011. To guarantee the quality and impact in the domain of BI, the authors selected only those articles published from journals indexed in Web of Science (WoS) or Scopus. All the articles selected encompass BI studies and/or studies in related systems such as business analytics. Further, this study only included original empirical studies and conceptual frameworks, written/published in the English language. Other types of articles such as meta-analysis and systematic review were also included.

### **2.3. Extraction of data**

The preliminary stage of the analysis included checking for redundant data. Subsequently, the abstracts were appraised based on the inclusion criteria. If the article was still relevant, the methodology and discussion section were read and recapitulated. The application of open coding was used via the Excel and Mendeley software. Figure 2 shows the SLR framework, portraying the selection process for the papers from the databases. In Step 1, the study identified 490 articles (Emerald, 30; Sage, 45; Elsevier, 103; IEEE, 130; Taylor & Francis, 39; Inderscience, 73; and Springer, 80). In Step 2, 65 articles were considered not relevant to this study and thus excluded in the sample. In Step 3, the abstracts of the 425 remaining articles were assessed to detect any paper that should not be included, resulting in the elimination of an additional 191 articles, leaving 234 articles. In Step 4, introduction of each article was checked comprehensively against the inclusion criteria, resulting in the elimination of a further 113 articles; the total of the remaining 121 articles were then assessed, leading to the exclusion of another 58 articles based on quality. In Step 5, the remaining 63 articles that fully met the inclusion criteria were, thus, chosen.

To confirm that these studies used a coherent description of factors affecting BI adoption, the definitions and items adopted to measure the factors of adoption were reviewed. The pool of articles included in this study matched in terms of research question, aim, frameworks adopted, and findings. The definitions used and the alignment of these definitions to the measurement

**Figure 2. PRISMA flowchart for the selected articles.**



adopted were appraised to ensure that the BI factors examined by the different researchers were largely analogous. The 63 articles included through the SLR highlighted the relationships of factors influencing BI adoption in many organizations that had a similar context with the current study. In this way, the key variables that have a positive influence on BI adoption were assembled.

Table 1 shows the total of the 63 selected articles from six databases, which were classified based on their quality either from SCOPUS or WoS.

#### 2.4. Factors extraction

The study checked through these 63 identified articles and extracted 22 important factors which influence the BIS adoption including: perceived security, relative advantage, compatibility, system quality, trialability, observability, social influence, top-management support, facilitating conditions, government policy, organizational readiness, organization size, complexity, data quality, vendor support, absorptive capacity, manager's innovativeness, manager's IT knowledge, IT infrastructure, organizational resource availability, competitive pressure, and government support.

#### 2.5. Experts' evaluation

According to Mosweu et al. (2016), the experience and integrity of the experts play a key role in choosing the essential factors that affect technology adoption. Additionally, these experts' evaluation method has shown encouraging results in previous examinations when applied to identifying factors for the adoption of information systems by different organizations in both developed and developing economies (Boonstra et al., 2014; Gagnon et al., 2012; Gruenhagen & Parker, 2020; Hawash et al., 2020; Mosweu et al., 2016; Mukred et al., 2019; Schneider & Sunyaev, 2016). Therefore, once the preceding was done and the factors that could influence BI adoption were



**Table 1. Results of the SLR**

| Database         | Authors  | No. of papers selected | Quality of paper |
|------------------|--|------------------------|------------------|
| Emerald          | (Ahmad, 2015; Daradkeh, 2019; El-Adaileh & Foster, 2019; Puklavec et al., 2018; Wang & Byrd, 2017)   | 5                      | SCOPUS & WoS     |
| Elsevier         | (Bach et al., 2016; Božič & Dimovski, 2019; Côte-Real et al., 2014; Llave, 2017; Pejić Bach et al., 2019; Ain et al., 2019)  | 7                      | SCOPUS & WoS     |
| IEEE             | (Adeyelu et al., 2016; Alarmouty & Fraihat, 2019; Anjariny et al., 2016; Apraxine & Stylianou, 2017; Chaveesuk & Horkondee, 2015; Chichti et al., 2016; Chuah, 2010; Concepcion et al., 2019; Daryaei et al., 2013; Elhassan & Klett, 2016; Harb & Alhayajneh, 2019; Jalil et al., 2019; Magaireah et al., 2017; Moyo & Loock, 2017; Shahid et al., 2017; Siemen et al., 2018) | 16                     | SCOPUS & WoS     |
| Inderscience     | (Ghaida, 2018; Hou, 2013, Hou, 2014; Jahantigh et al., 2019; Mathew, 2012; Nasab et al., 2017; Nofal & Yusof, 2016; Pool et al., 2018; Rouhani & Mehri, 2016; Yeoh, 2011; T. E. Yoon et al., 2017)   | 11                     | SCOPUS & WoS     |
| Sage             | (Banerjee & Banerjee, 2017; Bhatiasavi & Naglis, 2020; Han et al., 2014; Hou, 2016)  | 4                      |                  |
| Springer         | (Adeyelu et al., 2018a; A. Ahmad & Hossain, 2018; Ahmad & Miskon, 2020b; Aldossari & Mukhtar, 2019; Caserio & Trucco, 2018a, Caserio & Trucco, 2018b; Ferrari et al., 2011; Indriasari et al., 2019; Moyo & Loock, 2019; Shen et al., 2012; Venkatraman et al., 2018; Venter, 2019)  | 12                     | SCOPUS & WoS     |
| Taylor & Francis | (Adeyelu et al., 2018b; Boonsiritomachai et al., 2016; Grublješić & Jaklič, 2015a; Olszak, 2016; Passlick et al., 2020; Verkoou & Spruit, 2013; Wang, 2014; Yiu et al., 2020)  | 8                      | SCOPUS & WoS     |

identified, they were sent via e-mail to 15 experts from IT, SMEs and Healthcare fields to assess and endorse the factors and/or suggest the addition or removal of any relevant or irrelevant factors, respectively. A description of each factor was added in the questionnaire for easy understanding and appropriate response. The experts' evaluation was administered in May 2020 using an online survey. The experts were asked to anonymously appraise the importance of each factor in relation to BI adoption on a 5-point Likert scale (1 = very low importance to 5 = very high importance). A description of each factor was added in the questionnaire for easy understanding and appropriate response. The experts' evaluation was administered in May 2020. All respondents



were experts in the IT, SME, and Healthcare fields with at least 3 years' experience in their respective discipline. Further, they were all PhD holders, and had published at least one article indexed in either the WoS or Scopus. Consequently, the process resulted in retaining 16 factors which were used to construct the framework of the study (see [Figure 2](#)).

### 3. Results and discussion

In this section, the results of the data gathered from the SLR and the expert evaluation are analysed and deliberated. The data collected from IT, SMEs, and Healthcare experts were analyzed using SPSS and tested using the one-sample t-test (see [Table 2](#)). This test is used to compare the mean of the population ( $X$ ) to the hypothesized value ( $X_{\text{mean}} = 4$ ), indicated by the high importance value in the 5-point Likert scale (1 = very low importance to 5 = very high importance). Therefore, the testing value set for the factors is as follows:

- (1) Included: if the mean of the proposed factor is  $>4$ , the factor is considered important i.e., influences the BI adoption decision.
- (2) Excluded: if the mean of the proposed factor is  $<4$ , the factor is considered unimportant, i.e., does not influence the BI adoption decision.

In [Table 2](#), experts ranked 19 of the 22 factors as important and suggested removing three overlapping factors (facilitating condition, organizational readiness, and technology resources lumped into "organizational resource availability") and suggested the addition of one new factor as significant in influencing BIS adoption: perceived security, relative advantage, compatibility, system quality, trialability, observability, social influence, top-management support, facilitating conditions, government policy, organizational readiness, organization size, complexity, data quality, vendor support, absorptive capacity, manager's innovativeness, manager's IT knowledge, IT infrastructure, manager's attitude toward IT (added by experts), organizational resource availability, competitive pressure, and government support.

### 4. Theories, models and frameworks used in BIS studies

According to the articles included in this review, there are a several theories, frameworks, and models used to explore the major determinants of BIS adoption. Consequently, it is discovered that a total of nine theories, frameworks and models were commonly used in BIS adoption studies. Majority of these identified studies have used TOE framework, diffusion of innovation (DOI) theory, or institutional theory. while some which used IS adoption model for small businesses, unified theory of acceptance and use of technology (UTAUT) theory of planned behavior (TPB), resource-based view (RBV) and technology acceptance model (TAM). DOI, institutional theory, RBV and TOE were used for BIS adoption at firm level, while, UTAUT, TPB, IS adoption model for small businesses and TAM were used for BIS adoption at an individual level.

Therefore, based on the review of adoption theories and models, as shown in [Figure 2](#), the 16 identified factors were classified into four dimensions using the technology-organization-environment (TOE) framework (Tornatzky & Fleischer, 1990) and the "IS adoption model for small businesses" (Thong, 1999) as follows: technology (5 factors); organization (5 factors); environment (3 factors), and manager (3 factors). These factors were considered to be important in the adoption of BI in the healthcare sector, as detailed below.

### 5. Conceptual framework construction

This part provides an explanation of the four classified dimensions and the definition of the constructs required for the construction of the conceptual framework.

#### 5.1. Technology characteristics

A critical review of IT adoption literature discloses that technological contexts of innovation are the main emphasis of numerous IT adoption studies (Oliveira & Martins, 2011). The technological

**Table 2. Result of the experts' evaluation**

| Factors                              | N  | Mean  | t      | Sig. (2-tailed) | 95% Confidence Interval of the Difference |       | Decision |
|--------------------------------------|----|-------|--------|-----------------|---|-------|----------|
|                                      |    |       |        |                 | Lower                                     | Upper |          |
| Perceived security                   | 15 | 3.933 | -0.269 | .792            | -.599                                     | .466  | Excluded |
| Relative advantage                   | 15 | 4.733 | 6.205  | .000            | .480                                      | .987  | Included |
| Compatibility                        | 15 | 4.600 | 4.583  | .000            | .319                                      | .881  | Included |
| System quality                       | 15 | 3.867 | -0.564 | .582            | -.640                                     | .374  | Excluded |
| Triability                           | 15 | 4.667 | 5.292  | .000            | .396                                      | .937  | Included |
| Observability                        | 15 | 4.467 | 3.500  | .004            | .181                                      | .753  | Included |
| Social influence,                    | 15 | 3.800 | -0.899 | .384            | -.677                                     | .277  | Excluded |
| Top-mgt. support,                    | 15 | 5.000 | 3.055  | .009            | .119                                      | .681  | Included |
| Facilitating conditions,             | 15 | 4.400 | 6.205  | .000            | .480                                      | .987  | Excluded |
| Government policy                    | 15 | 4.733 | 4.583  | .000            | .319                                      | .881  | Included |
| Organizational readiness             | 15 | 4.600 | 4.583  | .000            | .319                                      | .881  | Excluded |
| Organization size                    | 15 | 4.600 | 2.646  | .019            | .063                                      | .604  | Included |
| Complexity                           | 15 | 4.333 | 4.000  | .001            | .247                                      | .819  | Included |
| Data quality                         | 15 | 3.800 | 4.000  | .001            | .247                                      | .819  | Excluded |
| Vendor support                       | 15 | 4.533 | 3.055  | .009            | .119                                      | .681  | Included |
| Absorptive capacity                  | 15 | 4.400 | 3.500  | .004            | .181                                      | .753  | Included |
| Manager's innovativeness,            | 15 | 4.467 | 4.583  | .000            | .319                                      | .881  | Included |
| Manager's IT knowledge,              | 15 | 4.600 | 2.646  | .019            | .063                                      | .604  | Included |
| IT infrastructure,                   | 15 | 4.333 | 4.000  | .001            | .247                                      | .819  | Excluded |
| Organizational resource availability | 15 | 4.800 | 4.000  | .001            | .247                                      | .819  | Included |
| Competitive pressure                 | 15 | 4.533 | 4.000  | .001            | .247                                      | .819  | Included |
| Government support                   | 15 | 4.533 | 4.000  | .001            | .247                                      | .819  | Included |

**Table 3. Definitions of technological characteristics**

| Constructs         | Description  | References            |
|--------------------|--|-----------------------|
| Relative advantage | Is the level to which an idea is considered to be greater than the idea it replaces  | Rogers, 2003,         |
| Complexity         | Is the level to which an invention is considered as impossible to grasp and use. It is the extent to which new technology such as BI is perceived as relatively intricate to comprehend and use.   | (Rogers, 1995).       |
| Compatibility      | Compatibility refers to the extent to which an idea is considered to be aligned with values, past perceptions and future implementation needs. Thus, it is the extent to which IT system is in harmony with existing values and experiences of a given organisation. | (Rogers, 1995).       |
| Observability      | Is the opportunity to track both innovation and its consequences. It designates how much people can see the influence of technology adoption prior to the adoption.  | (McCann et al., 2014) |
| Trialability       | Trialability is the degree to which prospective users have the chance to test an innovation. It is the organizational or individual ability to experiment, use, and practice new technologies or services prior to procuring or utilizing them.                      | (Rogers, 1995).       |

aspect of adoption defines the characteristics of external and internal technologies that might influence organizations or individuals (Khayer, Talukder et al., 2020). According to Tornatzky and Fleischer (1990), the technological context comprises both the external as well as internal technologies that are pertinent to the organizations. The external technologies of the organizations are those that are readily available in the market but are not presently adopted by a given firm; these technologies can affect innovation “by demarcating the limits of what is possible as well as by showing firms ways in which technology can enable them to evolve and adapt” (Baker, 2012, p. 232). The internal technologies of the organizations encompass the current equipment and practices of the organization, which are important in the decision to adopt innovation because they set a broad perimeter on the scope and pace of technological transformation that a firm can accept (Baker, 2012).

Based on the SLR and experts’ evaluation, the factors screened were exactly the Rogers’ five technological factors (Relative advantage, Complexity, Compatibility, Trialability, and Observability - see Table 3 for the definitions). According to Banapour et al. (2020) and Pipitwanichakarn and Wongtada (2019), the factors in Rogers (2003) theory of diffusion of innovation (DOI) are the most commonly studied factors used to examine the impact of technological factors on technology adoption by SMEs. Many studies used these technological characteristics as a criteria for determining the level of IT adoption in a business (Karunagaran et al., 2019; Khayer, Talukder et al., 2020; Ma & Lee, 2019; S. Z. Ahmad et al., 2019). Accordingly, S. Z. Ahmad et al. (2019) employed these attributes to examine social media adoption by SMEs in UAE. Also, Hiran and Henten (2020) used these elements to study the adoption of cloud computing in the Ethiopian higher education sector. Further, C. Yoon et al. (2020) used these

**Table 4. Definitions of Organizational characteristics**

| Constructs                                  | Description  | References   |
|---|--|--|
| <b>Absorptive capacity</b>                  | It is a firm's ability to identify, assimilate and apply the importance of new knowledge. It is the organizational ability to absorb and utilize knowledge from their environment. It acts an interfunctional harmonization role in assimilating and utilizing knowledge from the market, which could profit the organization.   | (Alexiou et al., 2019).<br>(Najafi-Tavani et al., 2016). |
| <b>Organizational resource availability</b> | "Resources are material and non-material capabilities that facilitate and support production and productivity" They are stocks of accessible factors that are possessed or regulated by organization.  | (Imran et al., 2019, p. 2)                               |
| <b>Top management support</b>               | It refers to the degree to which top management recognises the significance of the IS position and the extent to which it is engaged in IS activities  | (Ragu-Nathan et al., 2004).                              |
| <b>Organizational Size</b>                  | Organizational size is determined by many parameters such as target market size, number of employees, and capital investment made in an organization. Firm size is one more vital factor that can influence technology adoption. Adopting new innovations encompasses a huge investment that is equivalent to the size of a given organization.  | Anand and Kulshreshtha (2007)<br>(Rogers, 2003).         |
| <b>Presence of Champion</b>                 | The project champion refers to a management-level person who identifies the worth of an idea for the organization, and spearheads authority and resources for such an idea all the way through its development and implementation stage. Champions were influential in inspiring others to support the new innovation and surmounting barriers to its adoption and subsequent execution. | (Urquhart et al., 2019).<br>(Meyer, 2000).               |

same elements to investigate the factors affecting the adoption of the smart farm in Korea. These studies found these attributes important for technology adoption. This is also in line with Teixeira et al. (2018), who conducted a theoretical analysis of 41 articles focused on 45 factors related to organizational digital marketing adoption and found that relative advantage, compatibility and complexity, observability, and trialability are relevant factors associated with innovation adoption. In addition, the results of the meta-analysis of Hameed and Counsell (2014) confirm that these elements are strong factors of IT innovation adoption.

This technical dimension gives recommendations for best practice that allow organizations to handle electronic information and data protection over time and the system is implemented by technological changes. Therefore, a large range of variables affecting device implementation, which has many related benefits, form the technology component. If introduced as part of business continuity and as an autonomous method, business analytics is more likely to be

**Table 5. Definitions of Environmental characteristics**

| Constructs           | Description   | References   |
|----------------------|---|--|
| Competitive pressure | As the business environment is ever-changing, competition from other actors in the market upsurges, business organizations are more prone and compelled to pursue ways of realizing viable competitive advantage via innovative technologies. Every organization meticulously monitors the action of other actors to accomplish competitive advantages. New IT adoption is commonly acknowledged as a strategic requirement for organizational survival in today's great competitive and endlessly ever-changing business environment | (Cruz-Jesus et al., 2019).<br>(Khayer, Jahan et al., 2020).                        |
| Vendor Support       | The role of the vendor in terms of the provision of support to their customers and its users has been the subject of deliberation for a long period. Vendor support can be offered either by vendors, or by consultants. This support includes training of the users, help during implementation and maintenance, as well as software updates   | (Bhatiasevi & Naglis, 2020)<br>(Branco et al., 2019)<br>(Chatzoglou et al., 2017). |
| Government Support   | Government support denotes financial and administrative support given to the organizations by the government in the process of hosting and employing new IT. It also signifies the extent to which organizations are shaped by government actions for stimulating the industry. It is about the availability of relevant government policies and initiatives for stimulating the adoption of technologies by organizations  | (C. Yoon et al., 2020)<br>(Park & Kim, 2019)<br>(Chau et al., 2020).               |

embraced as necessary technological and infrastructure support for information processing in the enterprise (An & Wang, 2010; Sittig et al., 2014).

## 5.2. Organizational characteristics

According to Tornatzky and Fleischer (1990), organizational processes and structure can facilitate and/or inhibit innovation adoption. In the technology adoption context, characteristics of an organization exert a major role in the organizational adoption decision. Organizational characteristics refer to the internal considerations and characteristics of the organization (Clohessy et al., 2019; S. Z. Ahmad et al., 2019). A review of relevant literature indicates several organizational characteristics that may impact technological innovation adoption. These characteristics include all the features of the organization comprising the number of employees, revenue, degree of centralization and formalization, and managerial structure and its resources, including staff and their relationships and networks (Tornatzky & Fleischer, 1990). Given the characteristics of SMEs and based on the results above, the organizational factors that this study will focus on are: presence of champion, absorptive capacity, management support, organizational size, and organizational resource availability (see Table 4 for the definitions).

**Table 6. Definitions of Managers' characteristics**

| Constructs                                     | Description  | References   |
|--|--|--|
| <b>CEO's/Owner-managers' innovativeness</b>    | This refers to the degree to which a CEO is prepared to consciously implement innovative strategic strategies and technology to strengthen the organization. It refers to the enthusiasm of the CEO for the introduction of new technologies. Innovative CEOs play a vibrant role in influencing SMEs to adopt technology because they are more likely to generate new thoughts and ideas, assume high risks by employing new technology that may reinvigorate the business structure, move organization to a competitive position and upsurge its efficiency. | (Chau et al., 2020).<br>(Hameed & Counsell, 2012)<br>(Hameed & Counsell, 2012)       |
| <b>Owner-managers' IT knowledge</b>            | It refers to the strength of the IT awareness of managers about new innovative technology, which determines how new innovative technologies could be implemented early/late. It refers to the intensity of managers' IT knowledge concerning the new innovative technology, which defines how early/late new innovative technologies could be embraced. Managers' IT knowledge includes experience, skills, as well as training concerning IT usage.   | (Alrousan et al., 2020)<br>(Chau et al., 2020)<br>(Kannabiran & Dharmalingam, 2012). |
| <b>CEOs/Owner-managers' Attitude toward IT</b> | <b>Attitude toward IT</b> refers to the extent to which a positive or negative personal assessment of IT is hold by the individual. A lack of positive perceptions of worth in IT adoption, slanted toward negative perceptions concerning costs and a shortage of resources, lead to a failure to realize the strategic fit of these new IT applications with their business model. Organizations with affirmative attitudes toward IT adopt and use IT more efficiently.   | (Jones et al., 2014).  |

### 5.3. Environmental characteristics

Based on an analysis of literature on technology innovation, environmental characteristics are generally treated as a vital determining factor of innovation adoption (Damanpour & Schneider, 2006). It is essential to assess the effect of environmental factors prior to adopting a technology as they impact the success of any innovation adoption (Damanpour & Schneider, 2006). The environmental characteristics in the TOE framework integrates the availability of technology service providers, the structure of the industry, and the flexible organizational environment (Awa et al., 2016). The environmental context aids in offering better insight of the power of external environmental pressures on organizational technology adoption (Gutierrez et al., 2015; Taylor, 2019). Environmental characteristics have long been recognized as a motivating force for innovation, as cited in several published innovation studies. Environmental variables include external circumstances under which the company works (S. Z. Ahmad et al., 2019). In general, this study examines three environmental innovation characteristics for BI adoption by small and

medium-sized enterprises: vendor support, competitive pressure, and government support (see [Table 5](#) for the definitions).

#### **5.4. Owner-manager characteristics**

Characteristics of the owner-managers are another force that drives firms to adopt technological innovation. The literature reveals that the process of how potential adopters perceive innovation is one of the main determinants of adoption in many diffusion models (Ghobakhloo & Hong Tang 2013; Nguyen & Waring 2013). The owner-manager is the exclusive decision-maker having a direct influence on decision processes ranging from day-to-day functions to impending investments (Mazzarol & Reboud, 2020). They are individuals who are “frequently found to be working alone, with limited resources and high levels of uncertainty. They are often forced to depend on others, external to their firm, for assistance due to the absence of sufficient resources to bring such capacity ‘in-house’” (2020, p. 140). They are generally the principal shareholder with a position in the management board of the organization (Joe et al., 2019). Several studies on SMEs have advocated that the role of owner-managers is fundamental to the organization as their decisions affect both present and future activities of the organization. Therefore, based on SLR and experts’ evaluation, three constructs under the characteristics of owner-managers are examined in this study: Owner-managers’ innovativeness, attitude toward IT, and IT knowledge (see [Table 6](#) for the definitions).

#### **5.5. Proposed conceptual framework**

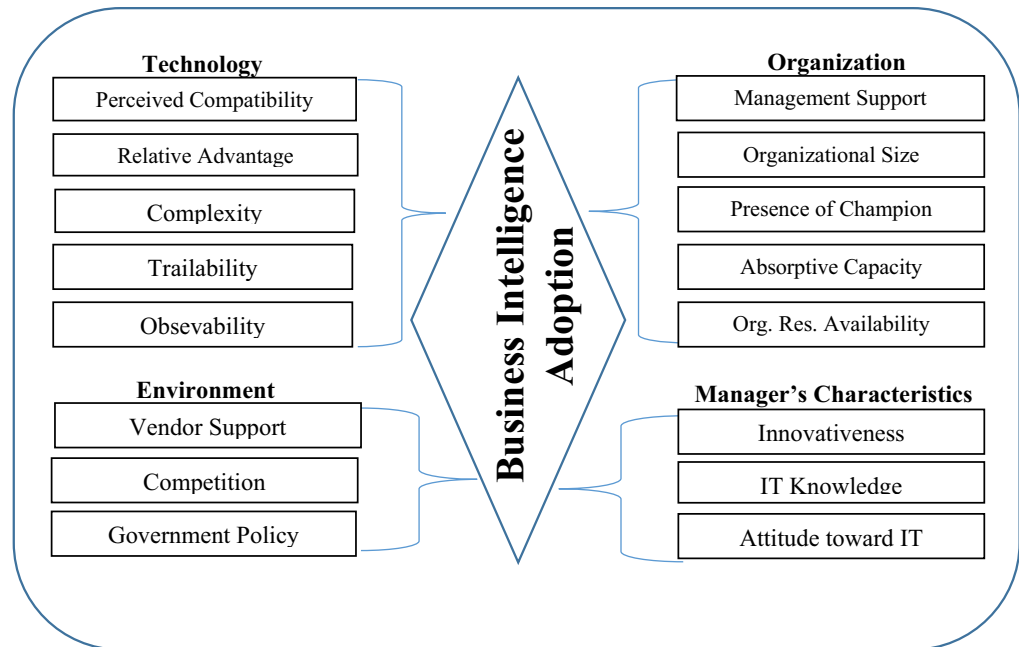
The aim of a conceptual framework is to identify and define the related concepts and the relationships between them (Aziz et al., 2018). A methodological structure that can be used to help and enhance the implementation of BIS is proposed in this paper. It is relevant to the principles, scientific analysis, and substantial hypotheses used in this study to discover and systemize the information introduced (Morioka & Carvalho, 2016; Ngulube, 2018). The conceptual structure thus describes the factors that affect the adoption of BIS to facilitate organizational continuity, such as technology, organization, environmental, and CEO factors, and reflects on promoting the awareness and desire of users to adopt BIS. The proposed conceptual structure contributes to the exploration of factors which can be used to determine the implementation of BIS in healthcare SMEs.

To this end, this analysis integrates “Diffusion of Innovation” theory (Rogers, 2003), “technology–organisation–environment (TOE) framework” (Tornatzky & Fleischer, 1990) and the “IS adoption model for small businesses” (Thong, 1999). with a range of factors chosen in one framework by the experts to better understand the problems impacting users in the healthcare SMEs’ field with regard to the adoption of this new system (see [Figure 2](#)). This framework demonstrates the influences of the five technological factors (relative advantage, complexity, compatibility, trialability, and observability); five organizational factors (presence of champion, absorptive capacity, management support, organizational size, and organizational resource availability); three environmental factors (vendor support, competitive pressure, and government support); and CEO factors (owner-managers’ innovativeness, attitude toward IT, and IT knowledge) on healthcare SMEs in adopting BIS. To describe the adoption outcomes in organizations, these variables can be integrated and they can be classified into the framework of TOE and IS adoption model for small businesses. But, for classifying variables, the frameworks are taxonomies, and it is not a reflection of an interconnected philosophical framework or a well-developed theory. The variables can vary from one context to the next within the frameworks, and thus for enrichment, certain other variables have to be integrated into it. This is the justification for using TOE and IS adoption model for small business as the foundation of this paper.

In [Figure 3](#), the suggested explanatory structure consists of four characteristics: technology characteristics, organizational characteristics, environment characteristics, and CEO’s characteristics. The goal of this framework is to establish a conceptual model of BIS acceptance with a succinct forecast and a simple interpretation of the key constructs and determinants. The framework is built with the combination of most possible models and theories such as the TOE,



**Figure 3. Conceptual framework.**



DOI, and IS framework for small businesses. Previously published literature has verified the regular convergence of the TOE paradigm with other frameworks to investigate the acceptance of innovations. Initially, the TOE did not have a solid model with determined variables affecting the technological acceptance decision of the companies. It only provided a taxonomy for the determinants within their respective context for categorization (Gangwar et al., 2015). In other words, the TOE framework has ambiguous major constructs and is too broad. Thus, this framework is required to be reinforced by incorporating it with the models having unblemished constructs. Therefore, scholars have encouraged the need for combining TOE and other models so that the predictive strength of the resulting model can be advanced and some of their specific shortcomings can be surmounted. Further, in the CEO's context, TOE does not have clear constructs for innovation acceptance. As a result, to address this void, the IS framework for SMEs has been incorporated.

## 6. Theoretical implications

The theoretical framework for the development of BIS is intended to provide an accurate description of potential determinants and a clear prediction of the successful adoption of BIS in organizations. It may affect the decisions of practitioners prior to integrating and adopting the BIS in their organization. The proposed framework would significantly contribute to the development of the BIS acceptance/adoption theory that is almost non-existent in current literature (Ahmad, Miskon, Alkanhal et al., 2020). A few developed models and theories have been proposed for the adoption of the BIS at the organizational level as well as for the acceptance of the BIS at the individual level. This is one of the first theoretical structures that has implemented the acceptance construct at the level of the individual as well as TOE frameworks with the goal of implementing the BIS at the organizational level. In the literature, all contexts have been extensively discussed and independently researched, but limited researchers have dwelled on the value of user acceptance to complete the implementation of BIS at the company level. Further, not only will this conceptual model and theoretical framework contribute to the body of knowledge in the BIS field, but it will also open new research horizons. In addition, the new conceptual model may be generalized or refined to produce new models or theories.

## 7. Practical implications

A systematic literature analysis of selected research from business and scholarly publications is the foundation of the present article. Next, a list of the most possible determinants is presented in the results. In different circumstances of each organization, determinants were used for the adoption and recognition of BIS in organizations, but the same determinants could lose their meaning in other business scenarios. Therefore, the collection of determinants according to the specifications of the organization and sector is necessary for producing better returns from BIS programmes. Further, prior studies indicate that the BIS raises market value generally in sectors such as education, telecommunications, insurance, research, supply chain, and retail chain businesses, etc. Hence, this analysis would make a considerable contribution to decision-making processes prior to the incorporation of the BIS into businesses. To be specific, this research empowers market analysts and policymakers to achieve a better understanding of the various aspects of an effective implementation of BIS determinants. Various determinants are illustrated here; strategic interest may be drawn, such as, manager's innovativeness and management support. Managers need to understand the key steps that contribute to the successful implementation of BIS in organizations in order to pursue these study results. In terms of environmental determinants, companies should also be mindful of the essential challenges and uncertainties associated with BIS implementation. This study will direct BI vendors and cloud service providers to pay attention to complexity and compatibility issues in solving BIS investments, especially for small to medium-sized organizations in developed countries.

## 8. Research limitations and future research guidelines

Like many other studies, this study is not without some drawbacks. Firstly, owing to the nature of the published research, the determinants are studied initially from a theoretical background. The determinants are taken from the studies defined for the SMEs in the healthcare sector. For different sectors, there could be different determinants that affect the decisions of the companies in various circumstances to adopt the BIS. Secondly, the key purpose of this review was to explore the significant determinants that could affect the decision of the organizations to conceptually implement the BIS. The study was carried out on the theoretical basis findings of previously obtained quantitative. There is a shortage of case studies needed to show in a realistic manner that the current research results are more relevant. Practical implementation is expected by industry experts and practitioners in order to further expand the current study findings. Thirdly, owing to human intervention, the complexity of word definitions and textual interpretation methods, biases cannot be eliminated, while utmost attempts are taken to ensure that the findings are more reliable and minimize the biases. Therefore, from a theoretical viewpoint, the findings might represent typical phenomena. Very few researches discussed the approval of BIS at the individual level. Individual level theories and frameworks such as decision theory, motivation theory, stakeholder theory, and social cognitive theory for implementing the BIS should be considered and suggested by researchers. Before the acceptance decision of BIS in organizations, RBV and critical Success Factor (CSF) theories should also be considered. These will help to define the significant resources and skills that form the strategic edge and lead to the success of BIS projects. Fourthly, this study explored the determinants comprehensively with analytical lenses that were most important for the BIS research field. However, there was no association between the determinants and their effects on the consequences of success, such as the efficacy and reliability of the decision-making process. In addition, a meta-analysis may be used by research to broaden the awareness in this area. Fifthly, the framework developed in this SLR needs to be tested using different statistical techniques such as PLS-SEM and/or MCDM. This would provide a clear picture of the most significant factor(s) that influence the adoption decision. Finally, the findings of this study can be used by researchers and practitioners to better understand and properly align their efforts to address the practical challenges of adopting BIS. Researchers can use this literature review to get a summary of existing studies, define new research issues, and place and coordinate their own work. More specifically, they can use this classification system to explain and analyze the context of the organizations they are researching. Further, the framework presented here can be used by practitioners to consider how they can exploit BIS in their own context and to recognize the realistic obstacles they might encounter while doing so.

## 9. Conclusion

A systematic literature review was undertaken to explore the most possible determinants and theories that impact the adoption and recognition of BIS in organizations. A total of 63 studies conducted in the last decade (2011–2020) were identified and reported. After the analysis of the results, a total of 22 determinants was identified and grouped into four contexts namely technology, organization, environment, and CEO's characteristics. In comparison, the researches listed were carried out in the healthcare industry. The findings also revealed that most of the BIS studies on the current topic of research were done for banks and several companies in developing countries. Therefore, from the viewpoint of the implementation of BIS, researchers should also pay heed to developing countries. Finally, more experiments are proposed to be carried out with respect to the uncovering of determinants that could impact the BIS projects by applying some other models and theories, including refining current theories and models. It is also noted that there is sufficient room for the current theoretical structure and conceptual model to be tested and checked with quantitative, qualitative, and mixed process testing methods to develop more refined models in the future.

### Funding

This work was supported by Fundamental Research Grant Scheme (FRGS) (Grant Number: 14449) from Kementerian Pengajian Tinggi (KPM) & Universiti Utara, Malaysia.

### Author details

Isyaku Salisu<sup>1</sup>

E-mail: [Salisu\\_isyaku@ahsgs.uum.edu.my](mailto:Salisu_isyaku@ahsgs.uum.edu.my)

ORCID ID: <http://orcid.org/0000-0002-2277-1805>

Mazlan Bin Mohd Sappri<sup>1</sup>

Mohd Faizal Bin Omar<sup>2</sup>

<sup>1</sup> School of Quantitative Science, Universiti Utara Malaysia, Sintok, Kedah, Malaysia.

<sup>2</sup> Innovation and Commercialisation Centre, Sintok, Kedah, Malaysia.

### Citation information

Cite this article as: The adoption of business intelligence systems in small and medium enterprises in the healthcare sector: A systematic literature review, Isyaku Salisu, Mazlan Bin Mohd Sappri & Mohd Faizal Bin Omar, *Cogent Business & Management* (2021), 8: 1935663.

### References

- Adeyelu, T. S., Kalema, B. M., & Bwalya, K. J. (2016). Development of mobile business intelligence framework for small and medium enterprises in developing countries case study of South Africa and Nigeria. *2016 4th International Symposium on Computational and Business Intelligence (ISCBI)*, 11–14. Hong Kong. <https://doi.org/10.1007/s12351-017-0343-4>
- Adeyelu, T. S., Kalema, B. M., & Bwalya, K. J. (2018a). A framework for deployment of mobile business intelligence within small and medium enterprises in developing countries. *Operational Research*, 18(3), 825–839. <https://doi.org/10.1007/s12351-017-0343-4>
- Adeyelu, T. S., Kalema, B. M., & Bwalya, K. J. (2018b). Deployment factors for mobile business intelligence in developing countries small and medium enterprises. *African Journal of Science, Technology, Innovation and Development*, 10(6), 715–723. <https://doi.org/10.1080/20421338.2018.1491137>
- Ahmad, A. (2015). Business intelligence for sustainable competitive advantage. In Quaddus M. & Woodside A.G (Eds.), *Sustaining competitive advantage via business intelligence, knowledge management, and system dynamics* (pp. iii). <https://doi.org/10.1108/s1069-09642015000022b008>
- Ahmad, A., & Hossain, M. A. (2018). Assimilation of business intelligence systems: The mediating role of organizational knowledge culture. In S. A. Al-Sharhan, A. C. Simintiras, Y. K. Dwivedi, M. Janssen, M. Mäntymäki, L. Tahat, & N. P. Rana (Eds.), *Challenges and Opportunities in the Digital Era 17th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3E 2018, Kuwait City, Kuwait* (Vol. 10, pp. 635–641). <https://doi.org/10.1108/WHATT-07-2018-0042>
- Ahmad, S., & Miskon, S. (2020a). The adoption of business intelligence systems in textile and apparel industry: Case studies. In F. Saeed, F. Mohammed, & N. Gazem (Eds.), *Emerging Trends in Intelligent Computing and Informatics* (pp. 12–23). Springer Nature: Switzerland AG.
- Ahmad, S., & Miskon, S. (2020b). The adoption of business intelligence systems in textile and apparel industry: Case studies. In F. Saeed, F. Mohammed, & N. Gazem, (Eds.), *Emerging trends in intelligent computing and informatics data science, intelligent information systems and smart computing, advances in intelligent systems and computing Volume 1073* (pp. 12–23). Springer Nature: Switzerland AG. [https://doi.org/10.1007/978-3-030-33582-3\\_2](https://doi.org/10.1007/978-3-030-33582-3_2)
- Ahmad, S., Miskon, S., Alabdhan, R., & Tlili, I. (2020). Towards sustainable textile and apparel industry: Exploring the role of business intelligence systems in the era of industry 4.0. *Sustainability* (Switzerland), 12(7), 1–23. <https://doi.org/10.3390/su12072632>
- Ahmad, S., Miskon, S., Alkanhal, T. A., & Tlili, I. (2020). Modeling of business intelligence systems using the potential determinants and theories with the lens of individual, technological, organizational, and environmental contexts-a systematic literature review. *Applied Sciences* (Switzerland), 10(9), 1–23. <https://doi.org/10.3390/app10093208>
- Ahmad, S. Z., Abu Bakar, A. R., & Ahmad, N. (2019). Social media adoption and its impact on firm performance: The case of the UAE. *International Journal of Entrepreneurial Behavior & Research*, 25(1), 84–111. <https://doi.org/10.1108/IJEBR-08-2017-0299>
- Alarmouty, B., & Fraihat, S. (2019). Data analytics and business intelligence framework for stock market trading. *2019 2nd International Conference on New Trends in Computing Sciences, ICTCS 2019 - Proceedings, Amman, Jordan*. <https://doi.org/10.1109/ICTCS.2019.8923059>
- Aldossari, S., & Mukhtar, U. A. (2019). Enterprise resource planning and business intelligence to enhance organizational performance in private sector of KSA: A preliminary review. In N. Gazem, F. Saeed, F. Mohammed, & A. Busalim (Eds.), *Recent Trends in Data Science and Soft Computing: Proceedings of the 3rd International Conference of Reliable Information and Communication Technology (IRICT 2018), Kuala Lumpur, Malaysia* (Vol. 843, pp. 343–352). <https://doi.org/10.1007/978-3-319-99007-1>

- Al-emran, M., Mezhuhev, V., Kamaludin, A., Kamaludin, A., Mezhuhev, V., & Kamaludin, A. (2018). Technology acceptance model in M-learning context: A systematic review. *Computers & Education*, 125, 389–412. <https://doi.org/10.1016/j.compedu.2018.06.008>
- Alexiou, A., Khanagha, S., & Schippers, M. C. (2019). Productive organizational energy mediates the impact of organizational structure on absorptive capacity. *Long Range Planning*, 52(2), 155–172. <https://doi.org/10.1016/j.lrp.2018.02.001>
- Alrousan, M. K., Al-Adwan, A. S., Al-Madadha, A., & Al-Khasawneh, M. H. (2020). Factors affecting the adoption of E-Marketing by decision makers in SMEs: Evidence from Jordan. *International Journal of E-Business Research*, 16(1), 1–27. <https://doi.org/10.4018/IJEER.2020010101>
- Alter, S. (2017). Nothing is more practical than a good conceptual artifact ... which may be a theory, framework, model, metaphor, paradigm or perhaps some other abstraction. *Information Systems Journal*, 27(5), 671–693. <https://doi.org/10.1111/isj.12116>
- An, X., & Wang, W. (2010). The integrated use of business continuity management systems, records management systems and knowledge management systems. *2010 International Conference on Management and Service Science*, MASS 2010, Wuhan, China. <https://doi.org/10.1109/ICMSS.2010.5576713>
- Anand, A., & Kulshreshtha, S. (2007). The B2C adoption in retail firms in India. *2nd International Conference on Systems, ICONS 2007, Sainte-Luce, Martinique, France*, 0–5. <https://doi.org/10.1109/ICONS.2007.55>
- Anjariy, A. H., Zeki, A. M., & Abubakar, A. I. (2016). The mediating effect of teamwork toward organizational readiness for Business Intelligence (BI) implementation. *Proceedings - 2015 4th International Conference on Advanced Computer Science Applications and Technologies, ACSAT 2015, Kuala Lumpur, Malaysia* 176–181. <https://doi.org/10.1109/ACSAT.2015.32>
- Apraxine, D., & Stylianou, E. (2017). Business Intelligence in a Higher Educational Institution. *Proceedings of 2017 IEEE Global Engineering Education Conference (Educon2017)*, (April), 1735–1746.
- Arnott, D., Lizama, F., & Song, Y. (2017). Patterns of business intelligence systems use in organizations. *Decision Support Systems*, 97, 58–68. <https://doi.org/10.1016/j.dss.2017.03.005>
- Awa, H. O., Ukoha, O., & Emecheta, B. C. (2016). Using T-O-E theoretical framework to study the adoption of ERP solution. *Cogent Business and Management*, 3(1), 1196571. <https://doi.org/10.1080/23311975.2016.1196571>
- Aziz, A. A., Yusof, Z. M., Mokhtar, U. A., & Jambari, D. I. (2018). A conceptual model for electronic document and records management system adoption in Malaysian public sector. *International Journal on Advanced Science, Engineering and Information Technology*, 8(4), 1191–1197. <https://doi.org/10.18517/ijaseit.8.4.6376>
- Bach, M. P., Čeljo, A., & Zoroja, J. (2016). Technology acceptance model for business intelligence systems: Preliminary research. *Procedia Computer Science*, 100, 995–1001. <https://doi.org/10.1016/j.procs.2016.09.270>
- Baker, J. (2012). The technology–organization–environment framework. Y. K. Dwivedi, M. R. Wade, & S. L. Schneberger (Eds.), *Information systems theory: Explaining and predicting our digital society* (Vol. 1, pp. 231–245). New York, NY: Springer. <https://doi.org/10.1007/978-1-4419-6108-2>
- Banapour, P., Yuh, B., Chenam, A., Shen, J. K., Ruel, N., Han, E. S., Kim, J. Y., Maghami, E. G., Pigazzi, A., Raz, D. J., Singh, G. P., Wakabayashi, M., Woo, Y., Fong, Y., & Lau, C. S. (2020). Readmission and complications after robotic surgery: Experience of 10,000 operations at a comprehensive cancer center. *Journal of Robotic Surgery*, 15(1), 0123456789. <https://doi.org/10.1007/s11701-020-01077-4>
- Banerjee, A., & Banerjee, T. (2017). Determinants of analytics process adoption in emerging economies: Perspectives from the marketing domain in India. *Vikalpa, the Journal for Decision Makers*, 42(2), 95–110. <https://doi.org/10.1177/0256090917704560>
- Bhatiasevi, V., & Naglis, M. (2020). Elucidating the determinants of business intelligence adoption and organizational performance. *Information Development*, 36(1), 78–96. <https://doi.org/10.1177/0266666918811394>
- Boonsiritomachai, W., McGrath, G. M., & Burgess, S. (2016). Exploring business intelligence and its depth of maturity in Thai SMEs. *Cogent Business and Management*, 3(1), 1–17. <https://doi.org/10.1080/23311975.2016.1220663>
- Boonstra, A., Versluis, A., & Vos, J. F. J. (2014). Implementing electronic health records in hospitals: A systematic literature review. *BMC Health Services Research*, 14(1), 1–24. <https://doi.org/10.1186/1472-6963-14-370>
- Boyton, J., Ayscough, P., Kaveri, D., & Chiong, R. (2015). Suboptimal business intelligence implementations: Understanding and addressing the problems. *Journal of Systems and Information Technology*, 17(3), 307–320. <https://doi.org/10.1108/JSIT-03-2015-0023>
- Božić, K., & Dimovski, V. (2019). Business intelligence and analytics for value creation: The role of absorptive capacity. *International Journal of Information Management*, 46(November2018), 93–103. <https://doi.org/10.1016/j.ijinfomgt.2018.11.020>
- Branco, T., Bianchi, I., & De Sá-soares, F. (2019). Cloud computing adoption in the government sector in Brazil: An exploratory study with recommendations from IT Managers. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 11484(LNCS), 162–175. [https://doi.org/10.1007/978-3-030-19223-5\\_12](https://doi.org/10.1007/978-3-030-19223-5_12)
- Caserio, C., & Trucco, S. (2018a). ERP and BI as tools to improve information quality in the Italian setting: Empirical analysis. *Contributions to Management Science*, 105–130. [https://doi.org/10.1007/978-3-319-77679-8\\_5](https://doi.org/10.1007/978-3-319-77679-8_5)
- Caserio, C., & Trucco, S. (2018b). ERP and BI as tools to improve information quality in the Italian setting: The research design. *Contributions to Management Science*, 75–104. [https://doi.org/10.1007/978-3-319-77679-8\\_4](https://doi.org/10.1007/978-3-319-77679-8_4)
- Chang, Y. W., Hsu, P. Y., & Wu, Z. Y. (2015). Exploring managers' intention to use business intelligence: The role of motivations. *Behaviour and Information Technology*, 34(3), 273–285. <https://doi.org/10.1080/0144929X.2014.968208>
- Chatzoglou, P., Chatzoudes, D., Fragidis, L., & Symeonidis, S. (2017). Examining the critical success factors for ERP implementation: An explanatory study conducted in SMEs. E. Ziemba (Ed.), *Information technology for management: New ideas and real solutions*. AITM 2016, ISM 2016. *Lecture Notes in Business Information Processing*, Springer, Cham (Vol. 277, pp. 179–201). <https://doi.org/10.1007/978-3-319-53076-5>



- Chau, N. T., Deng, H., & Tay, R. (2020). Critical determinants for mobile commerce adoption in Vietnamese small and medium-sized enterprises. *Journal of Marketing Management*, 36(5-6), 1–32. <https://doi.org/10.1080/0267257X.2020.1719187>
- Chaveesuk, S., & Horkondee, S. (2015). An integrated model of business intelligence adoption in Thailand logistics service firms. *Proceedings - 2015 7th International Conference on Information Technology and Electrical Engineering: Envisioning the Trend of Computer, Information and Engineering, ICITEE 2015, Chiang Mai, Thailand*, 604–608. <https://doi.org/10.1109/ICITEED.2015.7409018>
- Cheng, C., Zhong, H., & Cao, L. (2020). Facilitating speed of internationalization: The roles of business intelligence and organizational agility. *Journal of Business Research*, 110(January), 95–103. <https://doi.org/10.1016/j.jbusres.2020.01.003>
- Chichti, F. T., Besbes, A., & Benzammel, I. (2016). The impact of contextual factors on business intelligence. *Proceedings - 2016 International Conference on Digital Economy: Emerging Technologies and Business Innovation, ICDEc 2016, Carthage, Tunisia*, 74–79. <https://doi.org/10.1109/ICDEc.2016.7563148>
- Chuah, M. H. (2010). An Enterprise Business Intelligence Maturity Model (EBIMM): Conceptual framework. 2010 5th International Conference on Digital Information Management, ICDIM 2010, hunder Bay, ON, Canada, 303–308. <https://doi.org/10.1109/ICDIM.2010.5664244>
- Clohesy, T., Acton, T., & Rogers, N. (2019). Blockchain adoption: Technological, organisational and environmental considerations. H. Treiblmaier & R. Beck (Eds.), *Business Transformation through Blockchain*, Palgrave Macmillan, Cham (Vol. 1, pp. 47–76). <https://doi.org/10.1007/978-3-319-98911-2>
- Combita Niño, H. A., Cómbita Niño, J. P., & Morales Ortega, R. (2020). Business intelligence governance framework in a university: Universidad de la costa case study. *International Journal of Information Management*, 50(December2017), 405–412. <https://doi.org/10.1016/j.ijinfomgt.2018.11.012>
- Concepcion, R. S., Bedruz, R. A. R., Culaba, A. B., Dadios, E. P., & Pascua, A. R. A. R. (2019). The technology adoption and governance of artificial intelligence in the Philippines. 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management, HNICEM 2019, Laoag, Philippines. <https://doi.org/10.1109/HNICEM48295.2019.9072725>
- Côrte-Real, N., Ruivo, P., & Oliveira, T. (2014). The diffusion stages of Business Intelligence & Analytics (BI&A): A systematic mapping study. *Procedia Technology*, 16, 172–179. <https://doi.org/10.1016/j.protcy.2014.10.080>
- Cruz-Jesus, F., Pinheiro, A., & Oliveira, T. (2019). Understanding CRM adoption stages: Empirical analysis building on the TOE framework. *Computers in Industry*, 109, 1–13. <https://doi.org/10.1016/j.compin.2019.03.007>
- Damanpour, F., & Schneider, M. (2006). Phases of the adoption of innovation in organizations: Effects of environment, organization and top managers. *British Journal of Management*, 17(3), 215–236. <https://doi.org/10.1111/j.1467-8551.2006.00498.x>
- Daradkeh, M. K. (2019). Determinants of visual analytics adoption in organizations: Knowledge discovery through content analysis of online evaluation reviews. *Information Technology and People*, 32(3), 668–695. <https://doi.org/10.1108/ITP-10-2017-0359>
- Daryaei, M., Shirzad, M., & Kumar, V. (2013). Adoption of business intelligence. 2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT), Tiruchengode, India, 1–6. <https://doi.org/10.1109/ICCCNT.2013.6726506>
- El-Adailleh, N. A., & Foster, S. (2019). Successful business intelligence implementation: A systematic literature review. *Journal of Work-Applied Management*, 11(2), 121–132. <https://doi.org/10.1108/JWAM-09-2019-0027>
- Elhassan, I., & Klett, F. (2016). Bridging higher education and market dynamics in a business intelligence framework. *Proceedings - 2015 International Conference on Developments in ESystems Engineering, DeSE 2015, Dubai, United Arab Emirates*, 198–203. <https://doi.org/10.1109/DeSE.2015.22>
- Ferrari, A., Rossignoli, C., & Zardini, A. (2011). Enabling factors for SaaS business intelligence adoption: A theoretical framework proposal. In A. D'Atri, M. Ferrara, J. F. George, & P. Spagnoletti, (Eds.), *Information Technology and Innovation Trends in Organizations*, Springer-Verlag Berlin Heidelberg (pp. 355–362). <https://doi.org/10.1007/978-3-7908-2632-6>
- Gagnon, M. P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N., & Légaré, F. (2012). Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. *Journal of Medical Systems*, 36(1), 241–277. <https://doi.org/10.1007/s10916-010-9473-4>
- Gangwar, H., Date, H., & Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, 28(1), 107–130. <https://doi.org/10.1108/JEIM-08-2013-0065>
- Ghaida, D. A. (2018). The influence of organisational and technological factors on BI adoption in the telecommunication industry across the Middle East and Africa. *J. For Global Business Advancement*, 11(3), 332–350. <https://doi.org/10.1504/JGBA.2018.096303>
- Ghobakhloo, M., & Tang, S. H. (2013). The role of owner/manager in adoption of electronic commerce in small businesses: The case of developing countries. *Journal of small business and enterprise development*, 20(1), 754–787. doi:10.1108/JSBED-12-2011-0037
- Grublješić, T., & Jaklič, J. (2015a). Business intelligence acceptance: The prominence of organizational factors. *Information Systems Management*, 32(4), 299–315. <https://doi.org/10.1080/10580530.2015.1080000>
- Grublješić, T., & Jaklič, J. (2015b). Conceptualization of the business intelligence extended use model. *Journal of Computer Information Systems*, 55(3), 72–82. <https://doi.org/10.1080/08874417.2015.11645774>
- Gruenhagen, J. H., & Parker, R. (2020). Factors driving or impeding the diffusion and adoption of innovation in mining: A systematic review of the literature. *Resources Policy*, 65, 101540. <https://doi.org/10.1016/j.resourpol.2019.101540>
- Gutierrez, A., Boukrami, E., & Lumsden, R. (2015). Technological, organisational and environmental factors influencing managers' decision to adopt cloud computing in the UK. *Journal of Enterprise Information Management*, 28(6), 788–807. <https://doi.org/10.1108/JEIM-01-2015-0001>
- Hameed, M. A., & Counsell, S. (2012). Assessing the influence of environmental and CEO characteristics for adoption of information technology in organizations. *Journal of Technology Management and Innovation*, 7(1), 64–84. <https://doi.org/10.4067/S0718-27242012000100005>

- Hameed, M. A., & Counsell, S. (2014). Establishing relationships between innovation characteristics and innovation adoption in organisations: A meta-analysis approach. *International Journal of Innovation Management*, 18(1), 1450007. <https://doi.org/10.1142/S1363919614500078>
- Han, Y. M., Shen, C. S., & Farn, C. K. (2014). Determinants of continued usage of pervasive business intelligence systems. *Information Development*, 32(3), 424–439. <https://doi.org/10.1177/0266666914554811>
- Harb, Y., & Alhayajneh, S. (2019). Intention to use BI tools: Integrating technology acceptance model (TAM) and personality trait model. 2019 *IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology, JEEIT 2019 - Proceedings*, Amman, Jordan, 494–497. <https://doi.org/10.1109/JEEIT.2019.8717407>
- Harrison, R., Parker, A., Brosas, G., Chiong, R., & Tian, X. (2015). The role of technology in the management and exploitation of internal business intelligence. *Journal of Systems and Information Technology*, 17(3), 247–262. <https://doi.org/10.1108/JSIT-04-2015-0030>
- Hatta, N. N. M., Miskon, S., Ali, N. M., Abdullah, N. S., Ahmad, N., Hashim, H., ... Maarof, M. A. (2015). Business intelligence system adoption theories in SMEs: A literature review. *ARNP Journal of Engineering and Applied Sciences*, 10(23), 18165–18174.
- Hawash, B., Mokhtar, U. A., Yusof, Z. M., & Mukred, M. (2020). The adoption of electronic records management system (ERMS) in the Yemeni oil and gas sector: Influencing factors. *Records Management Journal*, 30(1), 1–22. <https://doi.org/10.1108/RMJ-03-2019-0010>
- Hiran, K. K., & Henten, A. (2020). An integrated TOE-DoI framework for cloud computing adoption in higher education: The case of Sub-Saharan Africa, Ethiopia. In M. Pant, T. K. Sharma, O. P. Verma, R. Singla, & A. Sikander (Eds.), *Advances in intelligent systems and computing 1053 soft computing: Theories and applications* (pp. 1281–1290). Springer Nature Singapore Pte Ltd.
- Hojnik, J., & Ruzzier, M. (2016). The driving forces of process eco-innovation and its impact on performance: Insights from Slovenia. *Journal of Cleaner Production*, 133, 812–825. <https://doi.org/10.1016/j.jclepro.2016.06.002>
- Hou, C. K. (2013). Investigating factors influencing the adoption of business intelligence systems: An empirical examination of two competing models. *International Journal of Technology, Policy and Management*, 13(4), 328–353. <https://doi.org/10.1504/IJTPM.2013.056787>
- Hou, C. K. (2014). Exploring the user acceptance of business intelligence systems in Taiwan's electronics industry: Applying the UTAUT model. *International Journal of Internet and Enterprise Management*, 8(3), 195. <https://doi.org/10.1504/IJIEEM.2014.059177>
- Hou, C. K. (2016). Understanding business intelligence system continuance intention: An empirical study of Taiwan's electronics industry. *Information Development*, 32(5), 1359–1371. <https://doi.org/10.1177/0266666915599588>
- Imran, M., Salisu, I., Aslam, H. D., Iqbal, J., & Hameed, I. (2019). Resource and information access for SME sustainability in the Era of IR 4.0: The mediating and moderating roles of innovation capability and management commitment. *Processes*, 7(211), 1–25. <https://doi.org/10.3390/pr7040211>
- Indriasari, E., Wayan, S., Gaol, F. L., Trisetarso, A., Saleh Abbas, B., & Ho Kang, C. (2019). Adoption of cloud business intelligence in Indonesia's financial services sector. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 11431(LNAI), 520–529. [https://doi.org/10.1007/978-3-030-14799-0\\_45](https://doi.org/10.1007/978-3-030-14799-0_45)
- Ishaya, T., & Folarin, M. (2012). A service oriented approach to business intelligence in Telecoms industry. *Telematics and Informatics*, 29(3), 273–285. <https://doi.org/10.1016/j.tele.2012.01.004>
- Jahantigh, F. F., Habibi, A., & Sarafrazi, A. (2019). A conceptual framework for business intelligence critical success factors. *International Journal of Business Information Systems*, 30(1), 109–123. <https://doi.org/10.1504/IJBIS.2019.097058>
- Jalil, N. A., Prapinit, P., Melan, M., & Mustaffa, A. B. (2019). Adoption of business intelligence - Technological, individual and supply chain efficiency. *Proceedings - 2019 International Conference on Machine Learning, Big Data and Business Intelligence, MLBDI 2019, Taiyuan, China*, 67–73. <https://doi.org/10.1109/MLBDI48998.2019.00021>
- Joe, D. Y., Jung, D., & Oh, F. D. (2019). Owner-managers and firm performance during the asian and global financial crises: Evidence from Korea. *Applied Economics*, 51(6), 611–623. <https://doi.org/10.1080/00036846.2018.1502870>
- Jones, P., Simmons, G., Packham, G., Beynon-davies, P., & Pickernell, D. (2014). An exploration of the attitudes and strategic responses of sole-proprietor micro-enterprises in adopting information and communication technology. *International Small Business Journal: Researching Entrepreneurship*, 32(3), 285–306. <https://doi.org/10.1177/0266242612461802>
- Kannabiran, G., & Dharmalingam, P. (2012). Enablers and inhibitors of advanced information technologies adoption by SMEs: An empirical study of auto ancillaries in India. *Journal of Enterprise Information Management*, 25(2), 186–209. <https://doi.org/10.1108/17410391211204419>
- Karunagaran, S., Mathew, S. K., & Lehner, F. (2019). Differential cloud adoption: A comparative case study of large enterprises and SMEs in Germany. *Information Systems Frontiers*, 21(4), 861–875. <https://doi.org/10.1007/s10796-017-9781-z>
- Khayer, A., Jahan, N., Hossain, M. N., & Hossain, M. Y. (2021). The adoption of cloud computing in small and medium enterprises: A developing country perspective. *VINE Journal of Information and Knowledge Management Systems*, 51(1), 64–91. <https://doi.org/10.1108/VJIKMS-05-2019-0064>
- Khayer, A., Talukder, M. S., Bao, Y., & Hossain, M. N. (2020). Cloud computing adoption and its impact on SMEs' performance for cloud supported operations: A dual-stage analytical approach. *Technology in Society*, 60, 101225. <https://doi.org/10.1016/j.techsoc.2019.101225>
- Lame, G. (2019). Systematic literature reviews: An introduction. *Proceedings of the International Conference on Engineering Design, ICED, 2019-Augus* (August), Delft, The Netherlands, 1633–1642. <https://doi.org/10.1017/dsi.2019.169>
- Liang, T. P., & Liu, Y. H. (2018). Research landscape of business intelligence and big data analytics: A bibliometrics study. *Expert Systems with Applications*, 111(128), 2–10. <https://doi.org/10.1016/j.eswa.2018.05.018>
- Llave, M. R. (2017). business intelligence and analytics in small and medium-sized enterprises: A systematic literature review. *Procedia Computer Science*, 121, 194–205. <https://doi.org/10.1016/j.procs.2017.11.027>

- Ma, L., & Lee, C. S. (2019). Investigating the adoption of MOOCs: A technology-user-environment perspective. *Journal of Computer Assisted Learning*, 35(1), 89–98. <https://doi.org/10.1111/jcal.12314>
- Maguireah, A. I., HidayahSulaiman, H., & Ali, N. (2019). Identifying the most critical factors to business intelligence implementation success in the public sector organizations. *The Journal of Social Sciences Research*, 5(2), 450–462. <https://doi.org/10.32861/jssr.52.450.462>
- Maguireah, A. I., Sulaiman, H., & Ali, N. (2017). Theoretical framework of critical success factors (CSFs) for Business Intelligence (BI) system. *ICIT 2017-8th International Conference on Information Technology, Proceedings, Amman, Jordan*, 455–463. <https://doi.org/10.1109/ICITECH.2017.8080042>
- Manz, F. (2019). Determinants of non-performing loans: What do we know? A systematic review and avenues for future research. In *Management review quarterly* (Vol. 69). <https://doi.org/10.1007/s11301-019-00156-7>
- Mathew, S. K. (2012). Adoption of business intelligence systems in Indian fashion retail. *International Journal of Business Information Systems*, 9(3), 261–277. <https://doi.org/10.1504/IJBIS.2012.045718>
- Mayer, M. (2000). Innovation roles: from souls of fire to devil's advocates. *The Journal of Business Communication*, 37(4), 328–347.
- Mazzarol, T., & Reboud, S. (2020). Innovation in Small Firms. In T. Mazzarol & S. Reboud, (Eds.), *Entrepreneurship and innovation*, Springer. *Texts in business and economics* (pp. 131–164). Springer Nature Singapore Pte Ltd. [https://doi.org/10.1007/978-981-13-9412-6\\_5](https://doi.org/10.1007/978-981-13-9412-6_5)
- McCann, L., Gedikoglu, H., Broz, B., Lory, J., & Massey, R. (2014). Effects of observability and complexity on farmers' adoption of environmental practices. *Journal of Environmental Planning and Management*, 58(8), 1346–1362. <https://doi.org/10.1080/09640568.2014.924911>
- Morioka, S. N., & Carvalho, M. M. D. (2016). A systematic literature review towards a conceptual framework for integrating sustainability performance into business. *Journal of Cleaner Production*, 136, 134–146. <https://doi.org/10.1016/j.jclepro.2016.01.104>
- Mosweu, O., Bwalya, K., & Mutshewa, A. (2016). Examining factors affecting the adoption and usage of document workflow management system (DWMS) using the UTAUT model: Case of Botswana. *Records Management Journal*, 26(1), 38–67. <https://doi.org/10.1108/RMJ-03-2015-0012>
- Moyo, M., & Looock, M. (2017). South African small and medium-sized enterprises' reluctance to adopt and use cloud-based business intelligence systems: A literature review. 2016 11th International Conference for Internet Technology and Secured Transactions, ICITST 2016, Barcelona, Spain, 250–254. <https://doi.org/10.1109/ICITST.2016.7856706>
- Moyo, M., & Looock, M. (2019). Small and medium-sized enterprises' understanding of security evaluation of cloud-based business intelligence systems and its challenges. *Communications in Computer and Information Science*, 973, 133–148. [https://doi.org/10.1007/978-3-030-11407-7\\_10](https://doi.org/10.1007/978-3-030-11407-7_10)
- Mukred, M., Yusof, Z. M., Mokhtar, U. A., & Fauzi, F. (2019). Taxonomic framework for factors influencing ERMS adoption in organisations of higher professional education. *Journal of Information Science*, 45(2), 139–155. <https://doi.org/10.1177/0165551518783133>
- Najafi-Tavani, S., Sharifi, H., & Najafi-Tavani, Z. (2016). Market orientation, marketing capability, and new product performance: The moderating role of absorptive capacity. *Journal of Business Research*, 69(11), 5059–5064. <https://doi.org/10.1016/j.jbusres.2016.04.080>
- Nasab, S. S., Jaryani, F., Selamat, H. B., & Masrom, M. (2017). Critical success factors for business intelligence system implementation in public sector organisation. *International Journal of Information Systems and Change Management*, 9(1), 22–43. <https://doi.org/10.1504/IJISCM.2017.086210>
- Ngulube, P. (2018). Overcoming the difficulties associated with using conceptual and theoretical frameworks in heritage studies. In P. Ngulube (Ed.), *Handbook of research on heritage management and preservation* (pp. 1–23). IGI Global.
- Nguyen, T. H., & Waring, T. S. (2013). The adoption of customer relationship management (CRM) technology in SMEs: An empirical study. *Journal of Small Business and Enterprise Development*, 20(4), 824–848. doi:10.1108/JSBED-01-2012-0013
- Nofal, M. I. M., & Yusof, Z. M. (2016). Conceptual model of enterprise resource planning and business intelligence systems usage Muhmmad Islam Mahmoud Nofal \* and Zawayah Mohammad Yusof. *International Journal of Business Information Systems*, 21(2), 178–194. <https://doi.org/10.1504/IJBIS.2016.074260>
- Oliveira, T., & Martins, M. F. (2011). Information technology adoption models at Firm Level: Review of literature. *The Electronic Journal Information Systems Evaluation*, 14(1), 110–121.
- Olzak, C. M. (2016). Toward better understanding and use of business intelligence in organizations. *Information Systems Management*, 33(2), 105–123. <https://doi.org/10.1080/10580530.2016.1155946>
- Park, J. H., & Kim, Y. B. (2019). Factors activating big data adoption by Korean Firms. *Journal of Computer Information Systems*, 4417. <https://doi.org/10.1080/08874417.2019.1631133>
- Passlick, J., Guhr, N., Lebek, B., & Breitner, M. H. (2020). Encouraging the use of self-service business intelligence—an examination of employee-related influencing factors. *Journal of Decision Systems*, 29(1), 1–26. <https://doi.org/10.1080/12460125.2020.1739884>
- Pejić Bach, M., Bosilj Vukšić, V., Suša Vugec, D., & Stjepić, A. M. (2019). BPM and BI in SMEs: The role of BPM/BI alignment in organizational performance. *International Journal of Engineering Business Management*, 11, 1–16. <https://doi.org/10.1177/1847979019874182>
- Pipitwanichakarn, T., & Wongtada, N. (2019). Leveraging the technology acceptance model for mobile commerce adoption under distinct stages of adoption: A case of micro businesses. *Asia Pacific Journal of Marketing and Logistics*, ahead-of-print(ahead-of-print). <https://doi.org/10.1108/APJML-10-2018-0448>
- Pool, J. K., Jamkhaneh, H. B., Tabaeian, R. A., Tavakoli, H., & Shahin, A. (2018). The effect of business intelligence adoption on agile supply chain performance. *International Journal of Productivity and Quality Management*, 23(3), 289–306. <https://doi.org/10.1504/IJPM.2018.089802>
- Puklavec, B., & Oliveira, T. (2014). Unpacking business intelligence systems adoption determinants: An exploratory study of small and medium enterprises. *Economic and Business Review*, 16(2), 185–213.
- Puklavec, B., Oliveira, T., & Popović, A. (2018). Understanding the determinants of business intelligence system adoption stages an empirical study of SMEs. *Industrial Management and Data Systems*, 118(1), 236–261. <https://doi.org/10.1108/IMDS-05-2017-0170>



- Ragu-Nathan, B. S., Apigian, C. H., Ragu-Nathan, T. S., & Tu, Q. (2004). A path analytic study of the effect of top management support for information systems performance. *Omega*, 32(6), 459–471. <https://doi.org/10.1016/j.omega.2004.03.001>
- Rogers, E. M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. In *Die diffusion von innovationen in der telekommunikation* (pp. 25–38). Berlin, Heidelberg: Springer.
- Rogers, E. M. (2003). *Diffusion of Innovation* (4th ed.). The Free Press.
- Rouhani, S., & Mehri, M. (2016). Does ERP have benefits on the business intelligence readiness? An empirical study. *International Journal of Information Systems and Change Management*, 8(2), 81–105. <https://doi.org/10.1504/IJISCM.2016.079559>
- Schneider, S., & Sunyaev, A. (2016). Determinant factors of cloud-sourcing decisions: Reflecting on the IT outsourcing literature in the era of cloud computing. *Journal of Information Technology*, 31(1), 1–31. <https://doi.org/10.1057/jit.2014.25>
- Shahid, S. S., Tavallaee, R., & Shobeiri, S. H. (2017). The human factors affecting the acceptance of business intelligence us behavioral ing the behavioral model of reasoned action theory. *9th International Conference on Information and Knowledge Technology, IKT 2017, 2018-Janua(Ikt)*, 62–70. <https://doi.org/10.1109/IKT.2017.8258619>
- Shen, C., Hsu, P.-Y., & Peng, Y.-T. (2012). The impact of data environment and profitability on business intelligence adoption. In J.-S. Pan, S.-M. Chen, & N. T. Nguyen (Eds.), *Intelligent Information and Database Systems 4th Asian Conference, ACIIDS 2012, Lecture Notes in Artificial Intelligence (Subseries of Lecture Notes in Computer Science)* (pp. 185–193). Springer-Verlag Berlin Heidelberg.
- Siemen, C., Clever, N., Barann, B., & Becker, J. (2018). Requirements elicitation for an inter-organizational business intelligence system for small and medium retail enterprises. *Proceeding - 2018 20th IEEE International Conference on Business Informatics, CBI 2018, Vienna, Austria*, 1, 129–138. <https://doi.org/10.1109/CBI.2018.00023>
- Sittig, D. F., Gonzalez, D., & Singh, H. (2014). Contingency planning for electronic health record-based care continuity: A survey of recommended practices. *International Journal of Medical Informatics*, 83(11), 797–804. <https://doi.org/10.1016/j.ijmedinf.2014.07.007>
- Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of big data challenges and analytical methods. *Journal of Business Research*, 70(1), 263–286. <https://doi.org/10.1016/j.jbusres.2016.08.001>
- Sun, S., Cegielski, C. G., Jia, L., & Hall, D. J. (2018). Understanding the factors affecting the organizational adoption of big data. *Journal of Computer Information Systems*, 58(3), 193–203. <https://doi.org/10.1080/08874417.2016.1222891>
- Taylor, P. (2019). Information and Communication Technology (ICT) adoption by small and medium enterprises in developing countries: The effects of leader, organizational and .... *International Journal of Economics, Commerce and ...*, VII (5), 671–683. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3388391](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3388391)
- Teixeira, S., Martins, J., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., & Moreira, F. (2018). A theoretical analysis of digital marketing adoption by startups. J. Mejia, M. Muñoz, Á. Rocha, Y. Quiñonez, & J. Calvo-Manzano (Eds.), *Advances in intelligent systems and computing*, Springer, Cham (Vol. 688, pp. 94–105). [https://doi.org/10.1007/978-3-319-69341-5\\_9](https://doi.org/10.1007/978-3-319-69341-5_9)
- Thong, J. Y. (1999). An integrated model of information systems adoption in small businesses. *Journal of Management Information Systems*, 15(4), 187–214. <https://doi.org/10.1080/07421222.1999.11518227>
- Tornatzky, L., & Fleischer, M. (1990). *Processes of technological innovation*. Lexington books.
- Trieu, V. H. (2017). Getting value from business intelligence systems: A review and research agenda. *Decision Support Systems*, 93, 111–124. <https://doi.org/10.1016/j.dss.2016.09.019>
- Ain, N., Vaia, G., Delone, W. H., & Waheed, M. (2019). Two decades of research on business intelligence system adoption, utilization and success – A systematic literature review. *Decision Support Systems*, 125. <https://doi.org/10.1016/j.dss.2019.113113>
- Urquhart, R., Kendall, C., Geldenhuys, L., Ross, A., Rajaraman, M., Folkes, A., Madden, L. L., Sullivan, V., Rayson, D., & Porter, G. A. (2019). The role of scientific evidence in decisions to adopt complex innovations in cancer care settings: A multiple case study in Nova Scotia, Canada. *Implementation Science*, 14(1), 1–12. <https://doi.org/10.1186/s13012-019-0859-5>
- Veeramisti, N., Paz, A., & Baker, J. (2020). A framework for corridor-level traffic safety network screening and its implementation using Business Intelligence. *Safety Science*, 121(August2019), 100–110. <https://doi.org/10.1016/j.ssci.2019.08.042>
- Venkatraman, S., Sundarraj, R. P., & Seethamraju, R. (2018). Assessing strategic readiness for healthcare analytics: System and design theory implications. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10844(LNCS), 116–131. [https://doi.org/10.1007/978-3-319-91800-6\\_8](https://doi.org/10.1007/978-3-319-91800-6_8)
- Venter, C. (2019). A critical systems approach to Elicit user-centric business intelligence business requirements. *Systemic Practice and Action Research*, 32(5), 481–500. <https://doi.org/10.1007/s11213-018-9468-5>
- Verkoou, K., & Spruit, M. (2013). Mobile business intelligence: Key considerations for implementations projects. *Journal of Computer Information Systems*, 54(1), 23–33. <https://doi.org/10.1080/08874417.2013.11645668>
- Wang, H. C. (2014). Distinguishing the adoption of business intelligence systems from their implementation: The role of managers personality profiles. *Behaviour and Information Technology*, 33(10), 1082–1092. <https://doi.org/10.1080/0144929X.2013.869260>
- Wang, Y., & Byrd, T. A. (2017). Business analytics-enabled decision-making effectiveness through knowledge absorptive capacity in health care. *Journal of Knowledge Management*, 21(3), 517–539. <https://doi.org/10.1108/JKM-08-2015-0301>
- Xia, B. S., & Gong, P. (2014). Review of business intelligence through data analysis. *Benchmarking: An International Journal*, 21(2), 300–311. <https://doi.org/10.1108/BIJ-08-2012-0050>
- Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, 39(1), 93–112. <https://doi.org/10.1177/0739456X17723971>

- Yeoh, W. (2011). Business intelligence systems implementation: Testing a critical success factors framework in multiple cases. *International Journal of Business Information Systems*, 8(2), 192–209. <https://doi.org/10.1504/IJBIS.2011.041791>
- Yeoh, W., & Popovic, A. (2016). Extending the understanding of critical success factors for implementing business intelligence systems William. *Journal of the Association for Information Science and Technology*, 67(1), 1–14. <https://doi.org/10.1002/asi>
- Yiu, L. M. D., Yeung, A. C. L., & Cheng, T. C. E. (2020). The impact of business intelligence systems on profitability and risks of firms. *International Journal of Production Research*, 7543(May), 1–24. <https://doi.org/10.1080/00207543.2020.1756506>
- Yoon, C., Lim, D., & Park, C. (2020). Factors affecting adoption of smart farms: The case of Korea. *Computers in Human Behavior*, 108, 106309. <https://doi.org/10.1016/j.chb.2020.106309>
- Yoon, T. E., Jeong, B. K., & Ghosh, B. (2017). User acceptance of business intelligence application: Motivation to learn, technology, social influence, and situational constraints. *International Journal of Business Information Systems*, 26(4), 432–450. <https://doi.org/10.1504/IJBIS.2017.087747>
- Zhao, J. L., Fan, S., & Hu, D. (2014). Business challenges and research directions of management analytics in the big data era. *Journal of Management Analytics*, 1(3), 169–174. <https://doi.org/10.1080/23270012.2014.968643>
- Zheng, G., Zhang, C., & Li, L. (2014). Bringing business intelligence to health information technology curriculum. *Journal of Information Systems Education*, 25(4), 317–325. <https://aisel.aisnet.org/jise/vol25/iss4/6>



© 2021 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

You are free to:

Share — copy and redistribute the material in any medium or format.

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.



***Cogent Business & Management* (ISSN: 2331-1975) is published by Cogent OA, part of Taylor & Francis Group.**

**Publishing with Cogent OA ensures:**

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

**Submit your manuscript to a Cogent OA journal at [www.CogentOA.com](http://www.CogentOA.com)**

