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A Systematic Literature Review of Business Intelligence Theories and Frameworks

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ARTICLE INFO	ABSTRACT
	Introduction: Business intelligence has become increasingly significant due to technological advancements and competitive pressures, providing valuable insights for decision-making processes. Despite substantial investments in BI systems, many organizations fail to realize expected returns. **Objectives**: This study presents a systematic literature review on business intelligence (BI) theories and frameworks, aiming to synthesize the constructs and their impacts within the field. **Methods**: Methodologically, this review involved a comprehensive search of multiple academic databases, including IEEE Xplore, SpringerLink, and ScienceDirect, to identify relevant studies published between 2000 and 2023. A total of 30 studies were selected based on predefined inclusion and exclusion criteria, which focused on BI adoption, usage, and success across different regions and research methodologies. The selected studies were analyzed using qualitative content analysis to identify key themes and patterns. **Results**: The main results reveal that successful BI implementation is influenced by several critical factors, including organizational structure, technological infrastructure, and management support. The theoretical underpinnings driving BI research were also examined, highlighting the dominant theories and frameworks utilized in the field. **Conclusions**: The findings provide a comprehensive understanding of BI's role in organizational performance and strategic decision-making, offering valuable insights for both researchers and practitioners. **Keywords:** Business Intelligence, BI Systems, Decision Support Systems, Data Warehousing, BI Frameworks, BI Adoption, BI Theories, Systematic Review

INTRODUCTION

Business intelligence (BI) has drawn a lot of attention from executives and decision-makers in the last few years because of technology advancements and heightened competition as a result of their capacity to offer intricate and informative inputs to the process of making decisions. Business intelligence systems have been on the rise since the 1990s due to improvements in organizational information systems and technology systems (Chen et al., 2012; Wixom et al., 2010). Business intelligence systems are widely acknowledged as a type of technical solution that enables organizations to gather, integrate, and analyze huge data warehouses in order to better understand their possibilities, strengths, and shortcomings. (Chaudhuri et al., 2011; Harrison et al., 2015), The management of organized and unorganized data, as well as the ability of end users to comprehend information, are just a few of the many constructs that make up business intelligence (BI) (Weider & Ossimitz, 2015). Enterprise BI systems, which are often designed by the central IT department to support as many managers in an organization as feasible, are the most complex systems that support management decision-making. They at least have users from several divisions.

Data warehouses and dashboards are examples of technologies that make up business intelligence (BI) system. Data warehouses collect precise, clean, and detailed data from a variety of sources for comprehensive evaluation (Yoon,

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2008). Dashboard servers are therefore used as an application for the business's performance indicators and data visualization (Clark et al., 2007). Business intelligence is growing in significance and value for many organizations as an outcome of the competitive nature between online and conventional businesses. The global BI market has grown by over 7% and is predicted to double by the end of 2023 (Bentley, 2017). Research signifies that many organizations do not gain from the constructed BI systems despite increased investments and significant market growth (Audzeyeva & Hudson, 2016). As consequently, 70% of BI programs fall short of expectations in terms of returns (Gartner, 2015) or provide organizations with minimal or no returns (Yeoh & Poppvic, 2016). The best approach to maximize the advantages of BI systems and ensure that their implementation is successful is an ongoing conflict for organizations (Visinescu et al., 2017).

Considering hundreds of publications across various platforms, academics as well as business leaders continue to debate the strategic and tactical approaches to effective implementation and application of BI systems. However, just a few research have attempted to combine this corpus of knowledge. For instance, (Jourdan et al., 2008) summarized BI studies from 1997 to 2006 with a concentration on the research methodologies used, such as field study, survey, lab or field experiments, etc. Similarly, (Friana et al., 2011) studied the development of BI trials from 2000 to 2011. They addressed the two most common research methodologies utilized in BI studies, the single methodology and the integrated methodology. To comprehend the procedures by which businesses might benefit from BI systems, (Trieu, 2017) reviewed BI studies from 2000 to 2015. The adoption, use, and success of BI systems ("which is subsequently referred to as AUS") at the organizational and individual levels have been the subject of a significant body of study over the past 20 years (Arefin et al., 2015; Arnott et al., 2017; Dawson & Van, 2013 Gaardboe et al., 2017). There are few or no studies that compile study findings about the adoption, use, and success of BI systems.

OBJECTIVES

In an attempt to synthesize studies regarding the constructs of business intelligence and their effects, this study presents a systematic literature review on business intelligence theories and frameworks. A thorough report on research methodology is also provided. The lack of a summary of research findings on BI theories and framework based on the adoption of theories/constructs in general served as the spark for the present research. The research process has been directed by the following questions in order to meet these study goals:

RQ1: How are the Business Intelligence construct studies considering the framework distributed across the countries of implementation and the years of publications?

RQ2: What are the main research methods and research statistical test addressed in the collected studies?

RQ3: What types of journal systems are mainly studied involving Business Intelligence publication.

RQ4: What are the main Business Intelligence construct considering their relationship with theories and framework?

This research study is structured as follows. The next section discusses the literature review which is followed by the development of the research framework. Subsequently, the methodology, this will examine the search strategy used including the inclusion and exclusion criteria. Also, the result section of findings such as publications, authors, countries, journals, and research fields will be provided and also discussed which will be followed by discussion and conclusions.

LITERATURE REVIEW

Large-scale "decision support systems (DSS)" are frequently referred to as business intelligence (BI) in many organizations. BI development and implementation are routinely found to be among CIOs' top priorities and will continue to be so at least through 2017, according to surveys conducted by company analysts and vendors, in its annual SIM IT Issues and Trends Study (Kappelman et al., 2016) noted that BI was the greatest organizational technology investment in 2015 and has been throughout 2009. Essentially, BI is one of the most crucial IT applications in a company and is anticipated to continue to be so for a while to come.

Few empirical research has been done on the organizational level adoption of BI Systems utilizing theories of technological advancement adoption. Additionally, the majority of previous studies have concentrated on a variety of businesses. Below is also addressed some examples of these studies: Ten components in the technological,

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organizational, and environmental factors that affect the adoption of BI at private and public institutions of higher education (IHE) in the USA were examined by (Sujitparapitaya et al., 2012), 243 senior administrators of institutional research and information technology units at both two- and four-year schools participated in a survey that was used to gather data. According to their findings, executive support, competitive advantage, and perceived benefits have no discernible influence on the adoption of BI and organizational structure, institution size, absorptive capacity, organizational legitimacy, stakeholder support, perceived costs, and perceived complexity are the main determinants of the adoption. Additionally, (Malladi, 2013) used the Technology-Organization-Environment paradigm in his study to explore the variables related to the degree of organizational adoption of Business Intelligence & Analytics (BIA). Through a survey, data from 358 firms in North America was obtained. According to his findings, an organization's perceived benefits, technological complexity in terms of data infrastructure, and organization size are all positively correlated with the degree of BIA adoption. Furthermore, the findings showed that although businesses in knowledge-driven sectors are likely to use BI more widely, adoption is hampered by a lack of industry standards.

Since its inception in the mid-1990s, back when it was mostly used in IT and business societies and a regular set of data matrices were used to create information and develop future planning, BI has grown throughout time. Beginning in the early 2000s, BI changed into a tool that was more analytically focused and was known as Business Analytics (BA) in the literature. With a focus on statistical and mathematical insights, BA employs a more lenient approach to datasets used to uncover new information and derive significance from organizational performances (Davenport, 2006) In essence, BI concentrated on reporting, whereas BA stressed both reporting plus forecasting for the future. Big Data or Big Data Analytics is the most recent word to emerge from BI and BA. It denotes higher volumes and complex sets of data that require specialized software to synthesize information while maintaining the same emphasis on reporting and analytics that is predictive (Chen & Storey, 2012).

RELATED STUDIES

A case study of a framework to define BI use patterns is constructed based on the findings of (David et al., 2017). The framework gives the creation of high quality BI theory with both a theoretical and empirically based foundation. According to the framework, an organization's enterprise and smaller functional BI systems work in unison to assist various decisions and decision-makers. The framework demonstrates that BI systems cannot be used to apply the personal DSS theory. The influence of BI on small- to medium-sized organizations is examined in (English, & Hoffmann, 2018). The authors' findings demonstrate that data volumes are essential for smaller businesses where they are scarce as well as the importance of critical and strategic data that can enhance competitiveness. However, because it is expensive for them to acquire workers of this caliber, smaller organizations find it difficult to hire skilled employees to produce and deliver information to management. The management team members who are supposed to put the information into practice are also ill-equipped to do so. (Krishnamoorthi & Mathew, 2018) evaluated the distribution of organizational resources, particularly those related to BI, and the financial performance measurements that were attained in order to analyses the value creation of multiple case studies. (Lautenbach & Johnston, 2017) attempted to identify the essential components for BI adoption and usage. The author identified factors that are essential for BI adoption based on the Technology-Organization-Environment (TOE) framework, including data-related infrastructure capabilities, data management challenges, top management support, talent management, external market influence, and regulatory compliance.

In contrast to empirical articles, comparative case studies, or descriptive reviews, the present systematic literature review (SLR) adopts a controlled and methodical approach to address research questions.

RESEARCH METHODOLOGY

The literature review will follow the reporting items for systematic reviews and meta-analysis. The stages of this methodology are group to two which are the protocol development and the inclusion and exclusion criteria. After which the database were searched and were screened using the abstract, title, and full text criteria. The data extraction was performed and a synthesis of the previous literature review.

Research Protocol

The protocol development was in line with the Cochrane Handbook for Systematic Review and set up the main research that questions that guided the search and selection of papers, the data sources and search string, the inclusion and exclusion criteria and the results. The bases of this review were on the research questions and quality papers and materials from different databases were identified using the study questions as a guide. Figure 1 depicts the stages of selecting studies from the literature.

Inclusion and exclusion criteria

In view of this research, only studies centered on the research topic were considered, Business Intelligence Theories and Framework. In order to get a maximum valid literature review, the inclusion paper are randomized control design study, experimental trial, study published from year 2000 till date were included and only the study written in English were considered. Full-text studies on ((Business AND Intelligence) AND (theories OR theory) AND (framework)). The excluded criteria are paper on systematic literature review study and conference study.

Data Source and Search strategy

In respect to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), we use Doaj database, Emerald, Taylor and Francis to get the studies that were used for this systematic review from year 2000 till date following the inclusion and exclusion criteria earlier mentioned. The following precise keywords were used in the literature search: ((Business AND Intelligence) AND (theories OR theory) AND (framework)). Table 1 shows the preliminary outputs of these criteria.

Figure1. The stages of the Research Methodology

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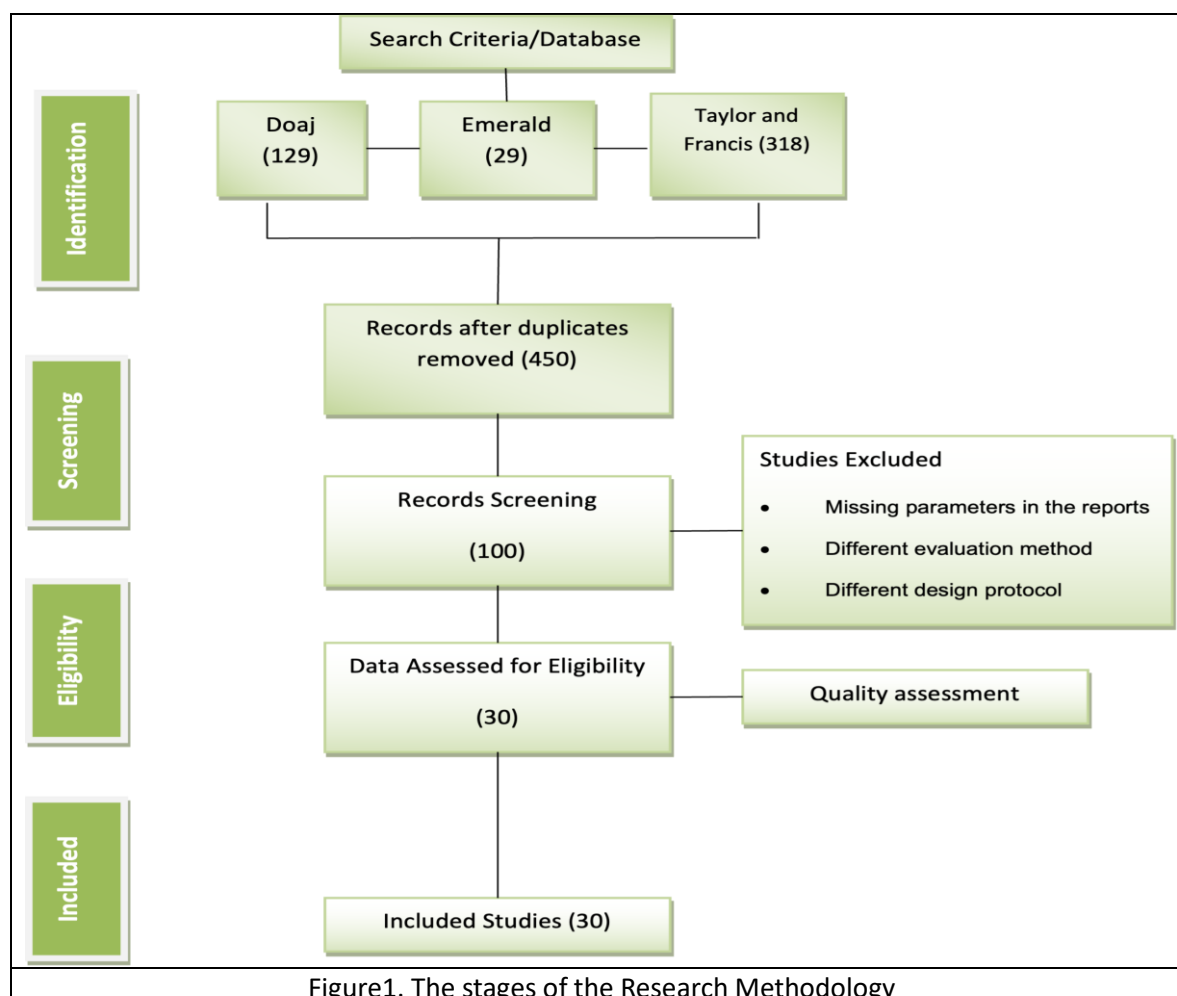
Database	Number of Studies
Doaj	129
Emerald	29
Taylor and Francis	318
Total	476

Table 1: Number of hits generated from database

Quality Assessment or Risk of Bias

Considering the nature of this research, quality assessment of the eligible studies was performed using Critical Appraisal Skill Program (CASP, 2018) tool. Each of the study was appraised based on the CASP checklist for qualitative studies (Table 2). The appraisal was basically "Low, Moderate and High" each study was asses and the score percentage were reported with a mark if the study satisfies the assessment questions either as 0, 0.5 or 1. The checklist criteria of assessment were 8 questions, and overall score were allocated based on the total number of 8. The risk of bias is termed low if the study has 70% and above assessment score, moderate if it has within 50% to 70% score and high if it has below 50%.

Question ID	Appraisal Questions
Q1	Are the frameworks clearly explained
Q2	Does the study have reliable or valid measures
Q3	Does the study add to your knowledge or understanding
Q4	Do the results add to the literature
Q5	Was BI the main topic
Q6	Is there a clear statement of findings
Q7	Are the research method clearly described
Q8	Are the research aims clearly specified

Table 2: Quality Assessment Questions

Study Selection / Data Extraction

The exclusion criteria for the selected studies were reported as a case reports, review articles, case series and studies not written in English language were excluded. Full text studies on the research topic were included. Randomized control trials were considered, and articles title and abstract were examined for inclusion and exclusion criteria. All the included studies were collected using a pre-defined sheet: study design, author's first name, year of publication, characteristics of the study. The final list of studies to be included was then presented using a PRISMA flowchart.

RESULTS

Study selection and Screening process

A total of 476 publications were obtained overall from the database after the keywords were put to the database. The 476 papers were initially put into Endnote, a reference manager, for vetting. At the screening stage, we scan through the abstracts and title of the studies and studies that are not related to our study's aim, including duplicates, were eliminated at the screening stage. At the same time, studies that were focused on another title completely were excluded. After the identification and screening stages, there were 30 articles left, full text screening was performed on the 30 papers and were then evaluated for methodology and data analysis, which had to be done in accordance with the current study's scope.

Quality Assessment

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Using Critical Appraisal Skill Program (CASP) qualitative assessment tool, all the 30 studies were appraised to assess the quality of the eligible studies. Interestingly, as shown in Figure 2, half of the included study was quality studies with 13 and 11 articles having low risk and moderate risk of bias respectively and 6 About 13 studies have 70% and above quality scores, 11 studies have within 50% and 70% quality scores and 6 studies have below 50% quality scores. The breakdown of the assessment is presented in Table 3.

Figure 2: Percentage Risk Assessed Using CASP
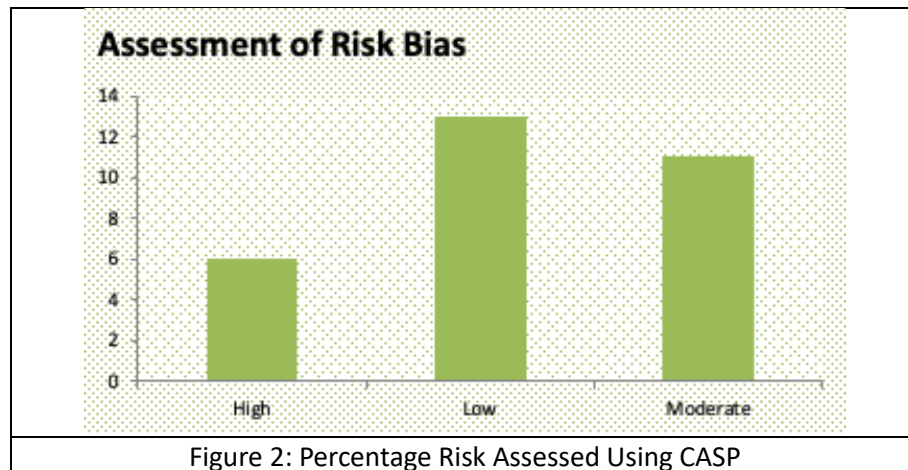
Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Percentage
S1	0	0.5	0.5	0	0.5	0.5	1	1	50%
S2	0	0.5	1	0.5	0.5	0.5	1	1	62.50%
S3	1	1	1	1	1	1	1	1	100%
S4	0	0.5	0.5	1	1	0	1	1	62.50%
S5	0	0	0	0	0.5	0	0	0.5	12.50%
S6	1	1	1	1	1	0.5	0.5	1	87.50%
S7	1	1	1	1	1	1	1	1	100%
S8	1	1	1	1	0.5	1	1	1	93.75%
S9	0	0	0.5	0.5	0.5	0.5	0.5	1	43.75%
S10	1	1	1	1	1	1	1	1	100%
S11	0	1	0	0	0.5	0.5	1	0.5	43.75%
S12	1	0.5	1	0.5	1	1	0	1	75%
S13	1	1	1	1	1	1	1	1	100%
S14	1	0	0	0	0.5	0	0	1	31.25%
S15	0.5	0.5	1	0.5	0.5	1	0.5	1	68.75%
S16	0.5	0.5	1	1	1	0.5	0	0.5	62.50%
S17	1	0.5	1	1	1	0.5	0.5	1	81.25%
S18	0	0.5	0.5	0.5	1	0	0.5	0.5	43.75%
S19	0	0.5	0.5	1	1	0.5	1	1	68.75%
S20	0	1	0.5	0	0.5	0.5	1	1	56.25%
S21	0	0	0	0	0.5	0	0	0	6.25%
S22	0.5	0.5	1	1	1	1	0.5	1	81.25%
S23	0.5	0.5	0.5	0	0.5	0.5	1	1	56.25%
S24	1	0	0.5	0.5	1	0.5	1	1	68.75%

S25	1	1	1	1	1	0.5	1	1	93.75%
S26	1	1	1	0	0.5	0	0.5	0.5	56.25%
S27	0	0.5	1	0.5	0.5	1	0	0.5	50%
S28	1	1	1	1	1	1	1	1	100%
S29	1	1	1	1	1	0.5	1	1	93.75%
S30	1	1	1	0.5	1	1	0.5	0.5	81.25%
			Table 3: Quality Assessment Score using CASP						

RQ1: How are the Business Intelligence construct studies considering the framework distributed across the countries of implementation and the years of publications?

Distribution of studies with respect to year of publication

A total of 30 studies were included in the final synthesis analysis following low risk of bias assessed using CASP. From the 30 included studies, most studies are published in year 2018, 2020, 2017 and 2015 respectively.
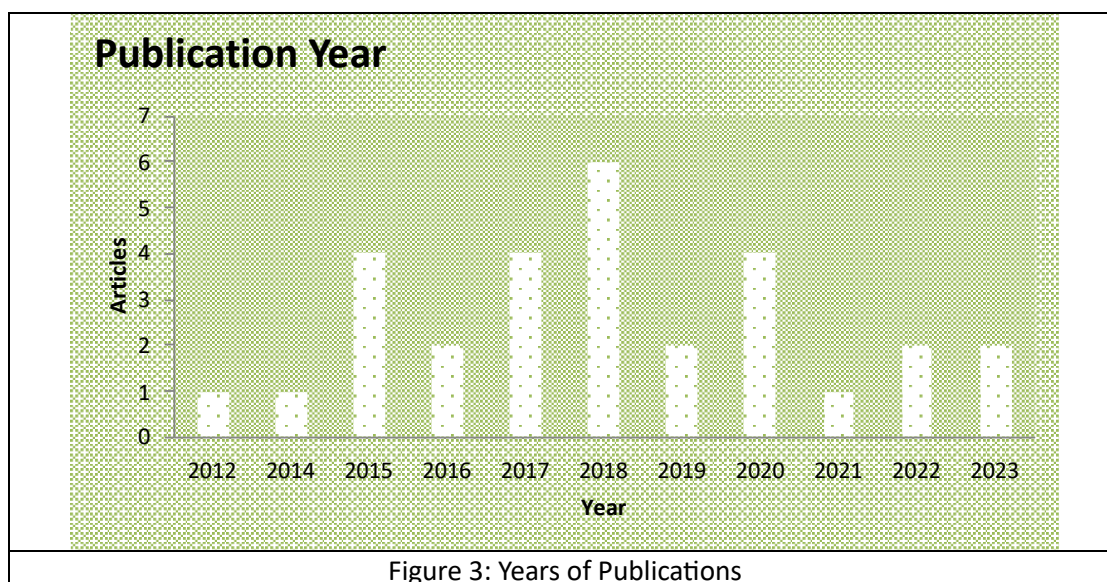

Figure 3: Years of Publications

Distribution of studies with respect to country of implementation

Figure 4 describes the distribution of the analyzed articles over the countries in which these research studies were carried out. As displayed in fig 4, the majority of these studies were undertaken in USA and Iran with 3 studies each followed by Sweden, South Africa and Canada with 2 studies each respectively among others.
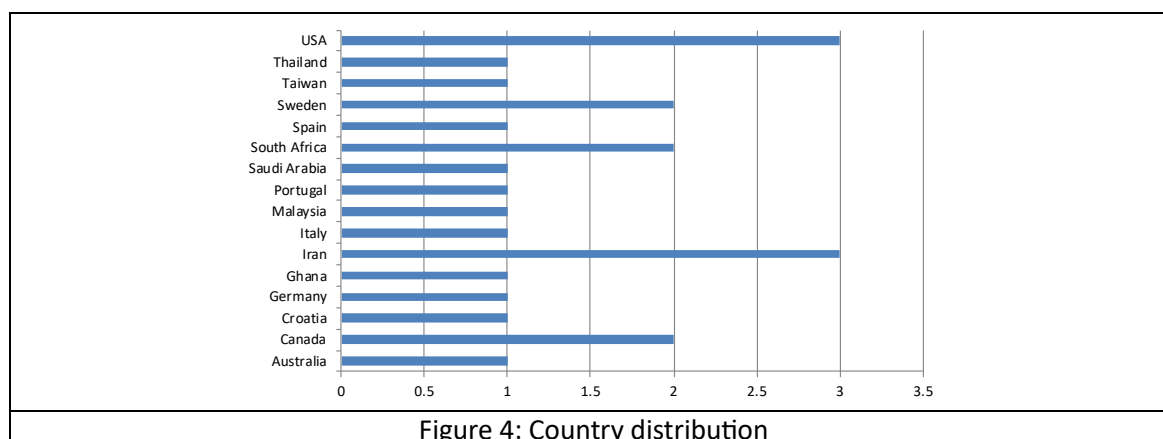

Figure 4: Country distribution

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RQ2: What are the main research methods and research statistical test addressed in the collected studies?

Distribution of research methodology

Figure 5 shows the methodology used in the included studies, 14 studies make used of structure qualitative survey, 9 studies make such of qualitative research and 7 research methodologies were not reported adequately.
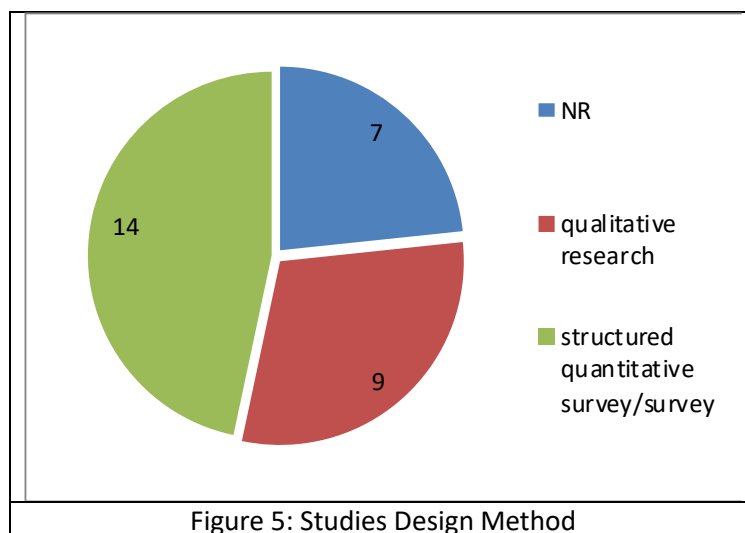

Figure 5: Studies Design Method

Distribution of Research Test Used

Out of the reported methodology in figure 5, structural equation modeling techniques were reported to be frequently used statistical test for the analysis follow by interpretative approach, contents analysis and regression model having the same frequency and path analysis and thematic analysis with the same frequency of statistical test used for the analysis.
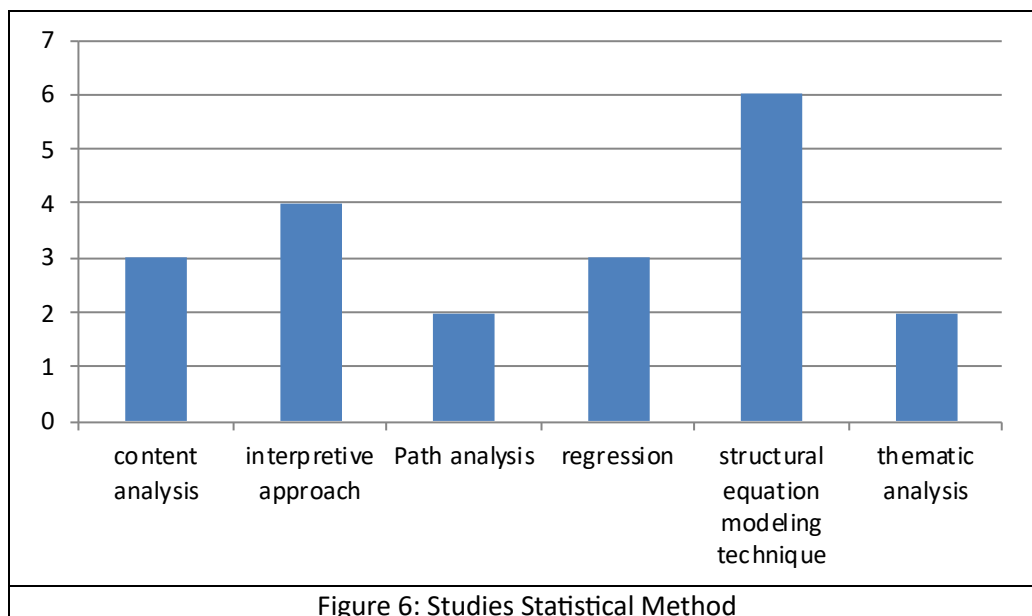

Figure 6: Studies Statistical Method

RQ3: What types of journal systems are mainly studied involving Business Intelligence publication.

Distribution of Journal System

Figure 7 shows the distribution of journal for the 30 included studies, Journal of computer information systems, industrial management and data system are the two highest journal system of the studies followed by journal of decision system, journal of system and information technology respectively, while others journal have 1 publication respectively.
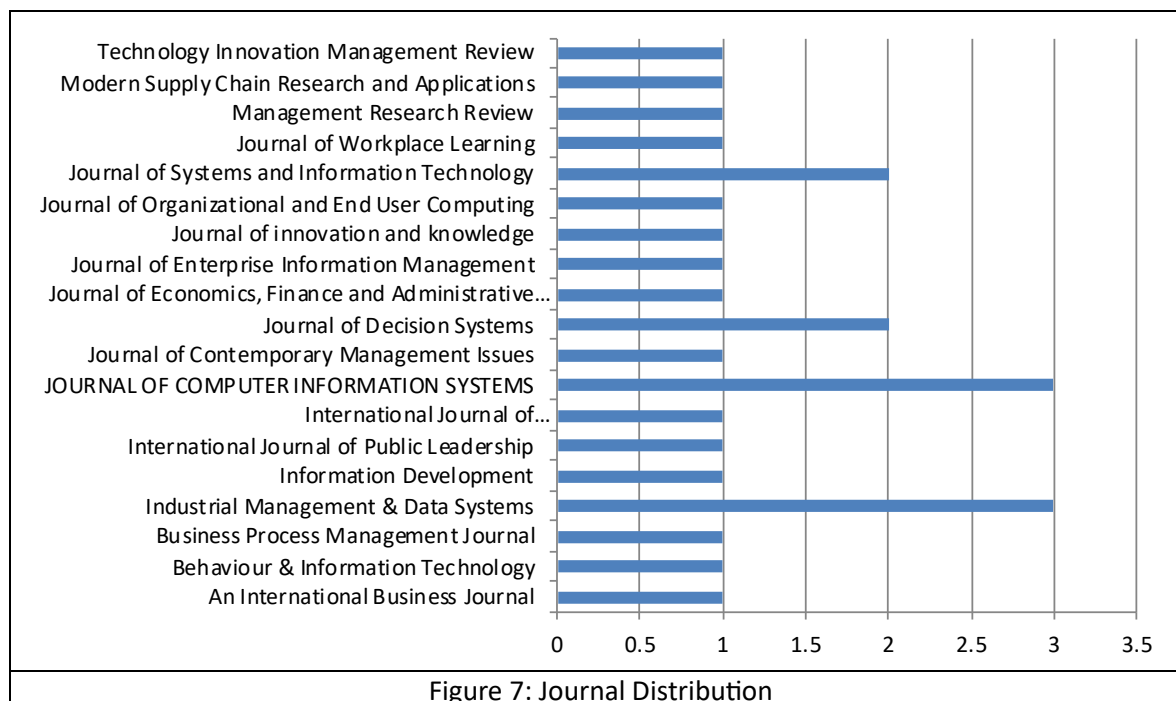

Figure 7: Journal Distribution

RQ4: What are the main Business Intelligence construct considering their relationship with theories and framework?

Series of research were carried out to examine and explore the relationship/impact/effect of different constructs of business intelligences theories and framework. Table 4 classify difference studies construct of business intelligence analyzed in respect to study author. The classification table reveals that knowledge process is the most frequently construct of business intelligence analyzed by 5 source followed by organizational performance analyzed by 4 sources. Data integrity capability construct has a significance impact on business intelligence theories (Abdallah et al., 2020; Veera & Michael, 2018). Operational Business Intelligence capabilities have significance relationship with BI (Abdallah et al., 2020; Daphne & Andy, 2020). Strategic capabilities construct have a significant relationship with Business Intelligence (Abdallah et al., 2020; Michael & Augustinus, 2018). Customer value anticipation and new products speed to market said to have a significant impact on BI framework (Abdallah et al., 2020). New product innovativeness (Abdallah et al., 2020; Michael Rosa et al., 2016), Product innovation performance (Abdallah et al., 2020; Michael & Augustinus, 2018), Satisfaction (Amra et al., 2021; Saeed & Amir, 2015), System usage (Amra et al., 2021; Lucian et al., 2017), Voluntariness (Amra et al., 2021; Borut et al., 2017), Individual performance (Amra et al., 2021), organizational performance (Dalia et al., 2020; Borut et al., 2017; Veera & Michael, 2018; XiaoFeng et al., 2020), Entrepreneurial orientation (Nuno et al., 2017), startup competitiveness/competitive advantage (Nuno et al., 2017; Daphne & Andy, 2020; Saeed & Amir, 2015), marketing and sales (Aleš et al., 2018; Daphne & Andy, 2020), management and international relation (Aleš et al., 2018; Ibrahim et al., 2023), firm procurement (Aleš et al., 2018; Daphne & Andy, 2020; Gregory et al., 2019), Adoption and use (Borut et al., 2017; Ibrahim et al., 2023; Lucian et al., 2017), knowledge processing (Saeed & Amir, 2015; Michael Rosa et al., 2016; Mandana et al., 2018; Ibrahim et al., 2023; Michael & Augustinus, 2018). However it was discovered that construct such as Customer value anticipation, Individual performance, Entrepreneurial orientation and new product speed to market were less studied considering their relationship with business intelligence. Startup competitiveness construct have no significant relationship with business intelligence (Nuno et al., 2017), BI-BPM alignment (Dalia et al., 2020) and system quality (Rolando & Jonathan, 2018).

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construct	Source	N
Data integration capability	Abdallah et al., 2020 Veera & Michael, 2018	2
Operational BI capabilities	Abdallah et al., 2020 Daphne & Andy, 2020	2
Strategic BI capabilities	Abdallah et al., 2020 Michael & Augustinus, 2018	2
Customer value anticipation	Abdallah et al., 2020	1
New product innovativeness	Abdallah et al., 2020 Michael Rosa et al., 2016	2
New product speed to market	Abdallah et al., 2020	1
Product innovation performance	Abdallah et al., 2020 Michael & Augustinus, 2018	2
Satisfaction	Amra et al., 2021 Saeed & Amir, 2015	2
System usage	Amra et al., 2021 Lucian et al., 2017	2
Voluntariness	Amra et al., 2021 Borut et al., 2017	2
Individual performance	Amra et al., 2021	1
organizational performance	Dalia et al., 2020 Borut et al., 2017 Veera & Michael, 2018 XiaoFeng et al., 2020	4
BI-BPM alignment	Dalia et al., 2020	1
Entrepreneurial orientation	Nuno et al., 2017	1
startup competitiveness or competitive advantage	Nuno et al., 2017 Daphne & Andy, 2020 Saeed & Amir, 2015	3
marketing and sales	Aleš et al., 2018 Daphne & Andy, 2020	2
management and international relation	Aleš et al., 2018 Ibrahim et al., 2023	2
firm procurement	Aleš et al., 2018 Daphne & Andy, 2020 Gregory et al., 2019	3
Adoption (A), and use (U).	Borut et al., 2017 Ibrahim et al., 2023 Lucian et al., 2017	3
Information quality, System quality and Service quality	olando & Jonathan, 2018	1
knowledge processing	Saeed & Amir, 2015 Michael Rosa et al., 2016 Mandana et al., 2018 Ibrahim et al., 2023 Michael & Augustinus, 2018	5

Table 4: Classification of business intelligence constructs across the analyzed studies.

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Source	Country	Journal Source	Purpose and consruct	Methods	Participants	findings
Abdallah et al, 2020	Saudi Arabia	Journal of innovation and knowledge	Purpose is aimed to test the proposed model in developing countries' contexts, particularly the Arab context. Recently, BI systems have largely been employed by firms in Arab countries, such as Egypt, Saudi Arabia and Jordan.	structured quantitative survey	marketing and sales directors	We concluded that BI is significantly and positively related to CVA (b = 0.59; t = 17.00; p < 0.001), new product innovativeness (NPI) (b = 0.60; t = 15.20; p < 0.001) and new product speed to market (NPSM) (b = 0.60; t = 16.21; p < 0.001), supporting H1, H2 and H3, respectively. Similarly, CVA has a positive and significant relationship with NPI (b = 0.52; t = 11.64; p < 0.001), supporting H4. CVA (b = 0.49; t = 13.03; p < 0.001), NPI (b = 0.50; t = 12.88; p < 0.001) and NPSM (b = 0.15; t = 4.10; p < 0.001) have a positive and significant effect on product information performance (PIP). Hence, these findings support H5, H6 and H7.
Amra et al., 2021		Journal of Contemporary Management Issues	It analyzes the contribution of business intelligence through a widely accepted model of information systems performance made up of user satisfaction, system use, and individual performance.	quantitative research design	employees	Based on information systems success theory, the result of the analysis reveals the vital role of end-user satisfaction with BI system useas an important predictor of individual job performance. The usefulness of this system is related to the nature of an organization's business: in some companies, they are in formative and are objectively not necessary for doing business, while in other compa nies they may be essential. The imperative for the successful implementation of a busi ness intelligence system is the focus on cus tomer satisfaction and their use of the sys tem itself. The model used in the research includes customer satisfaction and the use of the system, which further affects users' performance and thus represents the success of the business intelligence system. The theoretical model was analyzed using struc tural equation modeling techniques, which enabled the empirical validation of the inte grated model.
Dalia et al., 2020	Croatia	Business Process Management Journal	To enhance the understanding of how BI maturity is translated into organizational performance. Alignment of BI and BPM initiatives seems one possible way for creating business value with BI, particularly because BI enables process performance measurement and management, which allows the BI initiative to become more business focused.	structured quantitative survey	employees	The results show that the impact of BI maturity on OP is indirect and fully mediated by BIBPM alignment because hypothesis H2 is confirmed but H1 is not. This finding holds important theoretical and practical implications.– Our results provide evidence that the effect of BI on organizational performance is fully mediated by alignment of BI and BPM initiatives, and therefore, BI business value can be generated through the use of common terminology and methodologies, as well as a strong communication between BI and BPM experts, managers and teams in order to coordinate the two initiatives.
Nuno et al., 2017		An International Business Journal	To investigate the influence of business intelligence (BI) in startups competitiveness, contributing to a gap in literature as this relationship is normally more focused on stablished businesses. The mediating role of entrepreneurial orientation (EO) was taken in to account in the proposed research model.	structured quantitative survey		The results point to significant mediating role of EO in the impact of BI on competitiveness. The direct impact of BI on competitiveness was not confirmed
Mikael et al., 2019	Sweden	International Journal of Public Leadership	The purpose of this paper is to address the perceptions senior public leaders in local government have regarding the need for business intelligence and their perceptions of the extent to which their organizations are capable of effectively assimilating business intelligence.	structured quantitative survey	senior public leaders	The leaders' perceptions about the need for business intelligence were fragmented. Their perceptions regarding its use were even more fragmented, both between different municipalities and within municipalities
Aleš et al., 2018		Industrial Management & Data Systems	The purpose of this paper is to provide a better understanding of how post-adoption use of business intelligence system (BIS) affects firm performance. It develops and empirically tests a conceptual model for assessing the impact of BIS routine and innovative usage on firm performance the context of small and medium enterprises (SMEs).	survey		
Borut et al., 2017		Industrial Management & Data Systems	The purpose of this paper is to provide a better understanding of the determinants of business intelligence system (BIS) adoption stages. It develops and empirically tests a conceptual	survey		

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			model for assessing the determinants of BIS diffusion on the evaluation, adoption, and use stages in the context of small and medium enterprises (SMEs).			
Daphne & Andy, 2020	US	Industrial Management & Data Systems	To empirically examine the impact of Business Intelligence (BI) systems on operational capability in high-tech sectors. We also seek to understand the contextual factors that facilitate the adoption of BI systems.	stochastic frontier estimation (SFE) methodology	employees	We find that the implementation of BI systems leads to higher operational capability, particularly for large high-tech firms with high technology intensity. We further show that technology intensity and firm size are important contextual factors for firms to reap the benefits of BI systems.
Rolando & Jonathan, 2018	Spain	Journal of Economics, Finance and Administrative Scienc	To use three models that empirically compared, the DeLone and McLean model, the Seddon model and the Modified Seddon model, by measuring the impact of a business intelligence system (BIS) in companies in Peru. After that, the mediators and dependent constructs were analysed to determine if they were behaving properly (a good level of variance explanation and significant relations with others constructs).	quantitative		The Seddon model seems to show the best fit and explanation for the outcomes. After that, a review of the system use construct was realised, because of its limited variance explained and the few significant relations with other constructs, to improve its explanation power in future research.

Table 5: Analysis of business intelligence constructs related to various frameworks

Source	Country	Journal Source	Purpose and consruct	Methods	Participants	findings
Saeed & Amir, 2015	Iran	Journal of Enterprise Information Management	The purpose is to study the relationship between BI functions, DS benefits, and organizational benefits in context of decision environment.	quantitative survey		The findings confirm the existence of meaningful relationship between BI functions, DS benefits, and organizational benefits by supporting 15 out of 16 main hypotheses. Essentially, this research provides an insightful understanding about which capabilities of BI have strongest impact on the outcome benefits
Aaron et al., 2015	Germany	Journal of Systems and Information Technology	The purpose of the study is to investigate the development of software pricing, following the advent of cloud-based business intelligence & analytics (BI&A) Software.	qualitative expert interviews		The paper sheds light on the value perception of customers and suggests a clear focus on the interaction between customers and vendors, and less on technical issues. The developed customer-centric, value-based pricing framework helps to improve pricing techniques and strategies.
Ronda et al., 2015	Australia	Journal of Systems and Information Technology	This paper aims to provide an introductory overview of internal business intelligence (BI) and the role that technology plays in its management and exploitation.	typical internal BI architecture		The successful implementation of an internal BI system should include the core components and address operational issues, whilst also providing meaningful output to the organisation. It is contended, however, that to be truly successful, the internal BI system must be embedded within organisational processes and be adaptable to changing technologies, allowing the exploitation of the organisation's internal BI.
Rosa et al., 2016	Iran	Journal of Workplace Learning	The study is aimed on the role of business intelligence, knowledge sharing and organisational innovation on gaining competitive advantage.	survey	managers and specialists	The results showed that business intelligence has a positive and significant impact on knowledge sharing, organisational innovation and gaining competitive advantage. Further, business intelligence has a positive and significant effect on competitive advantage through knowledge sharing and organisational innovation. Knowledge sharing impacts gaining competitive advantage positively and significantly. Finally, organisational innovation impacts gaining competitive advantage positively and significantly.
Mandana et al, 2018	Iran	Management Research Review	The purpose of this research is to propose a framework for developing business intelligence systems (BIS).	qualitative research		The findings revealed that team-level influential factors play a more significant role in BIS development success. The results also indicate that BIS development relies on suppliers, customers and their relationships, whereas the supplier side has a more significant impact on determining successful development. Drawing on these findings, embedded knowledge, knowledge management process capability and project team members' interaction were identified at team level on supplier side which significantly influence the success of BIS development
Daniel & Francis, 2022	Chana	Modern Supply Chain Research and Applications	This study aims to examined the impact of business intelligence (BI) and supply chain ambidexterity (SCA) on operational performance (OP), contributing to dwarf knowledge in small- and mediumsized enterprises (SMEs) in the context of emerging economies.			With the discovery of this study, the theory of a resource-based view now has some empirical evidence behind it. As a result, SMEs prioritize aspects that could improve their operations and implement tactics that would nurture better performance and competitive advantages.
Kristens et al., 2015	Sweden	Journal of Decision Systems	This paper presents the results of a case study conducted at a complex-systems company, with the overall aim to identify how complex-systems companies may take advantage of BI using a framework	qualitative research		Our results also show that the case company is rather immature, still working on fulfilling most of the critical factors for success brought forward in the previous section. Therefore, we advocate that further research is needed to verify whether complexsystems companies are

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						less BI mature. Even more interestingly, if this turns out to be true, it would be important to investigate why
Ibrahim et al., 2023	Malaysia					
Veera & Michael, 2018	Thailand	Information Development	Elucidating the determinants of business intelligence adoption and organizational performance	narrative		The results of the structural equation modeling show that compatibility, technology readiness, top management support and competitive pressure posited a positive relationship towards business intelligence adoption. The adoption of business intelligence had a positive effect on internal process and learning and growth in terms of organizational performance.
Gregory et al., 2019	Canada	JOURNAL OF COMPUTER INFORMATION SYSTEMS	the impact of BI and the relative importance of BA on corporate performance management (CPM) have not yet been investigated. To modeled a CPM framework based on the Integrative model of IT business value and on information processing theory.	survey	senior managers	Findings suggest that the more effective the BI implementation, the more effective the CPM-related planning and analytic practices. BI effectiveness is strongly related to BA, planning and to measurement. In contrast, BA effectiveness is strongly related to planning but less so to measurement. T

Table 5 (continued)

Source	Country	Journal Source	Purpose and consruct	Methods	Participants	findings
XiaoFeng et al., 2020	USA	Journal of Organizational and End User Computing	Purpose is to evaluate the impact of business analytics (BA) and business intelligence (BI) use, IT infrastructure flexibility, and their interactions on organizational agility.	A cross-sectional survey		This contributes to the awareness behavior driver that helps determine an organization's actions, which matches well with the detecting changes dimension of OA. Therefore, this study proposes that BA-Use is one of the contributing components on the detecting dimension of OA. The PLS results in Figure 2 show that the path coefficient for the direct impact of BA-Use on OA is 0.175 and that is significant at the 0.05 significant level (p = .017). Hypothesis 1 (H1) is supported in this study.
Vittoria et al., 2022	Italy		The study firstly comprises a literature review on approaches for governance management, which confirm a disconnection between theory and practice. It then progresses to mapping the main business areas			
Lucian et al., 2017	USA	JOURNAL OF COMPUTER INFORMATION SYSTEMS		survey	organization	
Michael & Augustinus, 2018	Canada	Technology Innovation Management Review		qualitative		
Rob et al., 2012		Journal of Decision Systems		qualitative		
Brenda et al., 2017	South Africa	International Journal of Sustainability in Higher Education	Higher education institutions (HEIs) face a number of challenges in effectively managing and reporting on sustainability information, such as siloes of data and a limited distribution of information. Business intelligence (BI) can assist in addressing the challenges faced by organisations. The purpose of this study was to propose a BI framework for strategic sustainability information management (the Sustainable BI Framework) that can be used in HEIs	qualitative		Business Intelligence (BI) vendors have often asserted that the use of their tools can lead to organisational transformation. This paper compares the vendor literature on the topic with two management theories. The results of a content analysis of the vendor literature are presented, followed by an overview of dynamic capability theory and absorptive capacity. This comparison shows that the BI vendor literature treats transformation in a simplistic and narrow way. The paper argues for greater engagement between academia, BI vendors and BI customers, and outlines a research agenda for further work
Tshegofatso et al., 2018	South Africa		The study explores and describes the activities and contingencies enabling a business intelligence environment. Business intelligence is seen as a complex social activity system.	qualitative		To this point, Activity and Contingency theories are used as lenses to analyze the activity system. The paper conceptualizes a business intelligence activity framework for improving and enhancing performance, in a financial bank.
Lívia	Portugal		This research is to study the influence of intellectual capital in the relationship with customers to assess their needs, aiming to answer the following question: how the management of intellectual capital can contribute to the understanding and explanation of knowledge and strategic business needs on projects of BI systems?			
Sung et al., 2016						
Yu-Wei et al., 2014	Taiwan	Behaviour & Information Technology	The study examines how the motivational factors of both expectancy theory and social exchange theory (SET) affect managers' willingness to utilise BI.			

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Kashif et al., 2023	Journal of Computer Information Systems	qualitati ve
	Table 5 (continued)	

DISCUSSION

This study presents a systematic literature review on business intelligence theories and framework with the aim of bringing together research on the constructs of business intelligence and their impacts. Without an argument, this research has made a substantial contribution to the body of literature in this discipline. The results of the present study have generated a lot of solid evidence to back up the findings. Based on figure 3, the publishing performance distribution reveals most of the studies used were released in the years 2018, 2020, and 2017, respectively. In terms of publication country distribution, the United States and Iran came in first, followed by Sweden, South Africa, and Canada. Most of the studies used quantitative research methods, followed by qualitative surveys, as indicated in figure 5. As illustrated in figure 6, the three journals with the highest distribution of included study findings are Journal of computer information systems, Journal of industrial management and data system, followed by journal of decision system. To figure out the intersection and interactions between the reported constructs and business intelligence, approximately five studies used knowledge processing as the construct, four studies used organization performance as the construct, and three studies used firm procurement, adoption and competitive advantage as the construct. By referring to table 4, there are four distinct constructs of intelligence, including knowledge process which is the construct/theories that has been executed most commonly in studies, organization performance and the data integrity capability construct, which is said to have a significant effect on business intelligence (Abdallah et al., 2020; Veera& Michael, 2018). Studies have shown that the BI constructs which includes operational business intelligence capabilities, strategic capabilities; customer value anticipation and new product speed to market have a positive connection with business intelligence.

Business intelligence systems have widely been employed by firms in Arab countries such as Egypt and Saudi Arabia. (Abdallah et al, 2020; Michael & Augustinus, 2018) reveal in a study conducted that BI significantly and positively related to product innovativeness and product speed to market. It has been analyzed, the contribution of business intelligence through widely accepted constructs/theories of information systems performance such as user satisfaction, system use, and individual performance. Based on this information systems success theory, user satisfaction and system use have significant impact on business intelligence in organizations business (Amra et al., 2021). BI enables process performance measurement and management which has allowed the BI initiatives to become more businesses focused (Dalia et al., 2020). However, the effect BI on organizational performance is fully mediated by alignment of BI theories which is generated through strong communication. Table 5, the analysis of business intelligence framework of (Daphne & Andy, 2020) findings reveal the implementation of BI systems leads to higher operational capability with high technology intensity which is said to reap the benefits of BI systems. The study "Role of Business Intelligence in Gaining Competitive Advantage" by (Rosa et al., 2016) found that business intelligence has a beneficial and notable effect on acquiring edge over others through knowledge exchange and organizational creativity. At the team level, embedded knowledge, knowledge management process competency, and interaction between project team members were discovered. The findings of (Mandana et al., 2018) in table 5, team level influential elements are crucial for the success of business intelligence development.

In respect to (Veera and Michael, 2018) findings utilizing structural equation modeling, business intelligence adoption is positively correlated with compatibility, technological preparedness, top management support and competitive pressure. In regards to organizational performance, the use of business intelligence has a favorable impact on internal processes, learning and growth. A study of the vendor literature's content was displayed after which a discussion of dynamic capability theory and absorptive capacity was also presented. The aforementioned comparison demonstrates how the BI vendor literature approaches transformation in a straightforward and constrained manner (Brenda et al., 2017). To this point, Activity and Contingency theories are used as lenses to analyze the activity system as business intelligence activity framework for improving and enhancing performance.

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This present systematic review is limited to specific database for the collection of research studies as reported in the methodology (Doaj, Emerald, Taylor and Francis). Subsequently, researcher could further extend the search database to Scopus, Web of Science (WoB), among others.

CONCLUSION

This systematic literature review highlights the evolving landscape of business intelligence, underlining the critical factors and theoretical frameworks that influence its adoption and success. The analysis reveals that while BI systems hold significant potential for enhancing organizational performance, many enterprises struggle to fully capitalize on these technologies. Key determinants of successful BI implementation include organizational structure, technological infrastructure, and management support.

Contributions

This review makes several significant contributions to the field of business intelligence. First, it provides a comprehensive synthesis of BI theories and frameworks, offering a consolidated understanding of the existing research landscape. Second, it identifies critical factors that influence BI implementation success, providing actionable insights for practitioners aiming to optimize their BI initiatives. Third, it highlights the theoretical underpinnings driving BI research, helping to inform future studies and guide the development of more robust BI frameworks.

Limitations

Despite its contributions, this review has several limitations. The scope of the review is confined to studies published between 2000 and 2023, which may exclude relevant research outside this period. Additionally, the review focuses on studies available in specific academic databases, potentially omitting valuable insights from other sources. Furthermore, the qualitative content analysis, while thorough, is subject to the inherent biases of the researchers conducting the review. Future research should aim to address these limitations by including a broader range of studies and employing diverse analytical methods.

The review emphasizes the need for ongoing research to bridge gaps in understanding and to develop more robust frameworks for BI application. Future studies should focus on integrating emerging technologies and addressing the dynamic needs of modern enterprises to harness the full potential of business intelligence.

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