Socio-Technical Factors Influencing Business Intelligence Adoption in SMEs

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***Abstract*—This study explores the major challenges that Small and Medium-sized Enterprises (SMEs) encounter when adopting Business Intelligence Systems (BIS), particularly in complex socio-political environments, such as Libya. It aims to understand how internal constraints, like limited financial capacity, resistance to change among management, and weak knowledge-sharing practices, combined with external socio-political factors, influence BIS adoption in developing economies. A cross-sectional survey approach was employed, targeting 297 SME owners and managers in Libya. Data was collected using a structured questionnaire and analyzed with SmartPLS to examine the relationships among key variables: facilitating conditions, information quality, perceived ease of adoption, perceived usefulness, and social influence. The findings highlight that social influence, especially from peers and industry experts, plays a crucial role in shaping SMEs' adoption behavior. Moreover, the quality of information emerged as a significant determinant in the successful adoption of BIS. The study offers both practical and policy-level insights, suggesting that with the right support, BIS adoption can significantly enhance SMEs' competitiveness, decision-making capabilities, and operational efficiency.**

Keywords*—*Information quality; social influences; perceived usefulness of Business Intelligence Adoption; perceived ease of adoption of Business Intelligence System; Business Intelligence System adoption

I. Introduction

In today's fast-paced and ever-changing economic environment, organizations are compelled to utilize tools that support optimal decision-making and help them adapt effectively without incurring financial losses. One growing trend is the adoption of Business Intelligence Systems (BIS), which are recognized for giving companies a significant competitive edge. A study by Tantawy and Ismail (2021) examined a large retail company operating in multiple countries that implemented BIS to enhance decision-making, operational efficiency, and customer satisfaction. The implementation led to notable performance improvements, including increased revenue, better inventory management, and improved customer segmentation. In 2017, Holiday Retirement collaborated with Prorize LLC to develop a revenue management system utilizing operations research. This system provided optimal pricing recommendations across more than 300 senior living communities, resulting in consistent revenue increases of over 10%. In this same vein, Continental Airlines reported increased revenues and cost savings, resulting in a 100% return on investment (ROI). The key to such success lies in accessing accurate and timely information to guide strategic decisions [59]. However, as noted by [10], poor BI adoption can lead to adverse operational impacts, including loss of market share and a declining customer base.

Nevertheless, some studies emphasized that knowledge serves as a valuable organizational resource capable of generating wealth. However, simply possessing knowledge is insufficient; it must be directed and applied effectively to support sound decision-making. Organizations can enhance their existing knowledge base through the implementation of Business Intelligence (BI) initiatives. The success of such initiatives is influenced by various elements, including the quality of information available [16], the ease with which systems can be used [85], and their perceived benefits. Numerous studies have highlighted that the most crucial contributors to the successful implementation of BI systems are related to how organizations manage their information technology, particularly through practices like knowledge sharing and managing organizational change.

In the case of Libyan SMEs, there exists a lack of sufficient knowledge about BIS and its potential benefits, which hinders informed decision-making regarding their adoption. Many Libyan SMEs face resistance to adopting new technologies due to a preference for traditional business practices and a lack of change management strategies. These and many challenges require targeted strategies that will provide clear key success factors for BIS adoption.

Despite the global recognition of BIS as a driver of competitiveness, the adoption rate among SMEs in developing economies—particularly in Libya—remains considerably low. Limited infrastructure, inadequate technical expertise, and cultural resistance to digital transformation exacerbate the challenge. This creates a gap between the proven benefits of BIS in advanced markets and the unrealized potential within Libyan SMEs. Consequently, the absence of evidence-based strategies tailored to this context leaves decision-makers without practical guidance on how to overcome implementation barriers.

This research, therefore, addresses a critical problem: identifying the underlying factors that influence BIS adoption in Libyan SMEs. By investigating organizational, technological, and environmental conditions that either enable or constrain adoption, the study seeks to bridge the gap between theoretical promise and practical application. The objective is to provide a framework that highlights key success factors and offers actionable insights for SMEs, policymakers, and industry stakeholders aiming to enhance competitiveness through digital transformation.

The significance of this study lies not only in its contribution to academic discourse but also in its practical relevance. For Libyan SMEs, understanding how to leverage BIS effectively could improve efficiency, foster innovation, and support long-term sustainability in an increasingly competitive marketplace. For policymakers, the findings will offer evidence-based recommendations to design supportive policies and capacity-building programs that encourage technological adoption across the SME sector.

To achieve these aims, the paper is structured as follows: following this introduction, a literature review examines existing studies on BIS adoption and highlights the gaps within the Libyan context. The methodology section then outlines the research design, data collection, and analysis techniques employed. This is followed by the presentation and discussion of findings, where key success factors are identified and critically examined. The paper concludes by summarizing the implications for practice and policy while suggesting directions for future research.

Based on this, the current research aims to identify the key success factors for BIS adoption, emphasizing their significance in the context of Libyan Small and Medium Enterprises (SMEs).

II. Literature Review

A. Business Intelligence System

Business Intelligence System (BIS) has been seen as a product that is made up of several processes, such as perception, storage, learning, communication, and decision [14]. Accordingly, there are various views on BIS in terms of gathering, processing, interpreting, and communicating the necessary information in the decision-making processes, and with a similar approach. One could conclude that this conceptualizes recognizing the value of external environmental information for shaping organizational actions through managing the information life cycle, which includes perspectives from information systems and their impact context, enhancing value-added informational processes, and facilitating decision-making processes.

Within the context of small and medium-sized enterprises (SMEs), intelligence is not simply a characteristic or inherent quality, but rather a dynamic capability that develops at individual, group, and organizational levels. This development is shaped by interactive communication and relationships across these levels, particularly through problem-solving and actions that support the creation and transfer of knowledge. [14] define business intelligence as an organization's ability to respond to new challenges and tasks, and to strategically adapt by generating and utilizing knowledge. In this view, intelligence is a capacity that enables organizations to adjust to external changes, while the creation and application of knowledge underpin both business intelligence and strategic decision-making. However, success and long-term viability of SMEs in competitive markets rely heavily on the ability to extract valuable insights from data, recognize patterns, and identify trends to make informed decisions [15]. In the past, SMEs lacked the technological infrastructure to process information efficiently, resulting in strategic, tactical, and operational decisions being made largely on intuition. Over time, certain automated systems capable of receiving raw data and quickly distributing relevant information to appropriate users was conceived. This system utilizes methods such as automatic document summarization, encoding, and user profile updates. But, these early techniques, primarily statistical in nature, were limited in effectiveness without adequate communication systems and input/output tools. Gradually, the proposed approaches evolved, giving rise to advanced concepts and methodologies designed to enhance decision-making based on factual data and led to the broader development of what became known as "Business Intelligence System" (BIS), a term later coined by [29]. Today, BIS encompasses a wide range of applications, technologies, and methods that facilitate the collection, organization, transformation, and analysis of structured data. This process can involve direct access tools like queries and reports, or more complex analytical techniques that turn raw data into actionable knowledge [85].

However, the effectiveness of BIS relies not only on advanced methodologies and technologies but also on understanding both internal and external factors, such as economic, environmental, market behavior, legislation, currency exchange rate, internal communication, and operations that affect an organization (Singh, Thakur, & Sharma, 2016). These factors generally influence all stakeholders in a business (customers, competitors, partners, and many more), collectively guiding business decisions and enabling the creation of significant competitive advantages. According to [23], "The best way to analyze the environment is not to try to understand it as a collection systems and organizations, but to treat it as information that the company must access through research activities." He also emphasized that "what truly matters is not just the suppliers or customers themselves, but the information that the company possesses about their goals, interests, relationship conditions with SMEs, and many other aspects of their behavior. This information helps identify their characteristics and expectations for the SMEs. Pas studies similarly asserted "The rapid pace of product innovation and market changes requires that future firms have a clear and expensive view of the business environment." In response to tight deadlines, successful SMEs must proactively explore new applications for emerging technologies, initiate product development ahead of demand, cultivate and stimulate demand, and establish market penetration strategies in anticipation of future needs. Additionally, SMEs must develop a high sense of anticipation of possible agreements or technological developments of rival companies. The use of business intelligence has evolved by leaps and bounds in proportion to the rise of information technology and the growth of the global industry. Experts in the field have provided numerous definitions of business intelligence. It is often described as the process of transforming data into knowledge to obtain a competitive advantage.

Past studies identified the direct impact of business intelligence on startup business performance, as well as its indirect impact through network learning and innovativeness [16]. Their results revealed a significant and positive impact of business intelligence on innovativeness, network learning, and startup business performance. Hence, focusing on the role of BIS can enhance organizational network learning and

performance. On the other hand, [14] found that BIS significantly enhances organizational performance by facilitating business process changes. Similarly, [83] found a significant and positive impact of business intelligence on organizational performance, with this impact fully mediated by the alignment of business intelligence strategies.

Nevertheless, it is necessary to indicate that Libyan SMEs face certain challenges related to data and information which represent BIS and have the potential to affect future success in making use of adequate processes of strategic planning, planning by scenarios or mixed approaches, or to achieve flexible and scalable management against the continuous growth changes of companies, without losing the characteristics of efficiency, quality, and the ability to make decisions. For example, many Libyan SMEs struggle with limited access to reliable market data and lack the technological infrastructure needed for efficient data management and strategic forecasting. Importantly, it is necessary to differentiate between the terms data, information and knowledge, as they are sometimes used interchangeably in literature. The data is a symbolic representation, which has no semantic meaning; it does not transmit a message. On the other hand, information is the set of processed and organized data that has a meaning, transmits a message, allows decision-making, favors problem-solving, and increases knowledge. For the information, the source is the data, and the required activity is the structuring and interpreting of the data. With respect to knowledge, the origin is given in the information that requires analysis, synthesis, dialectical vision, and determination of inferences. Also, the high competition among Libyan SMEs, driven by the need to increase sales rates and market share, necessitates maintaining effective internal management inform of BIS as explained in the current study. In this context, BIS includes innovation, creativity, continuous growth, competitiveness, and decision-making, all within a systematic spiral of continuous improvement. This and many more signify the urgent solution required by the Libyan SMEs towards having a dynamic and globalized environment, information, knowledge, methodologies, and management strategies generate greater demands on executives and managers, impacting the overall performance of the organization [85]. As such, the current study investigates the key factors that influence the adoption of Business Intelligence Systems (BISs) within Small and Medium-sized Enterprises (SMEs).

B. Technology Acceptance Model (TAM)

The use and acceptance of information technologies by end users is an additional way for the system to be successful [4]. Many theories have addressed the use of information technologies by individual consumers, such as the Technology Acceptance Model (TAM), which represents the most widely used [56, 66, 11]. The Technology Acceptance Model (TAM), originally developed by [24], is grounded in the Theory of Planned Behaviour by [31. Its primary objective is to elucidate and predict individuals' acceptance and utilization of technological innovations. The initial model was refined and expanded upon by [24], solidifying its place in academic literature.

TAM posits that those two critical factors, perceived usefulness (PU) and perceived ease of use (PEOU), significantly influence users' attitudes toward technology adoption, as shown in Fig. 1. These perceptions shape behavioural intentions, ultimately affecting actual technology usage. Recent studies have extended TAM by integrating additional variables such as perceived enjoyment, self-efficacy, and perceived cyber risk, enhancing its predictive power in diverse contexts. Initially, TAM was predominantly applied to organizational information systems, focusing on professional users. However, recognizing that general users may lack the technical expertise of professionals, researchers have advocated for model adaptations that incorporate humanistic and social factors, as in the current study. For instance, the inclusion of constructs like personal innovativeness and perceived enjoyment has been shown to better capture end-user behaviours [30].

Contemporarily, adopting and using information technologies in the business environment has been the main focus of information systems research and applications. Understanding the conditions underlying which information systems will be owned by organizations and creating these conditions becomes a high priority, making the current research eminent to identify other social aspects that can contribute to technology to serve as BIS [74].

This concept has a rooted relevance in the theory of planned behavior, which adds that an emotion or personal predisposition of the user gives advance notice of future behaviors, adopting an intermediate role between the user's perceptions and the user's final decision. The current situation of the Libyan SMEs shows that many are facing challenges in implementing or adapting new functionalities of new technologies, and providing strategies for successful adoption by users. Based on this, the present study uses TAM to identify the intention of use and assess the acceptance of technology in different contexts.

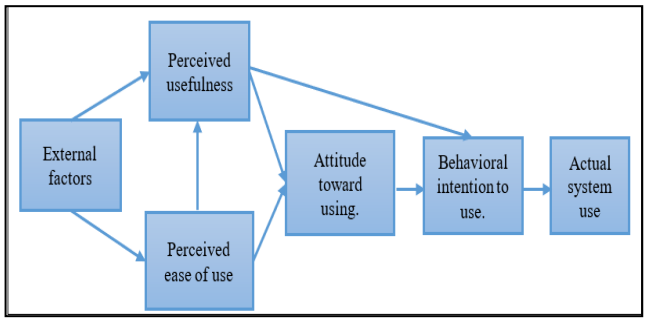

Fig. 1. Technological acceptance model. Source: [25].

C. Unified Theory of the Adoption and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) model, developed by [10], integrates elements from various technology acceptance theories to explain user intentions and behaviors regarding technology adoption. Key constructs include performance expectancy, effort expectancy, social influence, and facilitating conditions, which directly influence behavioral intention and usage behavior were incorporated as shown in Fig. 2 below. Moderating factors such

as age, gender, experience, and voluntariness of use further refine the model's predictive capabilities.

Specifically, UTAUT was employed to address the Technology Acceptance Model (TAM) limitations by incorporating social and environmental factors. Recent studies have applied UTAUT across diverse contexts, including education, healthcare, and mobile technology, especially during the COVID-19 pandemic. For instance, [21] conducted a systematic literature review, revealing that performance expectancy was the most significant predictor of technology adoption during this period. Additionally, facilitating conditions, effort expectancy, and social influence were confirmed as influential factors in user adoption behaviors.

Further research by [25] applied UTAUT to personalized learning systems, finding that perceived usefulness, perceived ease of use, habit, and facilitating conditions significantly impacted both behavioral intention and actual system use. These findings underscore the model's versatility and relevance in understanding technology adoption in various settings. Based on our study, we posit that UTAUT would enhance the adoption of BIS among Libyan SMEs.

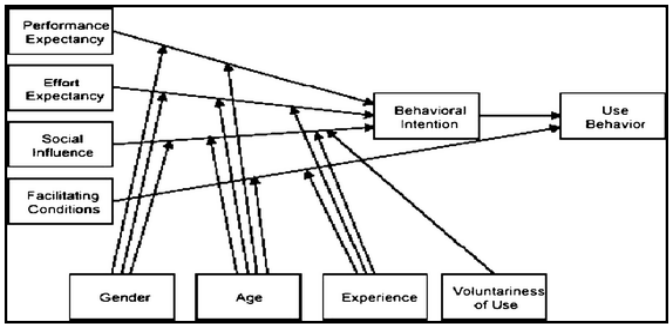

Fig. 2. Unified theory of adoption and use of technology, Source: [19].

D. The SMES Industry in Libya

SMEs in Libya are very important for the economic growth and social development of the country, in the contribution to the Gross Domestic Product (GDP) and job creation. Due to their characteristics, capacities and internal dynamics, they have attracted the attention of national and international organizations, authors, and researchers aiming to describe and address their challenges. The significant contribution of the SMEs industry to the Libyan economy motivated this study to investigate factors influencing the adoption of BIS. This technology is expected to help the SMEs industry achieve better performance and expand its market share within Africa.

SMEs are defined as businesses with limited employees and revenue, specifically those with fewer than 50 employees and less than USD700,000 in revenue, according to the Libyan regulation [5]. In [77], note that SMEs have distinct characteristics and dimensions but face occupational and financial limitations imposed by the regulations of each country. Consequently, there is no universal definition or characteristic that fully captures what SMEs are. The term SME refers to small and medium-sized companies. Typically, SMEs lack a defined structure and are often managed solely by the owner, who handles decisions related to pricing, hiring, salaries. Additionally, SMEs do not have specific job descriptions, and employees often perform multiple roles.

Small and medium businesses have different definitions in different countries. Generally, a small business is an organisation with limited number of employees, and typically, these employees are below fifty. In Libya, Small Business Administration defines small businesses as firms employing 50 or fewer persons, while medium enterprises are firms employing 50 to 250 as shown in Fig. 3.

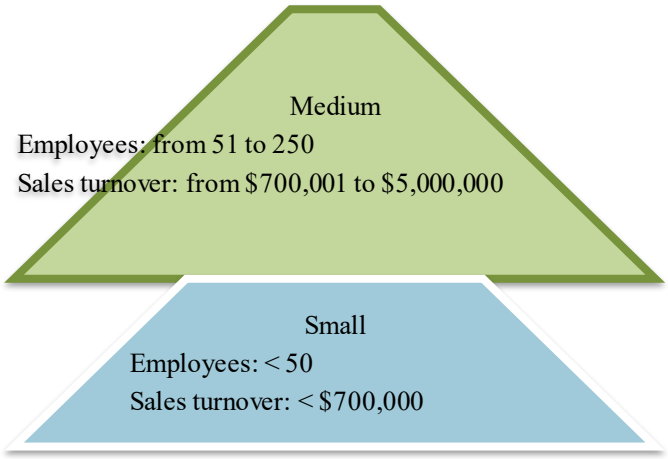

Fig. 3. SMEs classification in Libya. Source: Ministry of Industry - Libya 2020.

Currently, many Libyan small and medium businesses struggle due to the inadequate knowledge of business owners regarding the formulation of growth strategies. One of the reasons these businesses often fail to thrive is the low skill levels of their owners and managers [53]. According to [60], the absence of formal operational policies from authorities, which would guarantee the rights of informal business owners and managers, often leads to failures. In [55], the author pointed out that formalising business operations can lead to significant performance improvements for this business. In light, our study investigates the key factors that would influence the adoption of Business Intelligence Systems (BISs) within Small and Medium-sized Enterprises (SMEs) of Libya [77]. This is because it is very important for these SMEs to perform well, as the higher the number of successful SMEs can contribute to better Libyan economic conditions.

E. Research Hypotheses

The Technology Acceptance Model (TAM) posits that perceived usefulness is a key factor that influences the adoption and utilization of technology [25]-[28]. Information quality is a critical antecedent that can significantly shape this perception [44]. The better the quality of the information provided by BIS, the more likely the users are to find the system useful for decision-making and strategic planning [42]. Information quality can be characterized by attributes such as accuracy, timeliness, completeness, and reliability [12] [13]. Each of these facets contributes to the overall perception of usefulness. Previous studies underlined the importance of information quality for organizational performance [48], suggesting that good information quality enhances decision-making and increases perceived usefulness.

In sectors like healthcare, where the quality of information can be a matter of life and death, the link between information quality and the perceived usefulness of BIS is even more significant [48]. Similarly, in the context of SMEs struggling through unprecedented challenges such as the COVID-19 pandemic, the quality of information is paramount for managing crises and making informed decisions [41, 42]. Advancements in Artificial Intelligence (AI) have contributed to the improvement of information quality, subsequently affecting the perceived usefulness of systems like BIS. Studies like those by [57, 58] reflected that AI algorithms can enhance the quality of data mining, predictive analytics, and real-time data processing, thus making BIS more useful for end-users.

The relationship between information quality and perceived usefulness has been empirically tested in various domains. For instance, [44] specifically looked at Business Intelligence and Analytics (BIA) in micro, small- and medium-sized enterprises (MSMEs). They found that information quality directly correlates with the usefulness perceived by the businesses [45].

The hypothesis stands on strong theoretical and empirical foundations, making it a significant aspect of contemporary research in BISs. Quality of information is not just an isolated factor but rather a composite construct that profoundly influences how BIS is received and utilized in various organizational contexts. Based on the previous studies, such as [46, 78], which found a significant impact of information quality on the perceived usefulness of BIS, the proposed hypothesis is as follows:

H 1: There is a significant impact of information quality on the perceived usefulness of BIS

The concept of ease of implementation serves as a significant predictor for the acceptance and successful deployment of technological solutions, according to the TAM [25]. Information quality, with attributes such as accuracy, reliability, and timeliness, can significantly affect this ease [82]. The intersection of these two domains in the realm of BIS remains an area ripe for investigation.

Artificial Intelligence (AI) is increasingly important in automating data analysis and validation processes, enhancing information quality. Studies by [17, 34] demonstrated that AI can substantially ease the process of BIS implementation through predictive algorithms and real-time analytics, thereby providing high-quality information that is easier to integrate into existing systems. During times of crisis, such as the COVID-19 pandemic, the quality of information becomes crucial for quick decision-making and agile responses. [18] observed that the quality of information provided by AI systems significantly impacted the performance and ease of implementation of such technologies in the hospitality industry.

Previous studies have explored the importance of Industry 4.0 in enhancing operational efficiency [23, 30, 33]. Here, information quality is paramount as it directly influences how smoothly these digital transformations take place. The author in [40] addressed the role of AI in the retail industry, where the quality of information is vital for inventory management, customer relations, and logistics. When information quality is high, retail businesses find it much easier to implement and benefit from BIS and other AI-driven technologies. The author in [20], delved into scenario planning and business negotiations, suggesting that good information quality can help in predicting different scenarios more accurately, making the implementation of BIS easier for strategic planning and decision-making. Based on the previous studies, such as [40, 49] that found a significant impact of information quality on the perceived ease of implementation of BIS, the proposed hypothesis is as follows:

H 2: There is a significant impact of information quality on the perceived ease of BIS

The Technology Acceptance Model (TAM) originally emphasized the importance of perceived usefulness and ease of use in technology adoption [25, 14]. In [29], the author extended the TAM, incorporating social influences as a pivotal determinant in the Unified Theory of Acceptance and Use of Technology (UTAUT). Social influences include subjective norms, social identity, and system exposure, which can significantly impact the perceived usefulness of technological systems like BIS.

The author in [2] explored AI adoption in human resource management and highlighted that one of the significant factors impacting its effectiveness is the organizational perception of its utility. Often, this perception is moulded by the social norms within the HR department and the larger organizational culture. In [6], the author discussed the enterprise-level analysis of data analytics-oriented business intelligence technology. That research emphasized that social factors within an organization can either facilitate or hinder the effectiveness of these systems, thus affecting their perceived usefulness. In [10], the author considered AI and big data from ontological and communicative perspectives, suggesting that the social discourse surrounding these technologies influences their perceived utility. Such discourse is often shaped by organizational leaders and opinion makers, whose views are socially influential.

The author in [12], on the adoption of AI in hiring processes, found that social factors like management support and peer encouragement were influential in determining how useful the AI systems were considered to be. In [30], the author discussed AI governance and pointed out that social considerations, such as ethical and societal norms, can strongly impact how the usefulness of AI technologies, including BIS, is perceived within an organization. A previous study discussed the role of complementary resources and external readiness in SME performance. Social influences in the external business environment can significantly shape how useful a firm perceives its BIS, especially regarding its functionality in e-commerce platforms. Based on previous studies such as [1, 67] that found a significant impact of social influences on the perceived usefulness of BIS, the proposed hypothesis is as follows:

H 3: There is a significant impact of social influences on the perceived usefulness of BIS

Traditional models like the Technology Acceptance Model (TAM) have been extended to include social factors, like the

Unified Theory of Acceptance and Use of Technology (UTAUT), which identifies social influences as a significant predictor of technology adoption ease. In this context, social influences encompass subjective norms, social identity, and system exposure. In [72] the author explored how artificial intelligence could manage agricultural supply chain risks, especially during the COVID-19 pandemic. They found that perceived ease of implementation was substantially influenced by social forces, such as farmers' communities, collaborative knowledge, and even governmental directives. In [76], the author focused on how AI can transform library services in educational institutions. They note that the success of such implementation often rests on social factors like faculty support, student enthusiasm, and administrative will, which influence how easy the implementation is perceived to be.

The authors in [83,3] explored the need to adopt big data analytics in B2B organizations. Their model underlines the significance of social influences, such as competitive pressures and partner expectations, in gauging how straightforward it is to implement new technologies like BIS. In [4], the study provided a framework to realize strategic value from learning analytics. They identified that the perception of ease of implementation is influenced by the institution's culture and beliefs, which are, in turn, driven by social influences like academic advocacy or resistance. Past literature discussed artificial intelligence acceptance in the context of digital entrepreneurship. They proposed that social influences like peer networks, industry thought leadership, and market trends significantly impact entrepreneurs' perception regarding the ease with which AI can be implemented.

Based on previous studies, such as [69] and [84], which found a significant impact of social influences on the perceived ease of implementation of BIS, the proposed hypothesis is as follows:

H 4: There is a significant impact of social influences on the perceived ease of BIS

In technological acceptance models such as the Unified Theory of Acceptance and Use of Technology (UTAUT), facilitating conditions are considered a critical determinant of technology acceptance. These conditions often correlate positively with the perceived usefulness of the technology in question, as they can directly impact the technology's efficiency and effectiveness. The author in [55] discussed the role of facilitating conditions, like training and technology support in adopting virtual reality technology for sustainable quality in agriculture. The study showed that these conditions significantly improved farmers' perception of the technology's usefulness, providing insights into how facilitating conditions can also influence perceived usefulness in the domain of BIS.

Past research studied the adoption of AI mobile banking applications [19], focusing on facilitating conditions, such as user interface design and customer support. They found that these conditions were essential contributors to the perceived usefulness of mobile banking applications, suggesting similar implications for BIS. The author in [61] delved into how blockchain announcements affect stock value from a technology management perspective. The study revealed that factors like a supportive regulatory environment and internal blockchain expertise (facilitating conditions) significantly enhanced the perceived usefulness of blockchain. This finding can be paralleled in the context of BIS [62, 63].

In [68], the author studied the benefits and limitations of AI adoption in the pandemic-stricken Indian industry. The facilitating conditions, like government support and availability of skilled labour, played a considerable role in influencing the perceived usefulness of AI technologies, supporting the hypothesis in the realm of BIS. [71] investigated the factors affecting blockchain adoption in apparel supply chains. Their findings highlighted that facilitating conditions like technology infrastructure and stakeholder support played a vital role in determining the perceived usefulness of blockchain technologies. Based on previous studies such as [11, 65], which found a significant impact of facilitating conditions on the perceived usefulness of BIS, the proposed hypothesis is as follows:

H 5: There is a significant impact of facilitating conditions on the perceived usefulness of BIS

Facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system. If these conditions are favourable, they can significantly reduce the perceived complexity of implementing a new technology, such as BIS. The author in [32] examined the role of technology readiness and awareness in influencing the intention to use analytical AI in services. The study showed that facilitating conditions like technical readiness significantly influenced the perceived ease of implementing AI solutions. These findings can be extrapolated to understand how facilitating conditions could affect the ease of implementing BIS.

In [37], the author conducted a systematic review identifying the drivers and barriers of Industry 4.0 technology adoption among manufacturing SMEs. Their study highlighted that facilitating conditions, such as adequate training and technical support, can significantly ease the process of adopting advanced technologies, thereby supporting the hypothesis in the context of BIS. The author in [39] investigated the consumers' adoption of artificial intelligence and robotics in the hospitality and tourism sector. Their research noted that factors like consumer familiarity with technology (a facilitating condition) significantly impacted the perceived ease of interacting with such technologies. These findings support the notion that facilitating conditions similarly influence the perceived ease of implementing BIS.

Past literature discussed the use of conversational interfaces for accessing business relational data structures. They pointed out that user-friendly interfaces (a form of facilitating condition) make accessing and navigating complex data structures easier, potentially simplifying the implementation of BIS [51]. In [58], the author explored the perceptions of Indian managers on the impact of convergent technologies on work and resultant organizational performance. The study underlined the importance of facilitating conditions like managerial support and the availability of resources, which significantly influenced the ease of implementing these technologies. Based

on previous studies such as [18], which found a significant impact of facilitating conditions on the perceived ease of implementation of BIS, the proposed hypothesis is as follows:

H 6: There is a significant impact of facilitating conditions on the perceived ease of BIS

The perceived ease of implementation can affect the perceived usefulness by lowering the barriers to effective utilization. When a BIS is perceived as easy to implement, users are more likely to perceive it as beneficial to their tasks. Such a system seamlessly integrates with existing workflows and enhances its perceived usefulness.

In [2], research on AI adoption by human resource management highlighted that ease of use directly influences the perceived usefulness of AI systems in HR tasks. This research implies that when BIS are easier to implement, HR professionals may find them more useful for data analytics, strategic decision-making, and employee management. The work by [3, 52] presented a compelling argument for the role of organizational absorptive capacity in enhancing the efficiency of BISs. This study indirectly supported the hypothesis by suggesting that an organization's ability to assimilate and utilize new knowledge (a factor that can facilitate ease of implementation) significantly impacts the efficiency and, by extension, the perceived usefulness of BIS.

The study of [6] provided an enterprise-level analysis of business intelligence technology effectiveness. Their study posited that ease of integration and implementation are vital parameters for evaluating the effectiveness of data analytics-oriented BISs. Therefore, their findings provide empirical backing for the proposed hypothesis. Previous research [9] emphasized the relevance of self-service business intelligence tools in university management, noting that ease of use positively influences perceived usefulness. This is particularly applicable in an academic setting where administrative staff and faculty may lack advanced technical skills.

In the research of [10], which delved into the ontological and communicative perspectives of AI and big data. Their research suggested that easy-to-implement AI solutions, seamlessly integrate big data analytics are perceived as significantly more useful in solving complex business problems. Based on the previous studies, such as [81, 67] that found a significant impact of perceived ease of implementation of BIS on the perceived usefulness of BIS, the proposed hypothesis is as follows:

H 7: There is a significant impact of the perceived ease of BIS on the perceived usefulness of BIS

Perceived usefulness can be considered a key driver for the successful implementation of BIS. This is predicated on the assumption that perceived benefits like enhanced decision-making, improved efficiency, and increased competitive advantage will encourage stakeholders to support the system's implementation. The study by [2], examined AI adoption in human resource management and found that the perceived usefulness of AI systems significantly influences their implementation. This observation could be extrapolated to BIS implementation, suggesting that perceived usefulness would directly and positively impact the success of BIS roll-out.

In a study by [3], Serrano and Koulouri (2021), the authors explored the effect of organizational absorptive capacity on BIS efficiency. Although the focus is on efficiency, the underlying message is that organizations are more likely to successfully implement systems they find useful, further supporting the hypothesis in question. The author in [7] provided insights into the evaluation of data analytics-oriented business intelligence technology's effectiveness at the enterprise level. Their work underscores the importance of perceived usefulness as a key evaluative measure, indirectly implying that systems deemed useful are more likely to be implemented successfully.

According to [8] study, which delved into the utility of self-service business intelligence tools in university management. The emphasis on the perceived usefulness of these tools in facilitating administrative tasks suggests that these systems are more likely to be successfully implemented if they are deemed useful by the end-users. In [10] research, which explored the implications of AI and big data in modern businesses. Their research emphasized that the perceived usefulness of these technologies has a substantial impact on their successful integration into existing business processes. Based on previous studies, such as [81] found a significant impact of the perceived usefulness of BIS on the BIS implementation, the proposed hypothesis is as follows:

H 8: There is a significant impact of the perceived usefulness of BIS on the perceived ease of BIS

Information quality is often characterized by attributes like accuracy, timeliness, completeness, and relevance. High-quality information is expected to increase the perceived usefulness of a BIS, as it enables better decision-making. On the other hand, perceived usefulness refers to the degree to which a person believes using a BIS would enhance their job performance. Therefore, the better the information quality, the higher the perceived usefulness, which positively impacts the implementation of the BIS.

The study of [6] delved into the effectiveness of BIS at the enterprise level. Although the paper did not directly address the mediating role of perceived usefulness, it emphasized the importance of system effectiveness, which is closely linked to information quality. High-quality information would inevitably make a BIS more effective and enhance its perceived usefulness, thus influencing its successful implementation. The author in [8] focused on the applicability of self-service BIS tools in university management. In a self-service setting, the quality of information becomes even more critical as users need to rely on the data provided for decision-making. This highlights the importance of information quality in influencing perceived usefulness and successful implementation.

The work by [10] explored the adoption of AI and big data in different sectors. These advanced technologies enhance information quality, making systems more useful and more likely to be successfully implemented. Thus, the perceived usefulness here serves as a mediator between the high-quality information provided by AI and big data and the actual implementation of BIS. Based on previous studies such as [24,

48, 81], found significant mediation of the perceived usefulness of BIS between information quality and the BIS implementation, the proposed hypothesis is as follows:

H9: There is significant mediation of the perceived usefulness of BIS between information quality and the BIS implementation

Information quality in a BIS encompasses attributes like accuracy, timeliness, relevance, and completeness. When information quality is high, users are more likely to find the system easier to implement as they can more effectively use the data for decision-making. Ease of implementation refers to the perceived ease with which a system can be integrated into existing processes or a new setup can be operationalized. The easier the implementation, the more likely the system will be implemented successfully.

The research by [6] focused on evaluating data analytics-oriented BIS technology effectiveness at the enterprise level. While their work did not explicitly look at the ease of implementation, it emphasized the role of effective BIS systems. Effective systems characterized by high-quality information are likely to have reduced implementation barriers, thereby proving the mediating role of ease of implementation. [2] delved into the adoption of AI by Human Resource Management and its effectiveness. When AI algorithms produce high-quality information, HR professionals find the system easier to use and implement, thus providing an indirect link between information quality and successful implementation.

The study by [8] focused on the relevance of self-service BIS in university management. The importance of ease of implementation is implicitly emphasized here; high-quality information makes self-service tools more straightforward and more intuitive to implement. The author in [10] discussed the ontological and communicative perspectives in AI and big data scenarios in modern businesses. Here, the quality of information gained from these advanced technologies would naturally affect how easy it is to implement these systems, which affects their adoption rate. Based on previous studies, such as [81, 49] that found significant mediation of the perceived ease of implementation of BIS between information quality and the BIS implementation, the proposed hypothesis is as follows:

H10: There is a significant mediation of the perceived ease of BIS between information quality and the BIS implementation

F. Research Hypotheses

In this research, the existing problem has been identified as the lack of a BIS to improve SMEs' performance in Libya. Possible solutions to this problem have been formulated through hypotheses as explained in the previous section. This study identified several organizational and technological factors, such as information quality, social influences and facilitating conditions as the independent variable (IV), while perceived usefulness of BIS and perceived ease of BIS represent the mediation variable (MV) respectively toward BIS adoption which is the dependent variable (DV). The nomination of these factors was based on related theories such as the technology acceptance model (TAM), the unified theory of adoption and use of technology (UTAUT. This shows in the below research model Fig. 4 for the current study.

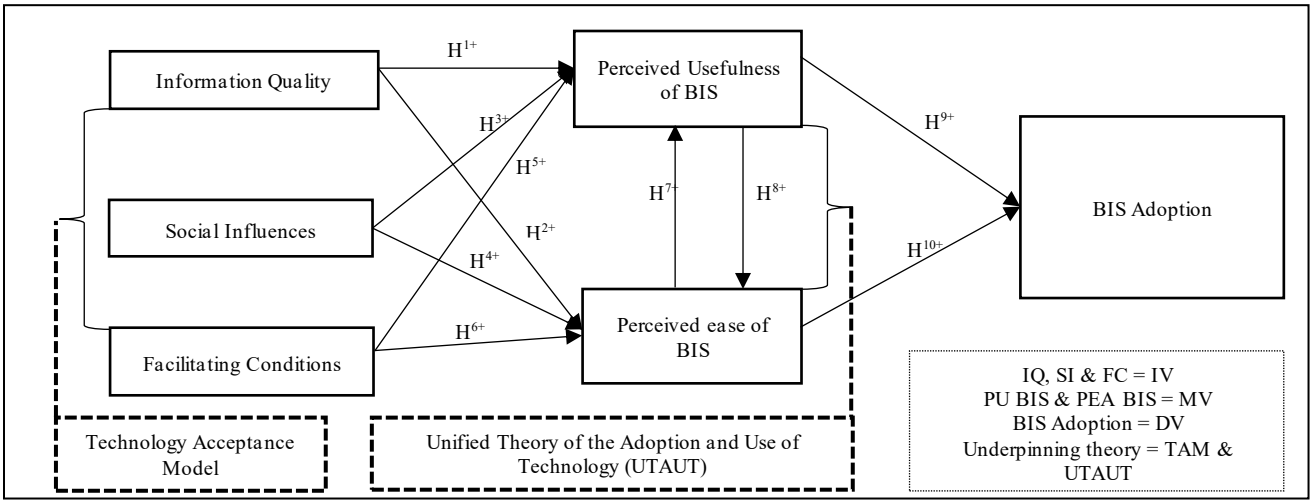

Fig. 4. Research model.

III. METHODOLOGY

The current study employed a quantitative methodology, which allowed to obtain relevant information to investigate factors that led Libyan SMEs towards adoption of BIS. According to [9], the research design clarifies the adopted process used to manage the data, which is used to figure out the possible solution to the research issues. The research design process includes several phases that lead to a potential solution for the research issues. These were identified by [22] in six phases as: 1) identifying the problem of the research, 2) underpinning the related theories and empirical studies, 3) clarifying the purpose of the research, 4) gathering the optimal data, 5) interpreting the obtained result retrieved from the data, and 6) conclude the finding of the research.

The population of this study represents the total management levels of those who work at Libyan SMEs all over the country. The sample size of this population is defined based on G-power software, which allows us to determine the optimal sample size based on the number of predictors within the constructed model proposed. The target population was 180,000 SMEs listed by the Libyan Ministry of Economy and Trade. Two methods were used to identify the target sample size based on the total population determined for this study: the optimal sample size proposed by [53]. Thus, the optimal sample size for this study was 384, as the total population is higher than 100,000. However, the response rate (77.3%) of the survey was 297 SMEs' owners and managers in Libya, which was seen as enough to test hypotheses based on numerical measurement and statistical analysis to derive a generalized result [35].

The questionnaire instrument was used for data collection as it provided measurements for the nominated factors. The design of the instrument comprises two main sections; the first section is about the respondents' profile, while the second section is assigned to measure the model construct. The study used SPSS27 and Smart PLS4 to test the relationships among the research variables:

A. Data Analysis and Results

In order to achieve the current research objective, the respondents' profile was analyzed with descriptive statistics. This is followed by the normality and the reliability test, respectively, as well as direct and indirect effects tests. The comprehensive details of each analysis are explained in the following sections.

B. Respondents Profile

It was important to determine the profile of respondents of the current study to better understand the target population, design research instruments, and draw more accurate conclusions from the data [75]. As such, several categories of respondents' profiles, such as gender, age, highest education, and working experience, were determined in the present study. Table I displays the profile of the respondents who participated in the study. The table shows that 71.4% of the participants belong to the male gender, while 28.6% belong to the female gender category. The result confirms that male respondents are the majority. In terms of the age of the participants, it was determined that most of the respondents (35.4%) were 20-31 years old, while 67 participants were in the range of 31-40 years old presenting 22.6% and 68 participants were in the range of 42-50 years old presenting 23.1%, with 57 participants found to be in age 51 years old and above 18.9%.

According to the results shown in Table I, most of the participants hold bachelor's certificates with a percentage of 32.8%. 28 participants hold high school certificates with a percentage of 9.4% and followed by 54 participants holding a diploma certificate with a percentage of 18.4%. Also, 60 participants hold master certificates with a percentage of 20.4% and 31 participants hold diploma certificates with a percentage of 10.5%, and 27 participants hold other certificates with a percentage of 8.5%. This ensures that all the participants are well educated [70]. The experience of the participants ranged from less than 1 year and more than five years. There are 15.2% of the participants who had experienced less than one year, followed by 23.7% of the participants with experience of 1 to 3 years, while 29.4% of the participants had experience of 3 to 5 years, and 31.7% of the participants had experience of more than five years. This shows that most of the respondents were well-experienced.

TABLE I. PROFILE OF RESPONDENTS (N = 297)

	n	%		n	%
Gender			**Highest Education**		
Male	212	71.4	High School	28	9.4
Female	85	28.6	Diploma	54	18.4
			Bachelor	97	32.8
Work Experiences			Master	60	20.4
Less than 1 year	45	15.2	PhD	31	10.5
1 to 3 years	70	23.7	Other	27	8.5
3 to 5 years	87	29.4	**Age**		
More than 5 years	95	31.7	21-30 years old	105	35.4
			31-40 years old	67	22.6
			41-50 years old	68	23.1
			51 years old and above	57	18.9

C. Descriptive Statistics

According to Table II, the mean statistics for all the items ranged between 2.811 and 4.387. Meanwhile, the standard deviation values ranged between 0.784 and 1.014. These results ensure that respondents are, on average agreement with the items stated for each factor in the questionnaire. Also, the results ensure the vital role of the independent and mediating variables in the BIS adoption by SMEs. The descriptive analysis for the current study also included the normality test. A normality test is a statistical procedure used to determine whether a given data set or sample is normally distributed or not. Normal distribution, also known as Gaussian distribution, is a bell-shaped probability distribution characterized by the mean, standard deviation, and other parameters that describe the spread and shape of the distribution.

The current research used the Skewness and Kurtosis values to test the normality of the distribution. The accepted range of Skewness between -3 and +3 is to be accepted, while the Kurtosis range should be between -5 and +5 [43]. Table II shows the result of the normality test for the construct that all the factors (information quality, social influences, facilitating conditions, perceived ease of implementation of BIS, perceived ease of implementation of BIS, and BIS adoption by SMEs) are normally distributed within the accepted range, with Skewness range between -1.646 and -0.014, as well as the Kurtosis range was between -0.563 and 3.818 [47].

D. Construct Reliability

The construct reliability test was carried out in this study to determine the internal consistency of the data [47]. Table III shows that the composite reliability, factor loadings, and Cronbach's alpha for each construct are more than the required threshold, which indicates that the measurements are reliable, where the factors (information quality, social influences, facilitating conditions, perceived ease of implementation of BIS, perceived ease of implementation of BIS, and BIS adoption by SMEs) were all within acceptable results. The Cronbach's alpha for the factors ranged between 0.754 and 0.898, while the composite reliability values ranged between 0.812 and 0.927 [78-80].

TABLE II. DESCRIPTIVE ANALYSIS

Items	Mean	Median	SD	Kurtosis	Skewness
IQ1	3.997	4.000	0.962	1.120	-1.087
IQ2	4.067	4.000	0.881	2.165	-1.200
IQ3	3.906	4.000	1.014	0.875	-1.017
IQ4	3.912	4.000	0.913	2.163	-1.212
SI1	3.781	4.000	0.874	0.198	-0.472
SI2	3.754	4.000	0.819	0.592	-0.480
SI3	3.953	4.000	0.844	0.671	-0.654
SI4	2.811	3.000	0.913	-0.563	-0.098
FC1	3.040	3.000	0.938	-0.158	-0.179
FC2	3.007	3.000	0.950	-0.385	-0.156
FC3	3.148	3.000	1.011	-0.448	-0.340
PU1	3.094	3.000	1.004	-0.376	-0.190
PU2	2.987	3.000	0.995	-0.243	-0.014
PU3	3.657	4.000	0.886	0.352	-0.877
PU4	3.838	4.000	0.730	2.707	-1.149
PEA1	3.596	4.000	0.909	1.631	-1.246
PEA2	3.485	4.000	0.821	1.559	-1.254
PEA3	4.387	5.000	0.784	3.818	-1.646
PEA4	4.232	4.000	0.827	2.789	-1.427
BIS1	4.131	4.000	0.978	1.589	-1.331
BIS2	3.808	4.000	0.833	0.585	-0.540
BIS3	3.700	4.000	0.784	0.952	-0.599

Where: IQ; Information quality, SI; Social influences, FC; Facilitating conditions, PU; Perceived usefulness of BIS, PEA; Perceived ease of adoption of BIS, and BIS; BIS adoption

E. Construct Reliability

The value used to test the convergent validity is the average variance extracted (AVE). According to the rule of thumb, when the value of AVE is greater than 0.5, the factor shows good construct validity. Table III shows that the factors (information quality, social influences, facilitating conditions, perceived ease of implementation of BIS, perceived ease of implementation of BIS, and BIS adoption by SMEs) have acceptable AVE values, ranging between 0.546 and 0.779.

The factor loading test was used in the study to confirm the validity of the research data. The accepted value for the factor loading is greater than 0.5. Table III reveals that the factors (information quality, social influences, facilitating conditions, perceived ease of implementation of BIS, perceived ease of implementation of BIS, and BIS adoption by SMEs) have acceptable factor loading values, ranging between 0.457 and 0.939.

F. Direct Effect Test

The direct effect test was employed in the study to examine the correlation between two variables by a correlation coefficient, whose value oscillates between -1 and +1. If the correlation coefficient is +1, it indicates a positive relationship between the variables, and -1 indicates a negative relationship between the two variables. Assessing path coefficients is an important step in conducting structural equation modeling (SEM), a statistical technique used to analyze complex relationships between variables. Path coefficients, also called standardized regression coefficients or beta weights, represent the strength and direction of the relationships between variables in a model [75]. For the current research, the path coefficients test was used to find out the relationships between the research variables.

TABLE III. ASSESSMENT OF THE FINAL MEASUREMENT MODEL

Model Construct	Items	Loading	CA	CR	AVE
BIS adoption	BIS1	0.823	0.754	0.857	0.667
	BIS2	0.855			
	BIS3	0.770			
Facilitating Conditions	FC1	0.927	0.864	0.913	0.779
	FC2	0.907			
	FC3	0.809			
Information Quality	IQ1	0.908	0.898	0.927	0.761
	IQ2	0.929			
	IQ3	0.782			
	IQ4	0.862			
Perceived Ease of Adoption of BIS	PEA1	0.457	0.757	0.812	0.546
	PEA2	0.467			
	PEA3	0.939			
	PEA4	0.936			
Perceived Usefulness of BIS	PU1	0.726	0.777	0.844	0.576
	PU2	0.703			
	PU3	0.791			
	PU4	0.809			
Social Influence	SI1	0.863	0.787	0.877	0.705
	SI2	0.901			
	SI3	0.748			

TABLE IV. DIRECT EFFECT

Paths	Beta	SD	T	P Values
Facilitating Conditions → Perceived Ease of Adoption of BIS	-0.010	0.051	0.189	0.850
Facilitating Conditions → Perceived Usefulness of BIS	0.758	0.029	25.881	0.000
Information Quality → Perceived Ease of Adoption of BIS	0.400	0.076	5.247	0.000
Information Quality → Perceived Usefulness of BIS	0.162	0.033	4.958	0.000
Perceived Ease of Adoption of BIS → BIS adoption	0.701	0.035	19.939	0.000
Perceived Usefulness of BIS → BIS adoption	0.031	0.052	0.596	0.552
Social Influence → Perceived Ease of Adoption of BIS	0.498	0.048	10.290	0.000
Social Influence → Perceived Usefulness of BIS	0.154	0.035	4.396	0.000

The Table IV above shows the direct effect of the hypotheses tested in the current study. The result of the Beta,

T-statistics and P-value (-0.010, 0.189, 0.850) show that there is no relationship between the facilitating conditions and the perceived ease of adoption of BIS as it is greater than the acceptable threshold of 0.05 [77]. However, other P-value of facilitating conditions and the perceived usefulness of BIS (beta = 0.758, T-value = 25.881, and P-value = 0.000), information quality and the perceived ease of adoption of BIS (beta = 0.400, T-value = 5.247, and P-value = 0.000), information quality and the perceived usefulness of BIS (beta = 0.162, T-value = 4.958, and P-value = 0.000), perceived ease of adoption of BIS and BIS adoption (beta = 0.701, T-value = 19.939, and P-value = 0.000), perceived usefulness of BIS and BIS adoption, social influence and the perceived ease of adoption of BIS (beta = 0.498, T-value = 10.290, and P-value = 0.000), social influence and the perceived usefulness of BIS with (beta = 0.154, T-value = 4.396, and P-value = 0.000) all shows that there is a positive and significant relationship as hypothesized.

G. Mediation Effect Test

The mediation test was used in the study to identify the mediation effect of perceived usefulness of BIS and perceived ease of adoption of BIS between the independent variables and the dependent variable as shown in Table V.

Table V shows that the perceived usefulness of BIS has no mediation relationship between facilitating conditions and BIS adoption as Beta=0.023, T-statistics=0.602 and P-value=0.547 all above or below the threshold values. Similarly, perceived ease of adoption of BIS has no mediating relationship between facilitating conditions and BIS adoption because Beta-value=-0.007, T-statistics=0.188 and P-value=0.851 all above or below the threshold values. However, perceived ease of adoption of BIS mediates the relationship between social influence and BIS adoption with (beta = 0.349, T-value = 8.636, and P-value = 0.000), while also perceived ease of adoption of BIS mediates the relationship between information quality and BIS adoption with (beta = 0.281, T-value = 4.984, and P-value = 0.000). Again, perceived usefulness did not mediate the relationship between information quality and BIS adoption as well as perceived usefulness of BIS did not mediate the relationship between social influence and BIS adoption as resulting in Beta = 0.005, T-statistics = 0.0576, P-value = 0.565 and Beta = 0.005, T-statistics = 0.0544, P-value = 0.587 all above or below the threshold values.

H. Discussion

The discussion section is the last step in the process of the findings. This section presents the results related to the research hypotheses and compares them with the results and findings of the previous studies. This study has found that BISs adoption factors in Libyan small and medium enterprises are facilitating conditions, information quality, perceived ease of adoption of BIS, perceived usefulness of BIS, and social influence. This study has found that there is no relationship between facilitating conditions and the perceived ease of adoption of BIS. There is a positive and significant relationship between facilitating conditions and the perceived usefulness of BIS with beta = 0.758, T-value = 25.881, and P-value = 0.000. There is a positive and significant relationship between information quality and perceived ease of adoption of BIS (beta = 0.400, T-value = 5.247, and P-value = 0.000). There is a positive and significant relationship between information quality and perceived usefulness of BIS (beta = 0.162, T-value = 4.958, and P-value = 0.000). There is a positive and significant relationship between the perceived ease of adoption of BIS and BIS adoption with beta = 0.701, T-value = 19.939, and P-value = 0.000. There is no relationship between the perceived usefulness of BIS and BIS adoption. There is a positive and significant relationship between social influence and perceived ease of adoption of BIS (beta = 0.498, T-value = 10.290, and P-value = 0.000). There is a positive and significant relationship between social influence and the perceived usefulness of BIS (beta = 0.154, T-value = 4.396, and P-value = 0.000).

These results were similar to the results of the previous studies, which means the previous studies' findings supported this study's findings. Previous research, such as [74,11] have indicated that both perceived usefulness (PU) and perceived ease of use (PEOU) directly impact the BIS implementation in general; these relationships will be needed in the context of BIS implementation, as stated within the original TAM model. Technology-driven strategy is defined by [36] as the development, integration, and usage of new technologies in new product and service development. Recent research has demonstrated that a technology-driven strategy strongly impacts developing information technology capabilities [43]. Therefore, the direct influence of the technology-driven strategy on BIS' perceived usefulness was tested. Information quality and organizational factors affect user satisfaction with technology and influence beliefs about using it [54]. The effect of information quality on PU and PEOU has been tested by [33, 50]. They found that information quality influences adoption success by positively impacting usefulness and perceived ease of implementation.

TABLE V. SUMMARY OF THE MEDIATION EFFECT TEST

Mediation Paths	Beta	SD	T	P-value
Facilitating Conditions → Perceived Usefulness of BIS -> BIS adoption	0.023	0.039	0.602	0.547
Facilitating Conditions → Perceived Ease of Adoption of BIS -> BIS adoption	-0.007	0.036	0.188	0.851
Social Influence → Perceived Ease of Adoption of BIS -> BIS adoption	0.349	0.040	8.636	0.000
Information Quality → Perceived Ease of Adoption of BIS -> BIS adoption	0.281	0.056	4.984	0.000
Information Quality → Perceived Usefulness of BIS -> BIS adoption	0.005	0.009	0.576	0.565
Social Influence → Perceived Usefulness of BIS -> BIS adoption	0.005	0.009	0.544	0.587

Note: * p<0.01(1.96)

SMEs that can implement robust information technologies can now operate more efficiently and solve supply chain problems. However, the decision to adopt technologies and innovations to improve the inventory processes mentioned includes different edges associated with technological, organizational and environmental factors is called the TOE model, which is a transversal conceptual research model proposed by [10]. This theoretical model has been widely used in information systems to study the influences of technological, organizational and environmental contexts on SMEs' decision-making. Therefore, the TOE model can help explore the effects of current digital technologies and the environment on the diversification of SMEs' activities.

A previous study by [8] extended TAM in project communications and training and shared beliefs. Their findings suggest that training and communication in project communication influence TAM since perceived usefulness and perceived ease of use contribute to behavioral intention to use the technology. This leads to the impact of project management on the perceived ease of implementation. The author in [73] suggested successful business process change, user support and involvement, and vendors' expertise as critical success factors in ERP projects. The authors in [64] as well as [120] suggested that managing organizational change is critical for successful IT project implementation. The authors in [6] and [19] concluded that knowledge sharing enables a project team to reduce rework and compresses the time it takes to plan projects. They also stated that having the "right knowledge" to the "right person(s)" at the "right time" allows for greater control over the project throughout the project's lifecycle by reducing uncertainty. Therefore, the project management is driven by the change management and knowledge sharing in companies.

The mediation effect test was also employed in the current study. This study has found that perceived usefulness of BIS doesn't mediate the relationship between facilitating conditions and BIS adoption, perceived ease of adoption of BIS doesn't mediate the relationship between facilitating conditions and BIS adoption, while perceived ease of adoption of BIS mediates the relationship between social influence and BIS adoption with beta = 0.349, T-value = 8.636, and P-value = 0.000. Perceived ease of adoption of BIS mediates the relationship between information quality and BIS adoption with beta = 0.281, T-value = 4.984, and P-value = 0.000. The perceived usefulness of BIS doesn't mediate the relationship between information quality and BIS adoption. Meanwhile, perceived usefulness of BIS doesn't mediate the relationship between social influence and BIS adoption.

These results differed from those of the results of previous studies, where several previous studies investigated factors that led to the implementation of BIS. These factors were varied due to the type of industry within the SME business environment; the study of [50] developed a conceptual model. The model suggested by [50] was developed based on three levels of order that led to the implementation. The first order level comprises five factors: quality of information, system performance, user information, user training, and top management support. In brief, this level stands on information, users, and management. While the second level order comprises three factors which are subjective norm, perceived usefulness, and perceived ease of use, which resulted from the first order level factors, as these factors are supported by the theoretical debate of the technology acceptance model.

[81, 49] found significant mediation of the perceived ease of implementation of BIS between information quality and BIS implementation. Also, [81, 38, 49] found significant mediation of the perceived ease of implementation of BIS between IT project management and the BIS implementation

IV. CONCLUSION

In conclusion, this study explored the impact of various factors, including facilitating conditions, information quality, perceived ease of adoption of Business Intelligence Systems (BIS), perceived usefulness of BIS, and social influence, on the adoption of BISs in Libyan Small and Medium Enterprises (SMEs). The findings of this study indicated that these factors play a significant role in influencing the adoption of BIS in Libyan SMEs. Facilitating conditions, such as the availability of necessary resources and supportive infrastructure, positively influenced BIS adoption. Furthermore, the quality of information was identified as an essential factor affecting the adoption process. The perceived ease of adoption of BIS and its perceived usefulness are important factors influencing the decision to adopt BIS in Libyan SMEs. The study also identified social influence, such as the influence of peers and industry experts, as a factor that can shape the adoption behavior of SMEs.

These findings provide valuable insights for Libyan SMEs and policymakers looking to enhance the adoption of BIS. Recognizing the importance of creating facilitating conditions by providing necessary resources and supportive infrastructure can facilitate successful BIS adoption. Improving information quality is crucial to enable SMEs to harness the full potential of BIS. Emphasizing the ease of adoption and highlighting the usefulness of BIS can also positively influence the decision-making process. Lastly, acknowledging the influence of social factors and leveraging peer networks and industry experts can help in promoting BIS adoption among Libyan SMEs. By considering and addressing these factors, Libyan SMEs can enhance their competitiveness, decision-making capabilities, and overall operational efficiency through the successful adoption and utilization of BISs.

The current research recommends performing a comparative analysis between different types of SMEs in Libya to explore variations in the impact of the identified factors on BIS adoption. This study can investigate whether factors differ based on industry sector, company size, or geographical location and how these variations influence the adoption of BIS in SMEs.

A. Contribution to Academic Literature

The current study contributes to academic literature in the area of the development of a new, customized model for BISs adoption in SMEs operating in politically unstable environments like Libya. The model integrates both social and technological perspectives, which is a novel approach in this research domain. Our study further extends the Technology Acceptance Model (TAM) and UTAUT Theory by incorporating unique factors such as "Change Management", "IT Project Management", "Social Influence", and "Information Quality", specifically tailored for developing economies. Additionally, we utilize Structural Equation Modeling (SEM) to validate and explore relationships among various determinants of BIS adoption, thereby enhancing methodological rigor. This was made possible by providing a comprehensive conceptual framework linking technological, psychological, and organizational factors, which future researchers can build upon in similar contexts. These become an academic novelty when addressing BIS adoption within conflict-affected environments and serve as a significantly underexplored context in existing literature.

B. Contribution to Industry

The current study delivers a practical and implementable model to help SME managers effectively adopt BIS in alignment with their operational and technological constraints. The model is designed to fit the limited capabilities and resources typical of SMEs in Libya, making it a relevant tool for improving operational efficiency and informed decision-making. Our study further emphasizes the critical role of user perceptions (perceived ease and usefulness) in BIS adoption, guiding companies to develop more effective training and awareness programs for staff. Additionally, the present study offers practical guidance on enhancing information quality and knowledge-sharing practices, enabling SMEs to gain a competitive edge. All these industrial contributions are distinctive in that the solutions are custom-built for Libya's context, rather than adopting generalized models from developed countries.

C. Contributing to Policy

The present study supports policymakers in promoting digital transformation policies by encouraging BIS adoption among SMEs, based on concrete evidence provided in the research. The findings can guide public support programs for financing, training, and technical assistance tailored towards priority sectors. Our study can also be used to reinforce the importance of data-driven governance frameworks, using BIS to generate actionable performance metrics across industries. Advocates for government action to tackle infrastructure gaps, cultural barriers, and skills shortages, which were identified as major obstacles to effective BIS implementation. This can serve as a novel policy orientation for BIS adoption model grounded in the area of data from Libya, offering a clear roadmap for strategic public interventions.

V. Limitations of the Study

It is essential to acknowledge the limitations of the current study. The current research is limited to the following:

A. Sample Size and Representativeness

The study had a limited sample size, which restricted the generalizability of the findings. The findings may not reflect the perspectives and experiences of all Libyan SMEs. A larger and more diverse sample could provide a more comprehensive understanding of the adoption factors of BI systems in Libyan SMEs.

B. Data Collection Method

The study's findings are dependent on the data collection method employed, which is a survey. The limitations inherent in the chosen method, such as response bias or limited depth of information, might impact the study's outcomes. Using multiple data collection methods or employing a mixed-methods approach could enhance the robustness of the study.

C. Self-reporting Bias

The study was subject to self-reporting bias, as participants provided responses they perceived as socially desirable or were influenced by their own perceptions and biases. This bias could affect the accuracy and reliability of the data collected. Employing validation techniques or triangulating data from multiple sources helped mitigate this bias.

D. Timeframe and Context

The study's findings were time and context-specific, reflecting the conditions and circumstances prevalent during the study period. As technology and business environments evolve rapidly, the adoption factors of BI systems in Libyan SMEs might change over time. Therefore, the study's findings were interpreted within the specific timeframe and context in which they were conducted.

E. Causality and Correlation

The study established correlations between adoption factors and BI system adoption, but it did not establish a causal relationship. Other unmeasured or omitted variables could influence the relationship between adoption factors and BI adoption. Longitudinal studies or experimental designs could provide stronger evidence of causal relationships. Acknowledging these limitations is crucial in understanding the scope and applicability of the study's findings. Future research can address these limitations by expanding the sample size, utilizing diverse data collection methods, considering broader contextual factors, validating data through multiple sources, conducting longitudinal studies, and employing experimental designs to establish causality

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