Research Article

The Adoption of Enterprise Resource Planning and Business Intelligence Systems in Small and Medium Enterprises: A Conceptual Framework

Jiehui Zheng [ID] **and Haliyana Khalid**

Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur 54100, Malaysia

Correspondence should be addressed to Jiehui Zheng; zhengjiehui@graduate.utm.my

The widespread globalism of services and the fast technological progress brought about by IT have made organizations today competitive in offering new products and services. One of the highlighted innovations is the enterprise resource planning and business intelligence system (ERPB), which has captivated the interest of industry analysts and policymakers due to its potential to provide more intellectual information for decision making and ensure its continuity. Firms must use ERPBI appropriately to flourish, as its misuse leads to failure. Even though research has focused on the factors influencing ERPBI adoption, most studies have ignored many factors that influenced the behavioral intention to adopt variable that significantly affects the adoption and use of technology. Ensuring the proper adoption of ERPBI is critical to corporate success. If ERPBI is misused, this will not serve its objective. Although a few studies have studied factors affecting the success of ERPBI adoption, the majority have failed to discover drivers of continuity and sustainability. This article proposed a conceptual framework for ERPBI adoption using the TOE and UTAUT models. Four main hypotheses were formulated for the three dimensions of technology, organization, and environment. The proposed framework is vital in adopting the ERPBI and could shape the direction in successfully adopting new technologies in SMEs. This study could fill in the gap in ERPBI research because previous studies have not focused on ERPBI adoption factors, ERPBI adoption, and business continuity.

1. Introduction

In today's business environment, the marketplace is defined by complexity and environment shift (from place to space), economic globalization, and the pace of technology. As a result, the market's competitive nature increases daily [1, 2].

The widespread globalism of services and the fast technological progress brought about by IT have made organizations today competitive in offering new products and services [3, 4]. As a result, the majority of firms have expanded their investments in various information technology (IT) systems, such as enterprise resource planning (ERP) and business intelligence (BI) [4–6].

Its power to reshape business procedures makes ERPBI more than just a piece of computer software. For example, human resource planning, managerial control, and operational control have all improved as a result of using ERP and BI. According to researchers today, ERP has excellent promise for small and medium enterprises (SMEs), with BI bringing about core competency in most businesses. [7, 8].

Integrated solutions such as Oracle's, consisting of ERP and BI systems, allow diverse users (not only dedicated IT staff) to access financial and operational data quickly, easily, efficiently, and cost effectively [9]. Therefore, using ERP or BI alone is insufficient [10, 11]. In addition, integrating ERP and BI systems has been demonstrated to boost business decision-making capacity [9, 12–14].

Ensuring the proper adoption of ERPBI is critical to corporate success. If ERPBI is misused, this will not serve its objective. Although a few studies have studied factors affecting the success of ERPBI adoption, the majority have

failed to discover drivers of continuity and sustainability [15]. Experts said that adopting an ERPBI system can boost performance, customer relations, and reporting [16, 17]. Companies, therefore, need to employ different ERPBI solutions to ensure their continuity and sustainability.

ERPBI adoption decisions are substantially influenced by examining relevant variables, according to the literature [18]. Individual and organizational adoption and acceptance of key determinants are not considered in any model for such an ERPBI system. As a result, this study aims to close the current adoption gaps in ERPBI by taking a TOE-centric perspective (technological, organizational, and environmental).

The article comprises six sections, deliberating the concepts and tenets shaping such adoption. The first section provides the definitions of concepts. The second section describes the importance of business continuity. The third section details the ERPBI in developed and developing countries. The fourth section presents the study's methodology. The fifth section discusses a conceptual framework's construction, describing the TOE dimensions and their factors. Finally, section eight provides the conclusion.

2. Definition of Key Concepts

Under this section, the study terms are defined in detail.

2.1. Enterprise Resource Planning (ERP). Although research expertise is leveraged in many firms to understand the needs and demands of customers, this may be insufficient because firms also have to know about their competitors in the market [3, 19]. Concerning this, the demand for BI and ERP systems application packages has expanded throughout commercial fields, particularly those that deal with commercial transaction processing and packaged solutions that promote both data warehousing and BI [20].

Added to the above, companies have successfully comprehended the critical role of IS when it comes to reinforcing business processes. As a result, IS has been implemented numerous times to count. Nevertheless, the primary issue faced by firms is the lack of processes and data integration among different IS types [21], which results in poor quality of data, conflicting definitions and formats of data, and lack of structured definition of business process, with the lack of information access due to the varying interface designs.

Furthermore, the lack of IS integration leads to issues in implementing business processes and eventually decision-making efficiency [22]. The ISs core business functionalities were introduced in the 1990s, where systems were combined under a single system known as the ERP system, with aligned definitions, user interfaces, and one database [23]. In this regard, ERP vendors created their systems and integrated business processes with ERP systems, including CRM, SCM, and legacy systems, according to the significant companies in the market. The vendors thus have become capable of using their best-practice methods, with ERP being a combination of ISs comprising of minor modules and fitted with

expansive functions range that brings about real-time transactions processes [21].

According to Goni et al. [24], advanced ERP hierarchy can provide an ERP explanation, with the basic premise being that it should be perceived from different points of view. Such points of view have to be comprehended for ERP implementation success. By obtaining a higher level of value, the firm's ERP system-level heightens from the lower progressive viewpoint to the top, more complicated, and tactical ones. Hence, the ERP system using firms should concentrate on achieving the highest tactical views in the hierarchy.

2.2. Business Intelligence (BI). Business intelligence is described as the business effectiveness in its clarification, planning, prediction, issues solving, and abstracting thinking, and comprehension, creation, and learning about the way to go about enhancing organizational information, providing information to make decisions and enabling sufficient versatility while supporting the establishment and achievement of business objectives [25]. Ngai et al. [26] defined it as a system that gathers, transforms, and reflects organized information throughout the levels, whereas Dresner [27] referred to it as a hypothetical account used to schedule time for data gathering, allowing practical use of concepts and methods for business decisions enhancements using information and facts from relevant systems.

Using IT to maintain commercial events has led to data growth related to processing and collecting. While traditional IT systems are capable of information gathering and transformation into suitable data for use, Davenport and Harris [28] highlighted the lack of efficient versatility in reporting functionality to understand information and its business effects. Information needed for enhanced data investigation and development linked with technology has resulted in the development of the current IT systems and the introduction of other state-of-the-art applications; these include data mining (DM), knowledge management (KM), collaborative systems (CS), analytics and knowledge discovery (KD), and corporate performance management (CPM).

Currently, firms have been turning to business intelligence (BI) as an alternative to traditional systems [1]. This is because BI could transform business presentation; as a result, most current firms can employ a standard system. In this regard, Olbrich et al. [29] stated that the International Data Corporation (IDC) indicated that businesses frequenting the BI deployment could reach around 40% return on investment (ROI) within three years. Similarly, the review conducted by the Cutter Consortium Report (2003), involving 142 businesses, revealed that the majority of the businesses (70%) applied data warehousing and BI creativities, while Gartner [30] demonstrated that BI is a top skills priority among 1500 chief information officers worldwide.

In actuality, today's businesses are facing off with their rivals in tight competition, with information being the basis of their performance success in the market and a required strategic choice. Thus, BI has been hailed as a unique

information technology used among firms to achieve performance and insight into firm risks [31]. Business processes have transformed into a business-client communication based on both parties' interests, with businesses targeting growth, profitability, and eventually survival, whereas clients desire more value. As a result, significant today enterprises carry out procedures aligned with their clients' prospects [32].

The history of business intelligence can be traced back to decision-making skills pioneered in the 1970s [33]. However, the term BI was not coined until 2006, in the study of Lawton [34]; following many years, BI has been defined as (1) crucial knowledge and information describing business establishment, the group and its state with regards to clients, markets, issues in the economy and competitors, and (2) a preplanned and methodical process used by the organization to acquire, examine, and disseminate data for the purpose of internal and external information sources, which are needed for business running and decision making [35].

Moreover, BI usage aims to reinforce the management of significant amounts of stocks and data concerning the group using classification and processing and condensing into administrative intelligence and information [35]. The related tasks encapsulate prior and current executive issues. They are used as one of the fundamental administrative tools for analyzing the business environment, which is used for making decisions [1, 35].

3. Importance of Business Continuity

Efforts toward business continuity can be traced throughout history and are generally described as the efforts to ensure service/product delivery continuity regardless of the disruptions. However, the formalization of such ideas in the business sphere only appeared in the 1970s because of the proliferation of computer systems as voluntary, hazard-centered, reactive, and IT-focused business continuity [36].

The term business continuity represents a novel formalized concept that refers to the organization's capability of continuing the products/services delivery within an acceptable period at a different capacity in the face of disruption [37]. Moreover, it is crucial for effective management, without which enhancement is impossible. Thus, this study identifies and measures the effect of ERPBI adoption practices on business continuity (BC) for its enhancements.

Organizations generally play a vital role in people's day-to-day lives. Their successes hold the gateway to developing nations' success, which is the reason behind the economists' comparison of organizations to an engine that drives economic, societal, and political progress. The past 25 years have witnessed the Nobel prizes awarded to researchers for their organizational analysis works [38]. The focus of each organization is business continuity because it is the secret to their ensured survival.

Moreover, despite being one of the top significant management variables that have been extensively cited in the academic literature, BC has yet to have a universal definition.

For example, both ISO 22301 and ISO 22313 define business continuity as the organization's capability to continue products/services delivery at a predefined acceptable level after a disruptive event.

Given its history, it is surprising why SMEs are largely clueless about what business continuity means, with many comparing it with emergency response or disaster recovery on IT and those who have heard about the term may not think it is pertinent to themselves [39].

BC reinforces the smooth provision of business services, and as such, it has become a topic of attention, particularly after the 9/11 incident. BC roots can be traced back to the 1970s study concerning disaster recovery plans [36], a history related to comprehending the present discussions and the limitations of BC approaches. There are several definitions proposed for the BC term. Still, each has its distinct wording. Thus, general purpose of the term BC as defined by Niemimaa [40] is adopted, which is the socio-technical ability of the firm to withstand and restore both intra- and extraorganizational contingencies.

The implication from the word disaster recovery was adopted in the early approaches about recovery. Still, practically, BI reflects the companies' preparedness for detailed procedures supporting their recovery efforts in case an IT system or server facility breaks down. However, this scope was too narrow for organizations because IT system recovery does not necessarily support the recovery of the companies from their business processes. It does not provide any assistance on how to continue as an IT system. Moreover, the approach failed because it cannot explain how business processes can recover following the recovery of the IT system and failed to cover significant incidents (e.g., power cuts). In sum, BC approaches aim to address weaknesses, like ensuring that accurate IT-based warehouse inventory is in place if manual processing of orders is required [41]. In the past several years, several methodologies have been forwarded by scholars and practitioners to help organizations in enhancing their business continuity [37, 41].

Concerning the above, even though success/failure is the ultimate continuity measurement, it offers little evidence of their reasons. Thus, the knowledge concerning such causes would enable management to determine appropriate solutions to counteract the failure while enhancing the potential for success. Research studies dedicated to business continuity show the challenge in objective measures acquisitions for privately-owned companies. This is also true for business units within multi-industry firms, where studies have overlooked consistent, accurate, continuity measurements. In the face of similar problems between two firm types, the causes behind such issues may differ.

Literature generally assumes that several factors have a positive effect on BC, with findings indicating that firms using ERPBI have a higher potential towards BC compared with their nonusing counterparts with operational performances (e.g., delivery enhancement, mitigation of costs of production, maximization of productivity, enhancement of flexibility, waste mitigation, and improved quality of products) that would facilitate BC.

4. Enterprise Resource Planning and Business Intelligence (ERPBI) in Developing and Developed Countries

Studies about ERP implementation in developing nations have been sadly lacking. Comparing the expected outcome from ERP implementation with actual organizations' implementation showed light on the literature gap. Hence, ERP projects in developing nations are predicted to have a high failure rate because they lag behind their developed counterparts in light of economic and industrial development [42].

Such implementation failure can be resolved by determining and examining ERP projects that have had a successful outcome. It was contended that this approach could counter the issues during such implementation. This may be exemplified by focusing only on the industrial aspects of ERP, disregarding its environmental ones, which could be the recipe for a complete failure. This is the reason behind the increasing number of academic and practical evidence in ERP-dedicated literature, with several studies focusing on ERP implementation success in the case of western nations [42, 43]. However, in developing countries, successful implementation stems from a lack of literary and practical evidence on the topic. This highlights the need for studies to examine ERP implementation in developing nations for an effective and appropriate ERP framework.

Lack of studies can be noted throughout the countries when it comes to ERP implementation and the effect of culture on it [44], with present studies on enterprise systems (ES) implementation mainly conducted in the western countries and only a few in their developing counterparts.

To begin with, failure of ERP projects in manufacturing firms was the focus of Hawari and Heeks [45] study, where they assessed pre- and postimplementation of ERP in documentation, observations, and conferences. However, based on their findings, there is a large gap between the assumptions and the requirement of ERP systems development and the actual circumstances in the manufacturing firms.

Moving on to Mirbagheri and Khajavi [46] Malaysian study concerning successful implementation of ERP among SMEs, the authors highlighted the benefits, both tangible and intangible, that SEMs could reap from such performance. Their findings showed that superior resource management is the top intangible benefit, with enhanced decision making and planning following suit and strategic gain, all of which supports business growth. However, the authors also found several barriers to ERP implementation in Malaysia, as a developing nation. They included weak basis and lack of information, political situation instability, lack of training, and lack of support from the government.

Moving on to Thailand, another developing country, ERP implementation was examined in the study of Chaveesuk and Hongsuwan [47], highlighting the associations-faced challenges in implementing ERP. The authors proposed an implementation framework for Thai associations and found barriers to successful ERP implementation: infrastructure, time, and cost.

As for enterprise recourse planning and business intelligence (ERPBI), it is more than just a piece of computer software because it is capable of transforming business processes based on various modules, which is why an increasing number of organizations and industries are opting for it. In Asia, most organizations reflect enhanced performance through the use of ERP and BI in terms of management control, human resource planning, and operational control, and presently, researchers agree that ERP holds potential promise among manufacturing firms, particularly when implementing ERPBI in combination to achieve core competency [48, 49].

In essence, the modern organization has become customer centric and responsive to reaping IS benefits (e.g., BI and ERP). The majority of them are urged by competitive pressure to adopt modern business processes to provide them with access to information and, eventually, competitively advantage [50]. Concerning this, the factors that were evidenced to influence the growth of ERP in the labor market were higher return on investment (ROI), dynamic industrialization of the market, and easy legal systems integration.

Notwithstanding the extensive and large-scale adoption of ERPBI systems, expected benefits achievement and leveraging are still challenging because of both systems' inadequate integration and lack of support [51]. However, according to Chan et al. [7], there is a potential positive effect of technological systems (ERP attributes and IT expertise), ERP subsystems, BI support of ERP subsystems, KM support, and contextual factors on the achievement of the expected advantages.

Added to the above, the ERPBI system is a robust system utilized for addressing corporate resource planning and supply chain processing. To it, ERP system contributes by integrating and managing the extensive transaction data in the enterprises. As a result, such systems have successful performance but lack data reporting and analytics capabilities, while BI tools ensure information technology innovation path consistency [52, 53].

Finally, the acceptance of the software will only increase if the advantages to be reaped are known to all levels of the organization. Concerning this, firms that generally fail to have the framework for ERPBI have severe consequences for guaranteeing their business continuity [54, 55].

5. Methodology

There were four hypotheses formulated in this article, three for each exogenous factor's dimension, to propose a framework for influencing factors on the behavioral intention to adopt ERPBI. The first-dimension hypotheses address the effect of technology factors, namely, Artificial Intelligence Tools, Perceived Usefulness, Compatibility, Big data Analytics Ability, and Cloud Commuting Facility on the ERPBI adoption. The second-dimension hypotheses address the effect of organizational factors, namely, Top Management Support, Training, Communication, and Relative Advantage, on the ERPBI adoption. In comparison, the third-dimension hypothesis addresses the effect of the environmental factors, namely, Competitiveness Pressure,

Firm Size, and Pandemic Recovery Plan, on the adoption of ERPBI. The final hypothesis (H4) addresses the influence of ERPBI adoption on business continuity.

To understand ERPBI adoption and its impact on business continuity, all factors must be aligned in a way that makes sense in the proposed framework. A full ERPBI benefit is impossible without influencing factors aligned together in their dimensions. Table 1 and Figure 1 show the constructs and associated hypotheses.

6. Discussing and Interpretations

Technology adoption is not entirely dependent on the technical aspects of IT [56]. External elements, such as organizational and environmental characteristics, are also crucial to facilitate adoption [57]. Implementing ERPBI systems is complex, and, therefore, their adoption is prone to significant organizational and individual issues rather than technical issues. Thus, ERPBI requires technological, organizational, and environmental viewpoints. According to Aldossari and Mokhtar [42], when organizations make their ERPBI systems, both valuable and easy to use by their employees, this helps both organizational and individual strategic issues. Therefore, a good understanding of those factors is necessary.

This research incorporates the TOE framework with various parameters chosen by experts to form one framework to understand the issues SMEs face when adopting this new system [58]. This framework illustrates how ERPBI adoption by SMEs is influenced by five technological factors (artificial intelligence tools, perceived usefulness, compatibility, big data analytics ability, and cloud commuting facility); four organizational factors (top management support, training, communication, and relative advantage); and three environmental factors (competitiveness pressure, firm size, and pandemic recovery plan). These variables can be integrated and classified into the TOE framework for small businesses to describe the adoption outcomes in organizations. However, the frameworks are taxonomies for organizing variables, and they are not a representation of an integrated philosophical framework or a well-developed theory. Moreover, within the frameworks, the variables can differ from one scenario to the next; hence, some extra factors must be incorporated for enrichment. This is the rationale for basing this article on the TOE adoption model for small businesses.

This study's independent variable is ERPBI adoption (see Figure 1). Adoption is defined as accepting and using IT innovation continuously. Also, Rogers Everett [59] views adoption as a verdict for incorporating IT innovation to a full extent. Therefore, in this study, based on Rogers' definition, ERPBI adoption denotes the adoption, implementation, and use of ERPBI among SMEs.

The impact of ERPBI adoption in this study is organizational continuity. Lucić [60] argued that BI adoption rates would enhance business continuity. At the same time, the results of the study by Githiga [61] provided initial evidence that business continuity increased through ERP adoption.

However, there is a lack of research that examines the role of integrated ERPBI with the business continuity of SMEs.

Based on these arguments, the ERPBI adoption by SMEs in Malaysia is presumed to lead to nonfinancial and financial measures. Therefore, this study evaluates the relationship between factors and the adoption of ERPBI and business continuity using the three dimensions of the technology, organizations, and environments among SMEs in Malaysia. Figure 1 shows the conceptual model of ERPBI adoption among SMEs.

6.1. Technological Factors.
The context of technology emphasizes quality. For the technological context in this study, three factors culled from the analysis of studies in the ICT and ERPBI fields that evidenced enhanced organizational performance. The study proposed the following:

> H1: Technological factors have a positive relationship with adopting ERPBI in SMEs. The subhypotheses are detailed below:

6.1.1. Artificial Intelligence Tools.
Major companies in the present times have been using artificial intelligence as a competitive growth factor, and the potential for its introduction into the national economic system is considerable and should not be confined to individual companies. This is evidenced by the potential of strategic planning to be adopted on the entire economic scale to determine optimal models of sectoral balance sheets, development of target indicators for significant businesses, forecasting aggregate demand and supply, and maximization of the monetary-crediting system. Furthermore, strategic planning based on AI should be introduced into the national economic plan to develop a model of extended reproduction, without disruptions among economic sectors, a sustainable, crisis-free, economic growth model [62].

With the above, continuity is crucial and should be a central concern in each business without crisis and imbalances. Several concepts are involved in such planning, such as subordinating the economic reproduction to an interbank balance and organization of institutes of indicative planning. It used to be known that planning was impossible to organize owing to the lack of computational abilities of technologies. Still, with today's technology and enhanced computer performance, such a feat has become possible. Combining capacities with AI and big data can remove technical issues relating to the distortion of information needed for planning [63].

The overcoming of the global crisis calls for the creation of a proactive AI system that entails a dynamic system of interpectoral balance, indicating an effective connection among the planning entities. Such a system can be developed by reflecting on the effects of objective economic laws to measure the introduction of AI into the strategic planning system, enabling the development of crisis-free national economy reproduction. Contrastingly, a quantitative easing policy or other incentive measures would result in relative

TABLE 1: The study hypothesis.

No	Hypothesis
H1	Technological factors have a positive relationship with the intention to adopt ERPBI in SMEs
H1a	Artificial intelligence tools as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs
H1b	Perceived usefulness as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs
H1c	Compatibility as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs
H1d	Big data analytics ability as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs
H1e	Cloud commuting facility as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs
H2	Organizational factors have a positive relationship with the intention to adopt ERPBI in SMEs
H2a	Top management support as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs
H2b	Training as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs
H2c	Communication as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs
H2d	Relative advantage on as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs
H3	Environmental factors have a positive relationship with the intention to adopt ERPBI in SMEs
H3a	Competitiveness pressure as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs
H3b	Firm size as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs
H3c	Pandemic recovery plan as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs
H4	ERPBI adoption has a positive effect on the business continuity of SMEs

overaccumulation of real sector capital and financial speculative bubbles inflation, among other negative effects.

The present study covers AI as a critical driver affecting ERPBI adoption success among SMEs. Thus, it proposed that

> H1a: Artificial intelligence tools as a technological factor has a positive relationship with adopting ERPBI in SMEs.

6.1.2. Perceived Usefulness. Empirical studies on technology adoption have extensively adopted Davis's (1989) TAM to explain and address barriers towards adoption. Based on TAM, technology adoption in varying fields largely depends on the individual field's perception of the ease of use and usefulness of technology to be adopted. As such, the present study considers perceived usefulness as one technological factor.

ERPBI is useful for organizations for productivity enhancement, and thus, its usefulness has to be promoted throughout the organizational departments. In examining theoretical models, Shin and Choo [64] focused on TAM using path analysis and multiple regression analysis to determine significant determinants of intention towards adopting ERPBI, both perceived usefulness and perceived ease of use were found to be among the top ones [65, 66].

Nevertheless, when it comes to robots, only a few studies have touched upon the significance of perceived usefulness [67–69], even though robotic design in the future is expected to depend on their acceptance and ability to satisfy the aging population's demands. Also, the acceptance of ERPBI was found to be influenced by perceived usefulness in different work tasks, both domestic and healthcare; for instance, in the assessment of perceived usefulness of technology among staff in various tasks performance by Broadbent et al. [70], which ranged from cleaning assistance to checking vital signs, the top-ranked tasks were daily activities and health/safety monitoring, while the lower-ranked ones include personal care provision, medical advice, and sadness assessment.

Therefore, usefulness is considered in this study as a critical determinant of the adoption of ERPBI and its use and thus the study proposed that

> H1b: Perceived usefulness as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.1.3. Compatibility. Innovation adoption requires compatibility between the adoption and the users' needs [71]. The compatibility concept is described as the level to which the innovation can provide value and experience of the user and is consistent with his or her needs [72]. According to the DOI theory, innovation compatibility with experiences and requirements positively correlates with the adoption of such innovation. Suffice it to say that a high compatibility level can lead to adoption—the higher the compatibility, the easier and timely the adoption will be. Firms transforming their network architectures into software-defined networking fitted with virtualization technologies enabling automation can support ERPBI capabilities and encourage self-diagnosis, self-healing, and self-orchestration. Compatibility of technology with the current IT environment is predicted to save cost and time for its implementation [73].

Therefore, the study proposed the following;

> H1c: Compatibility as a technological factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.1.4. Big Data Analytics Ability. In the past several years, big data development has directed researchers and practitioners to consider integrating advanced technology adoption into competitive advantage strategies [74]. Big data for decision making among firms has recently caught numerous researchers' attention [75]. They generally found that big data analytics investments among firms aim to improve their performance and competitiveness [76]. However, companies have opted for methods and technologies to store, analyze, and visualize data to fully leverage the data's fast-expanding
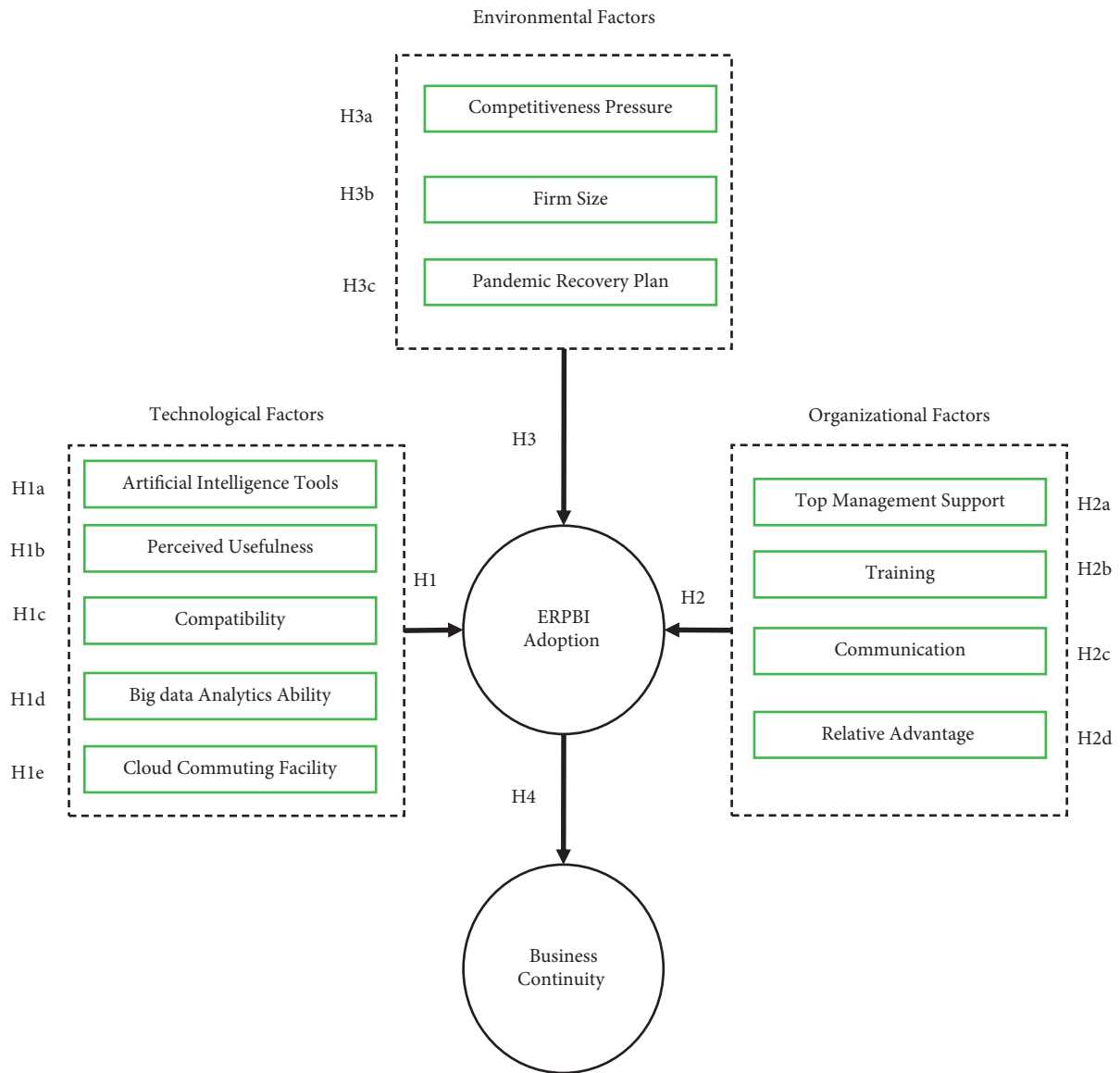
Figure 1: The ERPBI adoption conceptual framework with the hypothesis.

volume, velocity, and variety. However, research on how firms use these technologies to enhance their performance is still limited [74, 77]. Additionally, big data analytics is considered among the top methods used for big data analysis because it can capture a large amount of basic information and use the most effective analytical measurement practices [75].

Another alternative that can be used to address the issue is the inclusion of the factor into ERPBI to develop a customized user interface. In this regard, ERPBI system features should be compatible with the significant amounts of data to be accommodated. Efficient technology selection (big data analytic capability) consistent with the hardware and application should be ensured before system implementation. Therefore, the study comes up with the following hypothesis:

H1d: Big data analytics ability as a technological factor has a positive relationship with adopting ERPBI in SMEs.

6.1.5. Cloud Computing Facility. The issues surrounding the user's ability and proficiency to use ICT hardware and software have been highlighted because they influenced the performance of users [78–80]. Computers, like any other technology, were introduced, and shortly, it became a part of all walks of life, even among seniors who are used to using traditional [81]. Cloud computing is among the factors that significantly influence EPMS adoption, as prior studies revealed [82–84].

Although cloud computing has been extensively deployed worldwide, many users and stakeholders are still unaware of their existence, which makes them lag in knowledge and skills of its usage. Consequently, there is challenge to provide assistance and support to such regions. Cloud computing as a factor that might influence the technology adoption should be under the focus [57]. Thus, it is one of the vital factors in this regard and its influence

on adopting ERPBI [83, 85]. This study proposes the following in this regard:

> H1e: Cloud commuting facility as a technological factor has a positive relationship with adopting ERPBI in SMEs.

6.2. Organizational Factors. Studies of ERP adoption have underlined a set of organizational factors that explain the acceptance/rejection of the organization. The organization-IS relationship is essential in reaping benefits from IS use [86]. This dimension presents three factors that contribute to the effective use and adoption of ERPBI and enhance the organization's continuity. The study proposed the following:

> H2: Organizational factors have a positive relationship with the intention to adopt ERPBI in SMEs. The subhypotheses are detailed below:

6.2.1. Top Management Support. The top management level of conviction concerning the importance of technology function and its contribution to technical activities is one of the aspects covered under top management support [87]. In the study by Chae et al. [88], the authors showed a positive/ negative influence of top management support on adopting technology. Also, studies in this caliber support that without management support, technology use could lead to failed adoption [89]. In other words, lack of organizational support could be one barrier that stops users from technology use [90].

In contrast, sufficient management support towards technology acceptance ensures that it is used in the organization. In his study, Hasan et al. [91] integrated management support in the model to examine the determinants of professional users' adoption of adverse event reporting systems and revealed it to be a significant adoption factor.

In the same line of study, AlMuhayfith and Shaiti [92] supported the positive influence of management support on IT acceptance and adoption. The authors classified management support into direct and indirect support and described the former as the positioning of the IS staff in planning and developing phases, whereas the latter was described as the use of vendors and consultants to assist in system adoption in organizations. Thus, studies generally support the positive top management support on effective functioning and performance of the technology.

In the present study, top management support is examined as a factor that affects the adoption and use of ERPBI and contends that lack of such support could result in issues relating to development, planning, and use of technology. Thus, the study hypothesized the following:

> H2a: Top management support as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.2.2. Effective Communication. The implementation of ERP calls for clear and effective communication in every level of enterprise [93], owing to the connection of communication to the formation of an ERP projects team and to the marketing of the status and development of the project to other employees. Furthermore, effective communication is a critical success factor, affecting the acceptance of technology in the workplace implementing ERP [42].

With regards to the BI value in the company, it is often reflected by the premise that models bring about information, and this may be employed as the basis upon which the fundamental modifications can be done (new integration establishment, attracting potential customers, new markets expansion, and new markets supply) [1].

It was concluded by Nofal and Yusof [43] that effective communication is a must for ERP implementation, where such performance needs to be communicated at each life cycle of an ERP project. Users need to provide feedback in the form of requirements response, approval, and comments. In addition, the project's development has to be clarified to the committee and management for project status information and any other aims, activities, and updates changes [42, 94].

Added to the above studies, Mayeh et al. [95] also stated that effective communication is significant for using and implementing ERP, while Misra et al. [96] concluded that in successful system control, effective communication among stakeholders is one of the top factors. Hence, effective communication has a high probability of influencing the use of the system.

Lastly, effective communication is one of the significant ERP factors, so it is considered under the organizational dimension in the present study. The study proposed that

> H2b: Training as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.2.3. Training. Like the prior organizational dimensions discussed, training also has a significant role in successful ERP usage, where knowledge is needed to solve varying issues in the model. Users' lack of such knowledge may lead to their own process use through model components modification. In this regard, user training determined 42.20% of the overall ERP use success, and ultimately, it is required for system adoption success. Users equipped with knowledge of the new model concepts will be more inclined to use, have little resistance, and accept training easily [93].

In the same way, the involvement of users in ERP confirmation analysis in the data conversion process and model testing is mandatory because prior studies on the topic showed that ERPBI successful adoption needs good training through in-service programs, conferences, seminars, and workshops so that they will be able to use system functionalities with ease. Thus, training is included in the present examination.

In the same token, staff training guarantees to overcome risks that may act as barriers to system adoption and implementation success [97]. This may be exemplified by the lack of technical training and support that prevented the adoption of ERPBI among employees [98]. Furthermore, such a lack of training could also lead to the lack of

familiarity with the system among users, leading to failure to implement.

In the context of ERPBI, employees are trained in system use [99] through practical and quality training initiatives to obtain the necessary knowledge for system use and process operations. It is argued that ERP implementation success largely depends on the user's satisfaction, and thus, training is examined under the organizational dimension in this study. Therefore, the study hypothesis is the following:

> H2c: Communication as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.2.4. Relative Advantage. Relative advantage refers to the level to which an innovation is viewed as better compared with the approaches that preceded it [100]. According to Rogers [72], the perceived advantage of the innovation influences the intention to adopt the same in the organization. With AI, powerful computing, deep learning, and cross-border integration are possible. Therefore, perceived relative advantage plays a crucial role in extensive new services promulgation. AI technologies combined with massive data will ultimately facilitate firms' innovation and competitive advantage. AI has been used in customer service chatbots, speech, and voice services for customers and automatic network operations [50]. Such applications minimize the cost of firm operations, maximize service quality, and enhance customer experiences while maintaining efficiency. With raised awareness, users have a high probability of acceptance and active participation in the positive changes as use benefits. Therefore, this study hypothesis the following:

> H2d: Relative advantage as an organizational factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.3. Environmental Factors. Notwithstanding the benefits that can be obtained from the implementation of ERPBI, authors have time and again reported high failure rate owing to the challenges that arise in the environment [42]. This represents the reality of prioritizing successful ERPBI system implementation in both research and practice. Past studies stress the need to discuss the factors that drive implementation, and under this study, clear vision and planning, competitive pressure, and policy and government role are included in the environmental dimension. Additionally, environmental support has been evidenced to have a crucial role in innovation adoption, which holds true for ERP [101] and BI [102].

Hence, this study includes the above factors as top ERPBI adoption factors that improve organizations' business continuity. The study hypothesis is the following:

> H3: Environmental factors have a positive relationship with the intention to adopt ERPBI in SMEs.

The subhypotheses are presented as follows with details:

6.3.1. Competitive Pressure. ERP-dedicated studies revealed competitive pressure as a factor that affects success and performance of a system [42]. It is described as the level of pressure that the firm experiences from its rivals in the market.

IT innovation can bring about three ways to compete: changing the competition rules, changing the industry structure, and using new ways to create a competitive advantage to perform better than rivals. To this end, ERPBI assists in making decisions, coordinating departments, facilitating operational efficiencies, and reducing stock turnover.

In the same study caliber, Chan et al. [7] showed that dynamic competitive pressure drove firms to adopt IT business processes (e.g., ERPBI solutions) to access information and obtain and maintain effective competitiveness. In the context of Asian countries, ERP market growth is influenced by higher return on investment (ROI), increasing industrialization growth and ease of integrating with legacy system transaction, processing time, and total operating and administrative costs, supporting an alliance of business and business growth, creation of business innovations, and generating differentiation of products [14]. The advantages mentioned above can promote competitive advantage and edge over market rivals.

Thus, ERPBI system implementation could facilitate a first-mover opportunity for the firm to which other rivals lag. Moreover, such a timely implementation will enable the firm to obtain competitiveness and motivate it to maintain its leading positions among competitors, so competitive pressure is essential in system implementation.

Empirical findings also show that competitive pressure is the sole factor explaining behavioral intention towards IS usage in many pieces of research [49]. Competitive pressure in a strategic case if frequently documented as the top determinant, especially when it comes to decisions concerning enterprise-extensive information systems. With this, with the increasing number of firms adopting IT platforms, those who lag are pressured to act, forcing them to adopt IT platforms to stop first movers from benefitting strategically.

The study model thus includes competitive pressure as a factor that enhances motivation towards using ERPBI among SMEs. Thus, the study hypothesis is the following:

> H3a: Competitiveness pressure as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.3.2. Firm Size. Firm size is a major influencing factor in technology adoption, with large-sized firms having more resources than their SMEs counterparts, implying that the former would invest in and adopt more resource-efficient technologies and processes [103]. As a result, smaller firms are less likely to have enough manpower to obtain environmental certifications because they are more vulnerable to system, cost, capital, and other risks than larger firms. Thus, firm size can be a crucial factor in implementing and adopting technology.

Resource development theory (RDT) provided a lens through which Touboulic et al. [104] investigated the impact of relative power on implementing sustainable supply management techniques and sustainability plans. The authors discovered that the size of a company might either promote or hinder efficient cooperation for a sustainable supply chain, depending on how much influence it had. Similarly, firm size was found to have a significant impact on the adoption of sustainable supplier development practices, with large-sized firms more likely to adopt them because of their ample resources to invest in them and their sensitivity to reputational issues stemming from unethical practices of suppliers [105].

The firm's size was also identified as an internal obstacle and one of the most crucial organizational features that likely impact green activities [106]. Lastly, firm size was found by Uddin et al. [48] as a determinant of ERP adoption, with large firms being more inclined towards initiating ERP and technology practices. This study, therefore, hypothesis the following;

> H3b: Firm size as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.3.3. Pandemic Recovery Plan.

Plan and visions establishment is required in the ERP and BI processes implementation because this could mean obtaining the proper business strategy and plan before project initiation and directions set. A transparent business model and a clear, informative strategy to achieve the implementation phases are needed [26, 107, 108]. Planning also clarifies the project overview and relates it to the decisions for team members to comply with.

In business, the time horizon for the long run has to be constantly extended with a view of the realistic situation, future vision, and the vision for goals, needs, steps, and strategies. Nevertheless, expansive vision without effective expectations and planning can only lead to failure [109].

Thus, clear vision and planning are linked to BI technology implementation and the satisfaction of end users [110]. They are considered in the present study as factors affecting behavioral intention towards ERPBI usage. In the context of a pandemic recovery plan, enterprises should ensure continuity, and thus, such planning is considered a factor in ERPBI adoption success. The study comes up with the following subhypothesis:

> H3c: Pandemic recovery plan as an environmental factor has a positive relationship with the intention to adopt ERPBI in SMEs.

6.4. Behavioral Intention to Adopt ERPBI and Business Continuity.

Intention or behavioral intention when it comes to technology is the intention of the end-users towards adopting such technology. Intention reflects the level to which an individual consciously plans on performing or refrains from performing a certain future behavior [111]. On the other hand, behavioral intention is the individual's readiness to carry out a certain behavior and is deemed to be an antecedent of actual behavior [112].

Thus, this study describes intention as the way people gravitate towards performing a specific behavior and the effort they plan to use towards its performance. In theee TAM of Venkatesh et al. [113], the authors explained behavioral intention to use technology as a basic factor that drives the actual use of the technology, and as such, it is a determinant of actual system usage. Thus, behavioral intention towards technology use also plays a mediating variable.

Studies in the literature [93, 114] stated that TAM has four significant technology acceptance determinants: perceived ease of use, perceived usefulness, attitude towards use, and behavioral intention towards technology use. A significant positive relationship was found between perceived ease of use, perceived usefulness, and user's attitude towards technology use. The perspective was found to have a substantial relationship with the intention to use. In contrast, the intention to use had a significant relation with actual use, supporting the capability of TAM in the user's technology acceptance prediction.

Business continuity is a term that reflects intuitiveness and is referred to as the strategic and tactical capability of the organization in planning and responding to incidents/business disruptions for continued operations of the business at a predefined acceptable level. Business continuity is often mistaken for disaster recovery, which represents the process, policies, and procedures relating to recovery preparation or technology infrastructure, systems, and applications continuity for an organization to survive following a disaster [60].

In actuality, disaster recovery is a narrow term compared with business continuity; it is one of the significant components of the latter that concentrates on the technological aspect, whereas business continuity encapsulates the entire activities in business. Business continuity promotes the premise of protecting information in the event of significant and unexpected accidents. Business continuity management entails drawing up plans to determine what activities to take up in emergencies. Like BI, business continuity has a life cycle comprising the initial assessment and objective setting, identification of critical process/risk assessment, analysis of business impact, continuity response strategies/solutions architecture and design considerations, and plans monitoring, testing, and improvement. These constitute the core of business continuity management according to Tammineedi [115] and Hinson [116].

According to Croatian National CERT (Computer Emergency Response Team), there is a connection between BI and information security in their published work, "Business Continuity management." CERT refers to information security as one that deals with information confidentiality, integrity, and availability in the organization, and business continuity guarantees that information is available to those in need of it. Therefore, business information importance exists in information security and business continuity—business information reflects an inclination towards BI systems.

BI-business continuity relationship is used in the early warning system (EWS), with the system's purpose being to minimize surprises by identifying and monitoring risks and issuing warnings with the occurrence of threats. Business continuity aims to safeguard information if an unexpected accident or event arises. With regards to an ERPBI system, it detects potential dangers via an early warning system and encourages decision makers to prevent effects on business continuity.

BI basically indicates instruments and analytical methods that improve foresight. In the present study, the ERPBI system adoption-BI relationship is examined to obtain empirical findings on how continuity is ensured through successful ERPBI adoption and determine the level to which adoption assists in this case. Improving the entire activities and productivity will enhance the adoption system and processes.

In the examination of ERP by Albu et al. [117], the authors found its adoption to enhance firm performance and survival, enabling the firm to facilitate optimum management, control, and understanding of markets processes and achieve informed decisions. In other words, ERP enhances business survival during hard times and assists its achievement and maintenance of good performance.

Thus, the present study examines the ERPBI role in ensuring business continuity of organizations, and the hypothesis proposed is as follows:

H4: ERPBI adoption has a positive effect on the business continuity of SMEs.

7. Conclusion

SMEs in Asia have noted the critical role of ERPBI as part of institutional management. Thus, there is a need to propose a new system model to help the business's performance and use IT for business enhancement. Such a feat needs the determination and identification of factors contributing to IT implementation success. Thus, the present research investigates the critical success factors of intention towards ERPBI usage in Asian SMEs.

The study's primary focus is on the level to which technological factors, namely, artificial intelligence, perceived usefulness, compatibility, big data analytics facility, and cloud computing facility, affect behavioral intention towards using ERPBI. In addition to that, the study also combines organizational factors, such as top management support, effective communication, training, and relative advantages. The last dimension is the environment, which includes competitiveness pressure, pandemic recovery plan, and firm size.

Prior studies in literature categorized factors influencing the adoption of ERPBI into three groups (technological factors, organizational factors, and environmental factors). In this study, these factors are considered significant factors in the context of ERPBI use, particularly in the private sector.

Moreover, the underpinning theory adopted in this study is the UTAUT. This theory has a success rate of explaining 70% of the variance in the behavioral intention of individuals, exceeding the success rate of even TAM2, which can predict 40% of the variance. UTAUT is also more suitable to examine IS adoption in large-sized organizations. Still, because of both theories' extensive use in technology adoption literature, this study considers both of them.

This article reviewed studies relating to ERPBI implementation in institutions and the system's role in enhancing organizational performance and business continuity. In addition, the study conducted a review of frameworks for effective and efficient ERPBI adoption effectiveness and efficiency. The review involved discussions on the issue relating to ERPBI in different ways. Based on the outcome, ERPBI plays a significant role in the performance of organizations and business continuity, which is why it needs to be adopted among SMEs.

Lastly, this study found a gap in the literature regarding studies examining ERPBI and its significant role in business continuity, laying stress on the limitations of past studies relating to the topic. The study proposes an ERPBI adoption and usage model for Asian SMEs for successful implementation and use.

From a cultural standpoint, other factors should be studied to understand better how the ERPBI contributes to strategic and prolonged success. In addition, future research could examine other cloud-based apps that help businesses in various sectors, such as education or healthcare, maintain their continuity of operations.

Data Availability

The data used in this article are available from the corresponding authors upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] C. Olszak and E. Ziemba, "Critical success factors for implementing business intelligence systems in small and medium enterprises on the example of upper Silesia, Poland," *Interdisciplinary Journal of Information, Knowledge, and Management*, vol. 7, no. 12, pp. 129–150, 2012.

[2] A. T. Keinath, O. Rechnitz, V. Balasubramanian, and R. A. Epstein, "Environmental deformations dynamically shift human spatial memory," *Hippocampus*, vol. 31, no. 1, pp. 89–101, 2021.

[3] J. Ram, M.-L. Wu, and R. Tagg, "Competitive advantage from ERP projects: examining the role of key implementation drivers," *International Journal of Project Management*, vol. 32, no. 4, pp. 663–675, 2014.

[4] A. Y. Aremu, A. Shahzad, and S. Hassan, "The impacts of enterprise resource planning system adoption on firm's performance among medium size enterprises," *International Journal of Information Systems and Social Change*, vol. 11, no. 1, pp. 24–42, 2020.

[5] S. Aldossari and U. A. Mukhtar, "Enterprise resource planning and business intelligence to enhance organizational performance in private sector of KSA: a preliminary review," in *International Conference of Reliable Information and*

Communication Technology, Springer, Kuala Lumpur, Malaysia, June 2018.

[6] C. Cheng, H. Zhong, and L. Cao, "Facilitating speed of internationalization: the roles of business intelligence and organizational agility," *Journal of Business Research*, vol. 110, pp. 95–103, 2020.

[7] J. O. Chan, H. Abu-Khadra, and N. Alramahi, "ERP II readiness in jordanian industrial companies," *Communications of the IIMA*, vol. 11, no. 2, p. 5, 2011.

[8] Z. M. Yusof, M. J. Ab Aziz, A. S. A. Shatat, and A. Saleh, "The relationship between user engagement and business intelligence system effectiveness," *World Applied Sciences Journal*, vol. 28, no. 7, pp. 978–984, 2013.

[9] H. Chen, R. H. Chiang, and V. C. Storey, "Business intelligence and analytics: from big data to big impact," *MIS Quarterly*, vol. 36, no. 4, pp. 1165–1188, 2012.

[10] H. Ince, S. Z. Imamoglu, H. Keskin, A. Akgun, and M. N. Efe, "The impact of ERP systems and supply chain management practices on firm performance: case of Turkish companies," *Procedia - Social and Behavioral Sciences*, vol. 99, pp. 1124–1133, 2013.

[11] R. B. Carton and C. W. Hofer, *Measuring Organizational Performance: Metrics for Entrepreneurship and Strategic Management Research*, Edward Elgar Publishing, Cheltenham, United Kingdom, 2006.

[12] A. S. Radikovic, "ERP 3.0 requirements," 2012, https://www.selecthub.com/enterprise-resource-planning/key-erp-functional-requirements/.

[13] L. Drelichowski, "Evaluation of the efficiency of integrated ERP systems and business intelligence tools based on the diagnostic cases in the MSE sector," *Information Systems Management*, vol. 2, no. 24, p. 1, 2012.

[14] N. Ain, G. Vaia, W. H. DeLone, and M. Waheed, "Two decades of research on business intelligence system adoption, utilization and success–A systematic literature review," *Decision Support Systems*, vol. 125, Article ID 113113, 2019.

[15] A. Hailu and S. S. Rahman, "Evaluation of key success factors influencing ERP implementation success," in *Proceedings of the 2012 IEEE Eighth World Congress on Services (SERVICES)*, IEEE, Honolulu, HI, USA, June 2012.

[16] C. K. Hou, "Measuring the impacts of the integrating information systems on decision-making performance and organisational performance: an empirical study of the Taiwan semiconductor industry," *International Journal of Technology, Policy and Management*, vol. 13, no. 1, pp. 34–66, 2013.

[17] R. Adjie Eryadi and A. Nizar Hidayanto, "Critical success factors for business intelligence implementation in an enterprise resource planning system environment using dematel: a case study at a cement manufacture company in Indonesia," *Journal of Information Technology Management*, vol. 12, no. 1, pp. 67–85, 2020.

[18] A. I. Magaireah, "Identifying the most critical factors to business intelligence implementation success in the public sector organizations," *The Journal of Social Sciences Research*, vol. 5, no. 2, pp. 450–462, 2019.

[19] T. W. Malone, R. Laubacher, and C. Dellarocas, "Harnessing crowds: mapping the genome of collective intelligence," *SSRN Electronic Journal*, vol. 1, 2009.

[20] R. E. White, *Post-implementation Evaluation of enterprise Resource Planning (ERP) Systems*, University of North Texas, Denton, Texas, 2008.

[21] P. Hawking and C. Sellitto, "Business Intelligence (BI) critical success factors," in *Proceedings of the 21st Australian Conference on Informafion Systems*, Brisbane, Australia, December 2010.

[22] R. Heinrich, P. Merkle, J. Henss, and B. Paech, "Integrating business process simulation and information system simulation for performance prediction," *Software and Systems Modeling*, vol. 16, no. 1, pp. 257–277, 2017.

[23] C. Annamalai and T. Ramayah, "Enterprise resource planning (ERP) benefits survey of Indian manufacturing firms," *Business Process Management Journal*, vol. 17, no. 3, pp. 495–509, 2011.

[24] F. A. Goni, A. G. Chofreh, M. Mukhtar, S. Sahran, and S. A. Shukor, "Segments and elements influenced on ERP system implementation," *Australian Journal of Basic and Applied Sciences*, vol. 6, no. 10, pp. 209–221, 2012.

[25] I. Hribar Rajterič, "Overview of business intelligence maturity models," *Management: Journal of Contemporary Management Issues*, vol. 15, no. 1, pp. 47–67, 2010.

[26] E. W. T. Ngai, C. C. H. Law, and F. K. T. Wat, "Examining the critical success factors in the adoption of enterprise resource planning," *Computers in Industry*, vol. 59, no. 6, pp. 548–564, 2008.

[27] H. Dresner, *The Performance Management Revolution: Business Results through Insight and Action*, John Wiley & Sons, New Jersey, United States, 2008.

[28] T. H. Davenport and J. G. Harris, *Competing on Analytics: The New Science of Winning*, Harvard Business Press, Massachusetts, United States, 2007.

[29] S. Olbrich, J. Poeppelbuss, and B. Niehaves, "BI systems managers' perception of critical contextual success factors: a Delphi study," in *Proceedings of the International Conference on Information Systems*, Shanghai, China, December 2011.

[30] G. Gartner, *Gartner EXP Worldwide Survey of More than 1,500*, 2009, https://www.gartner.com/en/newsroom/press-releases/2020-03-10-gartner-business-continuity-survey-shows-just-twelve-percernt-of-organizations-are-highly-prepared-for-coronavirsu.

[31] A. Habul and A. Pilav-Velic, "Business intelligence and customer relationship management," in *Proceedings of the ITI 2010, 32nd International Conference on Information Technology Interfaces*, IEEE, Cavtat, Croatia, June 2010.

[32] O. H. Salah, Z. M. Yusof, and H. Mohamed, "The determinant factors for the adoption of CRM in the Palestinian SMEs: the moderating effect of firm size," *PloS one*, vol. 16, no. 3, p. e0243355, 2021.

[33] O. Tona and S. A. Carlsson, "Affecting decision-makers' attention through mobile BI: implications for mobile BI design process," in *Information System Development*, pp. 421–432, Springer, 2014.

[34] G. Lawton, "Making business intelligence more useful," *Computer*, vol. 39, no. 9, pp. 14–16, 2006.

[35] A. Lönnqvist and V. Puhakka, "The measurement of business intelligence," *EDPACS: The EDP Audit, Control and Security Newsletter*, vol. 40, no. 3, pp. 1–14, 2009.

[36] B. Herbane, "The evolution of business continuity management: a historical review of practices and drivers," *Business History*, vol. 52, no. 6, pp. 978–1002, 2010.

[37] B. Schmid, E. Raju, and P. K. M. Jensen, "COVID-19 and business continuity-learning from the private sector and humanitarian actors in Kenya," *Progress in Disaster Science*, vol. 11, Article ID 100181, 2021.

[38] C. Gavrea, L. Ilies, and R. Stegerean, "Determinants of organizational performance: the case of Romania," *Management & Marketing*, vol. 6, no. 2, p. 285, 2011.

[39] G. Heng and J. Wong, *Business Continuity Management Implementation for Small and Medium Sized Enterprises*, BCM Institute, United Kingdom, 2015.

[40] M. Niemimaa, "Interdisciplinary review of business continuity from an information systems perspective: toward an integrative framework," *Communications of the Association for Information Systems*, vol. 37, no. 1, p. 4, 2015.

[41] M. Niemimaa, J. Järveläinen, M. Heikkilä, and J. Heikkilä, "Business continuity of business models: evaluating the resilience of business models for contingencies," *International Journal of Information Management*, vol. 49, pp. 208–216, 2019.

[42] S. Aldossari and U. A. Mokhtar, "A model to adopt enterprise resource planning (ERP) and business intelligence (BI) among Saudi SMEs," *International Journal of Innovation*, vol. 8, no. 2, pp. 305–347, 2020.

[43] M. I. Nofal and Z. M. Yusof, "Taxonomy framework of ERP success usage in SMES in middle east region," *Journal of Theoretical and Applied Information Technology*, vol. 86, no. 3, pp. 420–431, 2016.

[44] M. Ali and L. Miller, "ERP system implementation in large enterprises–a systematic literature review," *Journal of Enterprise Information Management*, vol. 30, no. 4, 2017.

[45] A. a. Hawari and R. Heeks, "Explaining ERP failure in a developing country: a Jordanian case study," *Journal of Enterprise Information Management*, vol. 23, no. 2, pp. 135–160, 2010.

[46] F. A. Mirbagheri and G. Khajavi, "Impact of ERP implementation at Malaysian SMEs: analysis of five dimensions benefit," *International Journal of Enterprise Computing and Business Systems*, vol. 2, no. 1, 2013.

[47] S. Chaveesuk and S. Hongsuwan, "A structural equation model of ERP implementation success in Thailand," *Review of Integrative Business and Economics Research*, vol. 6, no. 3, p. 194, 2017.

[48] M. Uddin, M. S. Alam, A. A. Mamun, T.-U.-Z. Khan, and A. Akter, "A study of the adoption and implementation of enterprise resource planning (ERP): identification of moderators and mediator," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 6, no. 1, p. 2, 2020.

[49] V. Bhatiasevi and M. Naglis, "Elucidating the determinants of business intelligence adoption and organizational performance," *Information Development*, vol. 36, no. 1, pp. 78–96, 2020.

[50] A. M. AlBar and M. R. Hoque, "Factors affecting cloud ERP adoption in Saudi Arabia: an empirical study," *Information Development*, vol. 35, no. 1, pp. 150–164, 2019.

[51] M. Al-Fawaeer and H. A. Al-Zu'bi, "Investigating the link between enterprise resource planning (ERP) effectiveness and supply chain management. order," *Mooheba & et al*, vol. 5, no. 13, 2013.

[52] M. Velić, I. Padavić, and Z. Lovrić, "Model of the new sales planning optimization and sales force deployment ERP Business Intelligence module for direct sales of the products and services with temporal characteristics," in *Proceedings of the ITI 2012 34th International Conference on Information Technology Interfaces*, IEEE, Cavtat, Croatia, June 2012.

[53] P. Chou, "Workplace social support and attitude toward enterprise resource planning system," *International Journal of Information Systems and Social Change*, vol. 9, no. 1, pp. 58–76, 2018.

[54] M. Mukred, Z. M. Yusof, U. A. Mokhtar, A. S. Sadiq, B. Hawash, and W. A. Ahmed, "Improving the decision-making process in the higher learning institutions via electronic records management system adoption," *KSII Transactions on Internet and Information Systems (TIIS)*, vol. 15, no. 1, pp. 90–113, 2021.

[55] B. Hawash, U. Asma'Mokhtar, Z. M. Yusof, and M. Mukred, "The adoption of electronic records management system (ERMS) in the Yemeni oil and gas sector: influencing factors," *Records Management Journal*, vol. 30, no. 1, 2020.

[56] M. Mukred, *Framework for Electronic Records Management System Adoption in the Higher Professional Education in Yemen*, Universiti Kebangsaan Malaysia (UKM), Selangor, Malaysia, 2017.

[57] M. Mukred, Z. M. Yusof, N. A. B. M. Noor, B. K. Kayode, and R. Al-Duais, "The role of cloud electronic records management system (ERMS) technology in the competency of educational institutions," in *Proceedings of the International Conference of Reliable Information and Communication Technology*, Springer, Johor, Malaysia, September 2019.

[58] L. G. Tornatzky, M. Fleischer, and A. K. Chakrabarti, *Processes of Technological Innovation*, Lexington books, 1990.

[59] M. Rogers Everett, *Diffusion of Innovations*, p. 12, New York, 1995.

[60] D. Lucić, "Business intelligence and business continuity: empirical analysis of Croatian companies," *Annals of Disaster Risk Sciences: ADRS*, vol. 2, no. 1-2, pp. 1–10, 2019.

[61] M. W. Githiga, *Implication of Enterprise Resource Planning Systems Implementation in Public Institutions in Kenya: A Case of Communications Authority of Kenya*, United States International University-Africa, Nairobi, Kenya, 2018.

[62] R. Abdulov, "Artificial intelligence as an important factor of sustainable and crisis-free economic growth," *Procedia Computer Science*, vol. 169, pp. 468–472, 2020.

[63] H. M. Oumran, R. B. Atan, R. N. H. Binti Nor, S. B. Abdullah, and M. Mukred, "Knowledge management system Adoption to improve decision-making process in higher learning institutions in the developing countries: a conceptual framework," *Mathematical Problems in Engineering*, vol. 2021, 2021.

[64] D.-H. Shin and H. Choo, "Modeling the acceptance of socially interactive robotics," *Interaction Studies*, vol. 12, no. 3, pp. 430–460, 2011.

[65] B. Hawash, U. A. Mokhtar, Z. M. Yusof, M. Mukred, and A. S. Gaid, "Factors affecting internet of things (IoT) adoption in the Yemeni oil and gas sector," in *Proceedings of the 2021 International Conference of Technology, Science and Administration (ICTSA)*, IEEE, Taiz, Yemen, March 2021.

[66] B. Hawash, U. Mokhtar, Z. Yusof, M. Mukred, and W. Ali, "Intention to adopt electronic records management system in the oil and gas sector in Yemen," *International Journal of Advanced Trends in Computer Science and Engineering*, vol. 9, no. 5, pp. 6959–6971, 2020.

[67] A. K. Hall et al., "Acceptance and perceived usefulness of robots to assist with activities of daily living and healthcare tasks," *Assistive Technology*, vol. 31, no. 3, pp. 1–8, 2017.

[68] M. Mukred, Z. M. Yusof, W. A. Al-Moallemi, U. A. a. Mokhtar, and B. Hawash, "Electronic records management systems and the competency of educational institutions: evidence from Yemen," *Information Development*, vol. 38, no. 1, Article ID 0266666920980829, 2021.

[69] M. Mukred and Z. M. Yusof, "Factors influencing the adoption of electronic records management (ERM) for decision making process at higher professional education (HPE)'s institutions," in *Proceedings of the ICRIL-International Conference on Innovation in Science and Technology (lICIST 2015)*, Kuala Lumpur, May 2015.

[70] E. Broadbent, R. Stafford, and B. MacDonald, "Acceptance of healthcare robots for the older population: review and future directions," *International journal of social robotics*, vol. 1, no. 4, pp. 319–330, 2009.

[71] A. Azadegan and J. Teich, "Effective benchmarking of innovation adoptions: a theoretical framework for e-procurement technologies," *Benchmarking: An International Journal*, vol. 17, no. 4, 2010.

[72] E. M. Rogers, *Diffusion of Innovations*, Simon & Schuster, New York, United States, 2010.

[73] H. Chen, L. Li, and Y. Chen, "Explore success factors that impact artificial intelligence adoption on telecom industry in China," *Journal of Management Analytics*, vol. 8, no. 1, pp. 36–68, 2021.

[74] P. Maroufkhani, R. Wagner, W. K. Wan Ismail, M. B. Baroto, and M. Nourani, "Big data analytics and firm performance: a systematic review," *Information*, vol. 10, no. 7, p. 226, 2019.

[75] P. Mikalef, I. O. Pappas, J. Krogstie, and M. Giannakos, "Big data analytics capabilities: a systematic literature review and research agenda," *Information Systems and E-Business Management*, vol. 16, no. 3, pp. 547–578, 2018.

[76] I. D. Constantiou and J. Kallinikos, "New games, new rules: big data and the changing context of strategy," *Journal of Information Technology*, vol. 30, no. 1, pp. 44–57, 2015.

[77] N. A. Alzahrani, S. N. H. Sheikh Abdullah, I. Mohamed, and M. Mukred, "The adoption of geographic information systems in the public sector of Saudi arabia: a conceptual model," *Mathematical Problems in Engineering*, vol. 2021, 2021.

[78] A. M. Mills and T. A. Smith, "Knowledge management and organizational performance: a decomposed view," *Journal of Knowledge Management*, vol. 15, no. 1, 2011.

[79] J. M. Mills, "What are the issues involved in using e-portfolios as a pedagogical tool?," 2013, http://uobrep.openrepository.com/uobrep/bitstream/10547/312429/1/Mills+Nov+13.pdf.

[80] Z. Yasak and M. Alias, "ICT integrations in TVET: is it up to expectations?" *Procedia - Social and Behavioral Sciences*, vol. 204, pp. 88–97, 2015.

[81] J. Krämer and G. Seeber, "E-portfolios as tools to assess generic competences in distance learning study courses," *Elearning papers*, vol. 16, no. 9, p. 2009, 2009.

[82] K. H. Dening, D. Holmes, and A. Pepper, "Implementation of e-portfolios for the professional development of Admiral Nurses," *Nursing Standard*, vol. 32, no. 22, p. 46, 2018.

[83] I. Medvedeva, O. Martynyuk, S. Pan'kova, and I. Solovyova, "On the formation of student's E-portfolio," in *Proceedings of the 11th International Scientific and Practical Conference*, Tomsk, Russia, March 2017.

[84] S. N. A. Mohamad, M. A. Embi, and N. M. Nordin, "Designing an E-portfolio as a storage, workspace and showcase for social sciences and humanities in higher education institutions (HEIs)," *Asian Social Science*, vol. 12, no. 5, p. 2016, 2016.

[85] M. F. Baharuddin, T. A. T. Izhar, A. N. Mohamad, and W. Hasnol, "A framework based knowledge management system (KMS) for dynamic decision-making (DDM)," *International Journal of Academic Research in Business and Social Sciences*, vol. 6, no. 4, pp. 2222–6990, 2016.

[86] S. M. Qureshi and C. Kang, "Analysing the organizational factors of project complexity using structural equation modelling," *International Journal of Project Management*, vol. 33, no. 1, pp. 165–176, 2015.

[87] B. S. Ragu-Nathan, C. H. Apigian, T. S. Ragu-Nathan, and Q. Tu, "A path analytic study of the effect of top management support for information systems performance," *Omega*, vol. 32, no. 6, pp. 459–471, 2004.

[88] Y. M. Chae, K. B. Yoo, E. S. Kim, and H. Chae, "The adoption of electronic medical records and decision support systems in Korea," *Healthcare informatics research*, vol. 17, no. 3, pp. 172–177, 2011.

[89] M. C. Lacity and L. P. Willcocks, *A New Approach to Automating Services*, MIT Sloan Management Review, 2017.

[90] K. S. Chin, B. L. Chan, and P. K. Lam, "Identifying and prioritizing critical success factors for coopetition strategy," *Industrial Management & Data Systems*, vol. 108, no. 4, pp. 437–454, 2008.

[91] N. Hasan, S. J. Miah, Y. Bao, and M. R. Hoque, "Factors affecting post-implementation success of enterprise resource planning systems: a perspective of business process performance," *Enterprise Information Systems*, vol. 13, no. 9, pp. 1217–1244, 2019.

[92] S. AlMuhayfith and H. Shaiti, "The impact of enterprise resource planning on business performance: with the discussion on its relationship with open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 6, no. 3, p. 87, 2020.

[93] H. Altamony, Z. Al-Salti, A. Gharaibeh, and T. Elyas, "The relationship between change management strategy and successful enterprise resource planning (ERP) implementations: a theoretical perspective," *International Journal of Business Management and Economic Research*, vol. 7, no. 4, pp. 690–703, 2016.

[94] A. Singh and S. Randhawa, "Comparing the existing ERP modules in selected private universities of Punjab-an empirical study," in *Proceedings of the 2020 International Conference on Emerging Trends in Communication, Control and Computing (ICONC3)*, IEEE, Lakshmangarh, India, February 2020.

[95] M. Mayeh, T. Ramayah, and A. Mishra, "The role of absorptive capacity, communication and trust in ERP adoption," *Journal of Systems and Software*, vol. 119, pp. 58–69, 2016.

[96] S. C. Misra, V. Singh, N. K. Jha, and S. Bisui, "Modeling privacy issues in distributed enterprise resource planning systems," *International Journal of Communication Systems*, vol. 29, no. 2, pp. 378–401, 2016.

[97] C. J. Costa, M. Aparicio, and J. Raposo, "Determinants of the management learning performance in ERP context," *Heliyon*, vol. 6, no. 4, p. e03689, Article ID e03689, 2020.

[98] M. Q. Miranda, J. S. Farias, C. de Araújo Schwartz, and J. P. L. de Almeida, "Technology adoption in diffusion of innovations perspective: introduction of an ERP system in a non-profit organization," *RAI Revista de Administração e Inovação*, vol. 13, no. 1, pp. 48–57, 2016.

[99] Q. Hu, K. Chen, J. Zhang, X. Shao, and Y. Wei, "Emotional processing changes of qigong on college students: a pilot ERP study of a randomized controlled trial," *Journal of Traditional Chinese Medical Sciences*, vol. 8, no. 1, pp. 27–33, 2021.

[100] M. Zamzeer, Y. Alshamaileh, H. I. Alsawalqah, M. A. Hassan, E. J. A. Fannas, and S. S. Almubideen, "Determinants of cloud ERP adoption in Jordan: an exploratory study," *International Journal of Business Information Systems*, vol. 34, no. 2, pp. 204–228, 2020.

[101] B.-R. Lea, D. Mirchandani, M. Sumner, and K. Yu, "Personality types in learning enterprise resource planning (ERP)

systems," *Journal of Computer Information Systems*, vol. 62, no. 2, pp. 1–13, 2020.

[102] S. Ahmad, S. Miskon, T. A. Alkanhal, and I. Tlili, "Modeling of business intelligence systems using the potential determinants and theories with the lens of individual, technological, organizational, and environmental contexts-a systematic literature review," *Applied Sciences*, vol. 10, no. 9, p. 3208, 2020.

[103] Y.-H. Li and J.-W. Huang, "The moderating role of relational bonding in green supply chain practices and performance," *Journal of Purchasing and Supply Management*, vol. 23, no. 4, pp. 290–299, 2017.

[104] A. Touboulic, D. Chicksand, and H. Walker, "Managing imbalanced supply chain relationships for sustainability: a power perspective," *Decision Sciences*, vol. 45, no. 4, pp. 577–619, 2014.

[105] C. Sancha, A. Longoni, and C. Giménez, "Sustainable supplier development practices: drivers and enablers in a global context," *Journal of Purchasing and Supply Management*, vol. 21, no. 2, pp. 95–102, 2015.

[106] M. Y. Tay, A. A. Rahman, Y. A. Aziz, and S. Sidek, "A review on drivers and barriers towards sustainable supply chain practices," *International Journal of Social Science and Humanities*, vol. 5, no. 10, pp. 892–897, 2015.

[107] F. F.-H. Nah, Z. Islam, and M. Tan, "Empirical assessment of factors influencing success of enterprise resource planning implementations," *Selected Readings on Strategic Information Systems*, vol. 18, no. 4, p. 276, 2008.

[108] F. Hao, Q. Xiao, and K. Chon, "COVID-19 and China's hotel industry: impacts, a disaster management framework, and post-pandemic agenda," *International Journal of Hospitality Management*, vol. 90, Article ID 102636, 2020.

[109] J. C. Picken, "From founder to CEO: an entrepreneur's roadmap," *Business Horizons*, vol. 60, no. 1, pp. 7–14, 2017.

[110] G. Bargshady, F. Alipanah, A. W. Abdulrazzaq, and F. Chukwunonso, "Business intelligence technology implementation readiness factors," *Jurnal Teknologi*, vol. 68, no. 3, pp. 7–12, 2014.

[111] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: toward a unified view," *MIS Quarterly*, vol. 27, no. 3, pp. 425–478, 2003.

[112] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211, 1991.

[113] V. Venkatesh, T. A. Sykes, and X. Zhang, ""Just what the Doctor Ordered": a revised UTAUT for EMR system adoption and use by doctors," in *Proceedings of the 2011 44th Hawaii International Conference on System Sciences*, IEEE, Kauai, HI, USA, January 2011.

[114] M. A. Al-hadi and N. A. Al-Shaibany, "An extended ERP model for Yemeni universities using TAM model," *International Journal of Engineering and Computer Science*, vol. 6, no. 7, pp. 22084–22096, 2017.

[115] R. L. Tammineedi, "Business continuity management: a standards-based approach," *Information Security Journal: A Global Perspective*, vol. 19, no. 1, pp. 36–50, 2010.

[116] G. Hinson, "Technical briefing: business continuity management," *EDPACS*, vol. 45, no. 3, pp. 14–25, 2012.

[117] C.-N. Albu, N. Albu, M. Dumitru, and V. F. Dumitru, "The impact of the interaction between context variables and enterprise resource planning systems on organizational performance: a case study from a transition economy," *Information Systems Management*, vol. 32, no. 3, pp. 252–264, 2015.