

Analyzing the Effects of Digital Communication on Project Management in Bahrain During the COVID-19 Pandemic (a Case Study)



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1 Introduction

In 2020, the government of Bahrain faced a difficult situation due to the COVID-19 pandemic. Quick actions were taken, and procedures were altered to comply with social distancing and ensure the safety of everyone. One of the changes was shifting to digital communication. As this was a new concept, many managers expressed their dislike due to the physical absence of their employees. However, some employees were satisfied with the new situation and felt comfortable and were more productive working from home. Unfortunately, as people were not used to the new strategy, some challenges affected the productivity of the government entities in Bahrain.

This paper focuses on digital communication within public-sector organizations and the factors that have impacted project management. Digital communication is highly important nowadays, as it is necessary for the development of any country, business, or project. Its importance is evident when compared with traditional methods. There are several factors that have enabled digitalized project management to be accepted, such as reliability, security, convenience, acceptability, anonymity, efficiency, scalability, and privacy (Sidek, 2015).

This research shows the main factors of digitalization in Bahrain during the COVID-19 pandemic. A case study is conducted to identify the effects on procurement as a part of project management due to the quick transition to

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digitalization during the pandemic. We show the effects of digital communication factors and measure which factor has an impact on e-tendering. We also identify the challenges that caused a reduction in the number of bids provided by contractors to help improve the overall situation and participation in e-tendering. Managers can use the deliverables while setting objectives and plans to strengthen weak areas.

This study provides an overview of the Kingdom of Bahrain's Tender Board's experiment in digitalization in the year 2020, followed by the problem statement. The aim is to improve project management by using online-based tools, finding solutions for the limitations faced, and considering adopting the approach of digitalization on a continuous basis. The Bahrain Tender Board's operations witnessed major developments in terms of digital tender applications, which was the first step in the transition from comprehensive automation to comprehensive digitalization in line with His Majesty King Hamad bin Isa Al Khalifa's directives to adopt and employ artificial intelligence in the production sectors.

The Tender Board is committed to achieving the goals of Bahrain Economic Vision 2030, which aims to create a more competitive and sustainable economy. Comprehensive automation processes have contributed to improving and facilitating work between suppliers, contractors, and government agencies in addition to increasing the level of participation of suppliers and contractors, especially in the current circumstances where national efforts are united to mitigate the consequences of COVID-19 in a manner that preserves the safety of citizens, residents, and their health.

In April 2020, Bahrain's Tender Board announced that it was digitalizing its services in line with the Cabinet's directives for all ministries and authorities to make quick digital shifts for their services. Suppliers would be able to participate with bids for tenders by uploading them to an integrated central online platform called the e-tendering system. All tender processes would be conducted in that system, and the winners announced on it too. During the launch, the secretary general of the Tender Board stated that the pilot stage, which included full digitalization of all its services, would allow suppliers and companies to submit their bids easily. The system would also allow more establishments to participate in the process, especially during the COVID-19 pandemic. The full digitalization of the services would begin with a complete plan designed for this target and implemented in the second half of 2020. As the tendering process would take around 6 months, the results would be reflected in the first half of 2021.

One of the main challenges faced was communication. For any organization to succeed and for strong and successful project management, communication is key to achieving integration between different levels of employees. Goals can be achieved by having strong relationships and interaction between employees, as it allows the sharing of knowledge and experiences and creates a friendly environment where an employee feels comfortable working (Khalifa et al., 2021). These elements, in addition to strong communication, lead to high productivity and improvement of the organization's performance (Robbins & Judge, 2007). Digital communication has some benefits aside from reducing administration costs, and it can be effective if an organization makes the correct decisions and implements

strategies to control all the processes involved in adopting a work-from-home strategy (Bohrer, 2021).

Unfortunately, due to the sudden transition to remote working, communication problems occurred. Some of the employees were not prepared for working from home, as they did not have laptops or remote access. This resulted in late submissions, confusion, and disappointed employees. Professional and social activities and informal communications, such as communicating with work colleagues, meeting other ministries' employees or suppliers, friendly conversations, lunch break talks, and events that influenced relationships between employees, were affected. Meetings were conducted online through different applications, such as Zoom and Microsoft Teams, but the quality and outcomes were different (Khalifa et al., 2021).

Due to transitioning to digital communication (e-tendering system) during the COVID-19 pandemic, the tender's value increased by BD 733,300,756 in the first half of 2021 (Bahrain Tender Board Annual Report, 2020). The number of bids received was reduced by 24%, from 5555 in 2020 to 4561 bids in 2021, which also considered a reduction in the options available and price variety. This meant lower offers to choose from to get a product or service done and avoid work delays. Hence, the cost to conduct services or products requested increased from BD 1,557,395,691 to BD 2,290,696,447 in the year 2021. Furthermore, a lower number of contractors applied for tenders in the shift to the e-tendering system during COVID-19 and increased their prices, while the purchasing authorities were faced with the problem of a decreased number of participants in their tenders.

Thus, relationships between employees were affected, and some managers forced their employees to remain in the workplace during working hours to avoid any limitations. Studies have revealed that there are challenges with working from home, such as receiving work requests from managers and colleagues after scheduled work hours and/or at their convenience as well as colleagues not responding on time, and communication with colleagues can be more difficult by an average of 42% (Moovala, 2020). The studies illustrate the many aspects of digitalization, development, and how users perceive these new changes. As Bahrain became digitalized and many people started using this type of technology, a research gap existed in relation to how people in Bahrain were supposed to deal with the changes.

2 Literature Review

2.1 *Effects of COVID-19 on Project Management Processes*

The pandemic affected the work-related processes of project management, stressing employees working on projects as a team. The number of activities that had to be coordinated and managed during the pandemic could overwhelm management teams. Proper planning was therefore essential for an organization's leadership

team. However, making quick and correct decisions was challenging due to the abrupt changes experienced in different sectors of the global economy (Shamim, 2022).

An article was written about this period in Bangladesh in 2022 in which the author stated that COVID-19 greatly affected various aspects of business, including strains on the entire process of managing projects from the initiation phase of a project to the end or closing stage of the project. Some of the changes that affected essential project management processes included a shift in communication, extra pressure on project teams, a need for creativity and workarounds, delays in project delivery, and vendor management risks. To solve these issues, a clear communication strategy and project team collaboration were needed in addition to the centralization of data, as it would enable the management and all employees involved to gain access to the required information.

Another study about the digital revolution published in 2020 stated that since the 1980s, the digital revolution has been both a negative and positive force. According to the authors of this article, the lockdown during COVID-19 accelerated the adoption of digital solutions at an unprecedented pace, creating unforeseen opportunities for scaling up alternative approaches to social and economic life, but it also resulted in digital risks and threats (Hantrais et al., 2021). The authors found that the pandemic supported changes in data collection techniques and dissemination practices for official statistics. They demonstrated how the ethics of artificial intelligence became a primary concern for government legislation at national and international levels and how the features enabling smart cities to act as drivers of productivity did not necessarily give them an advantage during the pandemic.

It was also illustrated that the pandemic accelerated the adoption of digital technologies in some areas where uptake had been stalled or was only slowly progressing, such as data collection techniques, online working, learning, and social interconnectedness. New challenges were created, requiring the scaling up of production, fast-tracking of digital supplies, and construction of online platforms and video-conferencing products. These transformations did not come without a cost: The pandemic exacerbated existing challenges, demanding government interventions to prevent harm and social exclusion associated with teleworking and social networking on an unprecedented scale.

In conclusion, many authors have established that COVID-19 has had a large effect on project management, and it is the main reason for the digital revolution.

2.2 Digital Project Management

Prior to the COVID-19 pandemic, project management had been undergoing a gradual shift from traditional ways of working toward embracing digitalization. The pandemic accelerated the transformation to the digitalization of project management, including the adoption of digital tools and technologies, embracing an agile approach to implementing projects, working collaboratively in remote teams, and

breaking traditional barriers of geography, time zones, and, fundamentally, how project teams collaborate.

Research was conducted in Romania in 2018 about project management in the digital era. The results stated that project management in the digital age is affected by a series of influences. Among these, digitalization is one of the most important ones identified in the research (Simion et al., 2018). The author mentioned that it is likely that in the foreseeable future, nearly all project managers will be digital project managers, giving rise to the importance of understanding the challenges and benefits and building digital skills for both individuals and organizations.

Another study was conducted in Germany in 2019 about digitalization in small and medium enterprises (SMEs). The authors stated that there are several manual processes that need to be digitized. Any SME setting out to digitalize must identify which processes among the entire value chain of the company will give them the highest benefits according to their key performance indicators (e.g., improving overall equipment effectiveness, process transparency, and efficiency, customer satisfaction, and cash flow improvement). The main objective of digitalization is to improve the entire value chain and enterprise resource planning as a higher-level system for the planning and management of all of the company's organizational and technical resources, and the entire chain is only as strong as its weakest link. Thus, automation and logistic technologies are usually implemented to improve the productivity of the company (Kilimis et al., 2019).

In sum, many studies have established that digitalization affects project management.

2.3 Digital Communication During the COVID-19 Global Pandemic

Governments and public health institutions across the world set social distancing and work-from-home guidelines to battle the COVID-19 pandemic. With reduced opportunities to spend time together in person came new challenges to remain socially connected. The pandemic changed people's use of digital communication methods, and inequalities in the use of these methods may have arisen. Digital inequalities may have been further reinforced by a lack of access to digital support. As the world began to heavily rely on digital technology for communication, the less tech-savvy may have needed more support. People mostly depend on family and peer networks for digital support (Razzaque & Hamdan, 2020; Khalaf et al., 2023; Kurdy et al., 2023); however, social distancing and stay-at-home guidelines may have made it more difficult, especially for those who rely mainly on face-to-face social connections.

Older people and those with lower internet skills were more likely to reduce digital communication during the pandemic. While the internet may also function as a digital support source (e.g., search engines, social network sites, and forums), it is

mostly used by those with greater internet experience and skills (Kurdy et al., 2023). During the pandemic, the less tech-savvy may have become increasingly disconnected from society with less access to sources of support for establishing new ways of communicating. At the same time, as in-person interactions were limited to a minimum, people were connecting through video chat apps and services for communication for the first time (Ayyash, 2022; Shoaib, 2022). In that sense, the pandemic with its lockdown measures could be an opportunity for people to overcome motivational barriers (Albinali & Hamdan, 2021) to try out and adopt novel ways of communicating.

A study conducted in the United States in 2020 addressed whether people changed their digital media use and how factors concerning internet access and internet skills related to changes in social contact during the pandemic. The authors observed a vast increase in digital communication, which had implications for digital inequality scholarship. Digital inequality research has suggested that people vary in their quality of internet access and skills, which may then influence the benefits they can reap from communication technologies (Nguyen et al., 2020). Beyond access quality, other challenges to engaging with technology include unstable internet connections and difficulties in maintaining the functionality of devices (More, 2023; Mary Josephine & Muninarayanappa, 2023). Furthermore, during the pandemic, some people may have lacked the know-how to use digital media effectively in replacing face-to-face communication (Karthick & Gopalsamy, 2023). People who rarely used messaging, voice, and video-conferencing apps had to learn how to download and install these on their devices and then figure out how to use them.

Therefore, it can be concluded that digital communication increased during the pandemic, but there were some challenges.

2.4 Acceptance of Digitalization

Digitalization has been studied in different ways, and with the large acceptance of digitalization, it is spreading widely. Several studies have shown that digitalized systems are preferred and accepted by users (Ary et al., 2020). A study was conducted in Morocco in 2020 with the main objective of identifying factors influencing IT acceptance by employees of human development public organizations. The results revealed the significant influence of attitudes and perceived risk on employees' intentions to accept technology. This research yielded strong conclusions about the conditions for successful digitalization in human development public organizations in Morocco and in developing countries (Oumlil & Aderkaoui, 2020).

Another study was conducted in Romania in 2020 about digitalization and e-procurement systems. It presented a practical overview of the implementation of a new technological tool for supporting the procurement process within a company, which impacted organizational change management and process changes as an adapting strategy to the automation trend within the firm. The study concluded that e-procurement technology contributed to more dynamic processing of orders and

establishing a network between end customers, strategic buyers, and purchasing agents. However, it also brought challenges, such as periodic conflicts, especially between strategic buyers and purchasing agents, due to dynamic changes in regulations. This was solved in time as the process changes became the new internal rules of the procurement department.

E-procurement systems are now a trend within large companies, especially as the globalization and internationalization processes of companies are becoming more and more dominant. In terms of strategic procurement, this field is also a significant one, as ensuring cost-efficient contracts with suppliers and favorable conditions for both the procuring company and the end customers are key elements for success (Alexandra, 2020).

To summarize, these studies have established the acceptance and preference of digitalization by employees, buyers, and other parties.

2.5 Safety and Security Influence Factor

Data security protection is an essential element in any system, and the absence of security can influence the success and acceptance of any technology. Although digital transformation is geared toward achieving strategic goals, such as efficiency or competitive advantages, it involves digital threats. Information technology (IT) security is an overarching task for managers and specialists that currently receives little attention in digitalization projects. Therefore, the strategic potential of IT security mostly remains untapped due to a lack of appropriate decision-making and communication tools that support project managers to address IT security consciously (Guggenmos et al., 2022).

In addition, security is a way to decrease vulnerability and ensure the privacy and authenticity of information sources (Tounekti et al., 2017). Safety is managed by security in conducting fund transfers and online payments in addition to data entries in systems and shared folders. A study was conducted in Russia in 2020 and focused on identifying the goals and objectives of digitalization and presenting the forms of implementation of processes. It investigated the methods of ensuring information security in educational institutions and identified four basic types of risk to build a threat model. The results of the study showed a significant decline in the number of successful attacks after implementing the recommendations. The author considered the effectiveness of approaches to information security of educational processes in the context of digitalization by conducting a study of the corporate education system, which included computer facilities, network interactions, and gateways to the global internet. Automated workplaces were equipped with software for the education system and had online access services to various network infrastructures, such as online bibliographic systems. To imitate a real scenario in which an intruder attacks the network, the researchers conducted a penetration test using the “black box” method in which the intruder did not have any advanced information about the system (Almaz et al., 2020).

It has become increasingly evident that the COVID-19 pandemic not only fundamentally altered the modus operandi of many organizations but also precipitated the failure of many businesses around the globe. The range of measures, including local and national lockdowns, social distancing, government-led border closures, and quarantines, forced many firms to adapt their business models at short notice. Broadly speaking, this arose in two domains: externally (how firms interface with customers, suppliers, and other stakeholders) and internally (how firms manage employees and employer–employee relationships). One consequence of COVID-19 may have been the accelerated trend toward the digitalization of business models coupled with the shift of commercial activities from predominantly offline and brick-and-mortar outlets to online outlets.

Research from 2021 illustrated that shifting to remote working and remote operations was a driver for digitalization. Although many of the technologies for enabling remote working have existed for at least a decade, most firms chose not to adopt them; nevertheless, the pandemic forced large numbers of firms to embrace emergent technologies to shift to remote working and remote skills formation activities. The results of the study indicated that the adoption of emerging technologies could be hindered by vested external interests, nostalgia, and employer opportunism as well as negative effects on employee well-being that undermine productivity, work–life balance, and the future of work. While digitalization may bring new opportunities, the process imparts risks that may be hard to mitigate or prepare for (Amoah et al., 2021).

In conclusion, researchers have found that safety and security are the main digital communication factors. In this research, we study whether safety and security factors influence project management in the Kingdom of Bahrain.

2.6 Ease-of-Use Influence Factor

The ease of use of a system is achieved when a user can expect to use the system without effort. Many end-user customers have a reasonable understanding and can use new technologies. New technologies can be personalized to provide maximum ease of use for employees and customers, but an enormously complicated system will push them away. Ease of use can be a key factor for suppliers to accept a tendering system or apply for tenders or not. E-payments involve multiple aspects, which are ease of payment, ease of registration, and ease of access. The procedure to conduct a payment must be short and easy (Tounekti et al., 2017). Ease of use can affect a user’s aim toward using a new technology and the ongoing use of it. Several studies have used the technology acceptance model (TAM) to study the ease-of-use influence factor (Barkhordari et al., 2017). Referring to TAM, ease of use is known “as the degree to which the prospective adopter expects the new technology adopted to be a free effort regarding its transfer and utilization” (Davis, 1989).

The ease-of-use factor in e-systems relates to the result of self-efficiency that a user seeks, which is the capacity to produce the mandatory results with less effort,

and the technology is used without complications (Chipato, 2017). Research was conducted in Zambia in 2017 regarding the factors influencing the adoption of e-banking, a type of digitalized system provided to users, in addition to an e-tendering system facilitating e-payments. It stated that a system's ease of use is the level of effort required for using the system, and this level must be moderately low. The research found that ease of use was instrumental in forming the user's attitude toward using the system, but it was not a factor that directly determined whether the user would use the e-payment system or not. Hence, if an e-payment system has a high level of ease, it produces a positive effect on the user and creates a positive attitude toward using the system. This research highlighted that users perceive that learning to use a system is easy, that an e-payment service does not require much mental effort, and that an e-payment system can be used to achieve banking requirements (Mwiya, et al., 2017).

Another study in 2019 was about the transformation of the innovation process and how digital tools are changing work, collaboration, and organizations in new product development. This study included some interviews with engineers that reflected the early use of digital design tools. The results mentioned dissatisfaction with the complexity of some tools and that ease of use can be both a benefit and a liability to those involved in the projects (Marion & Fixson, 2021).

Multiple researchers have established that ease of use has a key influence on project management. In this research paper, a study is conducted to determine whether the ease-of-use factor affects e-tendering in the Kingdom of Bahrain.

2.7 Accessibility Influence Factor

Accessibility refers to the inclusive practice of removing barriers that prevent interaction with or access to websites, digital tools, and technologies by people with disabilities. The concept is centered around the practice of ensuring that digital resources can be used by all users with a diverse range of abilities. During the global COVID-19 pandemic, the availability of internet connectivity helped maintain business continuity, keep children in education, and ensure that people could access essential goods and services online (Runde, 2021).

A study was conducted in Tarakli in 2021 on the importance of digitalization and accessibility. It stated that it is necessary to make digital data accessible to everyone for reliability, interaction density, efficiency, and actuality. The aim of the study was to determine the opinions of individuals working in institutions in local governments about the importance of digitalization and accessibility. Results showed that much-lost data could have been recorded if digitalization had started earlier. "Priority can be given to practices that will promote the district in digital media." According to the study, the participants had positive thoughts about the use of ICH practices in the tourism industry by ensuring accessibility during the transition to digital media. Accessibility could ensure the recognition and popularity of the district in the national and international markets (Ismael, 2021).

Another study about accessibility to digital technology in 2021 stated that while the history of digital technology exhibits periodic cycles of gain and loss of accessibility, the pattern can also be observed at the much smaller level of specific projects and services (Borg et al., 2021). The most common pattern when it comes to accessibility is that corrections are made, but the production process itself is not improved. Consequently, as soon as external accessibility consultants or an especially knowledgeable developer leaves and an update is required, old and new accessibility problems are recreated (Cooper et al., 2012). In other words, fixing the result is a largely wasted effort if the software production process itself is not improved to include accessibility in the same way that it includes usability, security, and other key criteria. To the extent that accessibility is used to qualitatively rethink every aspect of the design and production process, it can improve the overall user experience for everyone (Microsoft, 2010).

To sum up, several researchers have established that accessibility has a key influence on project management. This research paper aims to determine whether the accessibility factor affects e-tendering in the Kingdom of Bahrain.

2.8 Cost Influence Factor

Nowadays, huge budgets are being invested to embody digital strategies in public organizations worldwide. One main reason behind this investment refers to its important role in empowering and ensuring the success of public policies for sustainable human development. Moreover, digitalization enables public organizations to reduce costs, ensure transparency, and optimize budget efficiency. However, these goals are not always reached (Oumlil & Aderkaoui, 2020).

As companies go international, there is an increased need for e-procurement systems to control operations, maintain relationships between buyers and suppliers, and reduce costs. Some studies have shown that e-procurement technology makes it possible for firms to lower total purchase costs on average by 8–12%. As mentioned earlier, a study conducted in Romania in 2020 about digitalization and e-procurement systems presented an overview of a new technological tool to support the procurement process of a company. There were advantages in terms of decreasing time and costs for purchase order management. The study partly confirmed that costs could be reduced by introducing part-timers or decreasing payments due to more catalogs and catalog products as well as through the responsibility of users to edit their purchase requisitions (PRs). This was because the number of part-timers increased by only one person for the whole team, but the decrease in extra hours to process PRs and payments was confirmed.

Another study was conducted in 2022 to examine the perceived value of service digitalization in France. The findings underlined the perceived benefits and costs of service digitalization for both managers and customers (Vo-Thanh et al., 2022). A third study conducted in Bahrain in 2020 showed that for the employer, remote working can boost productivity and lower organizational costs, while employees

can enjoy perks like flexibility and reduced commuting. However, employees must ensure that they have the technology required, a separate workspace, and an internet service that meets their needs. All these may entail additional costs to ensure access to an online system (Moovala, 2020).

In conclusion, cost has been found to have an influence on project management. One of the goals of this research paper is to determine whether the cost factor affects e-tendering in Bahrain.

2.9 Review Outcomes

Digital communication has been implemented in many sectors before COVID-19, but this significantly increased after the pandemic (Alexandra, 2020). In this chapter, we stated that digitalized systems are being implemented and used at an increasing rate by governments and organizations. With the improvement of technology, digital communication has become more widely applied, earning employees' and users' acceptance and preference with time (Ary et al., 2020). With regard to using digital communication, various influencing factors affect users, starting from project managers to employees and customers. Through the studies on numerous factors reviewed in this research, we found that the results of each factor are distinct from the others. In this research, we focus on four factors – safety and security, accessibility, ease of use, and cost – which have been established to impact project management. Such factors play a key role in digitalization acceptance and implementation in project management processes; thus, the government of the Kingdom of Bahrain needs to motivate organizations to turn to digitalization.

3 Research Methodology

The focus of this section is the methodologies applied to interpret the data acquired from questionnaires. A survey was conducted to collect information and opinions from several points of view. This research targeted a sample of users who dealt mainly with the e-tendering system in Bahrain to analyze the effect and impact level of digitalization on e-tendering. Thus, the survey was distributed to users such as purchasing authorities, contractors, and Tender Board employees. We identified cause-and-effect relationships between two or more variables: dependent and independent variables. We then manipulated the levels of the dependent variables to gauge their effect on the dependent variable. Therefore, an investigational research design was the most suitable approach to observe the factors influencing e-tender values in the Kingdom of Bahrain and answer the main research question recognized in chapter “[Sustainable Competitive Advantage Through Technological Innovation: An Introduction](#)” of this research. Furthermore, we implemented a quantitative research approach to explore the effects by utilizing statistical data collected through

the designed survey distributed electronically to the users of the e-tendering system. Statistical testing methods were added to examine the type of relations between the dependent and independent variables of this research.

3.1 Theoretical Framework

The system theory and user theory are related to this work. Below is the theoretical framework (Fig. 1).

3.2 Research Hypotheses

A hypothesis is used to investigate the relationship between dependent and independent variables. Concerning the research structure devised, the problem of the research established, and the research aim and objectives set for this study review, research assumptions were formulated to test the impact of digitalized communication factors on tender values. The analysis was used to test the following hypotheses:

- H1: Safety and security affected tender values in Bahrain during the COVID-19 pandemic.
- H2: Cost affected tender values in Bahrain during the COVID-19 pandemic.
- H3: Ease of use affected tender values in Bahrain during the COVID-19 pandemic.
- H4: Accessibility affected tender values in Bahrain during the COVID-19 pandemic.

Safety and security were important reasons for shifting to digital communication during the pandemic. To ensure social distancing while keeping data secure, the e-tendering system was implemented by Bahrain Tender Board to maintain purchasing processes around the kingdom. People were afraid of getting infected with the COVID-19 virus, and the e-system aimed to solve this issue. Unfortunately, some challenges and negative effects of this change arose.

The cost of acquiring technology was another factor that may have influenced tender values, as the technology required some extra costs, such as a PC or laptop



Fig. 1 Theoretical framework

and an internet connection to enter the e-tendering system and upload or review documents. Suppliers also needed to acquire the required technology, devices, and internet service to apply for tenders. The Tender Board and purchasing authorities had to provide these services and items. All these may have entailed additional costs to ensure access to the online system.

Ease of use may also have had an influence on tender values. An easier process could result in more benefits, but some users were not used to the technology and online work, especially older users. The knowledge to use the system to upload and download tender documents and the complexity of the process may have influenced the purchasing process and the values of the tenders.

The last factor, accessibility, may have affected tender values in several ways. Ease of access and the ability to access from anywhere at any time were factors that may have influenced the purchasing process and the tenders' values.

3.3 Research Population and Research Sample

The research population is often viewed as a large group of individuals or objects that is the core focus of a research study. It is a subcategory of the population that has the same characteristics as the rest of the population. The population is represented by observations and inferences drawn from the sample data. The population for this research was e-tendering system users in the Kingdom of Bahrain with access to an online questionnaire. This delivered the required results, and the targeted sample was suitable for gathering all the obligatory data and information. The expected connections and relations of the dependent variables and the independent variables were studied by analyzing the collected data. This study was limited to a selected sample as follows: Bahrain Tender Board employees who evaluate and control the tendering processes, purchasing authorities who add tenders to the system, and contractors who are registered and active in the e-tendering system within the last 12 months.

3.4 Questionnaire Design

The focal research question was articulated in an appropriate survey questionnaire with the assistance of the identified research variables, which suited a quantitative research approach. The questionnaire was taken from previous research, but some factors were added like "safety" and "cost." The questionnaire was divided into five parts. The first collected demographic or general information, such as age, gender, and education, from the respondents. The second part contained five questions aimed at gathering data to measure the e-tendering system's security and users' safety. The third part comprised four questions aimed at measuring the e-tendering system's cost. The fourth part had seven questions to measure the e-tendering

system's ease of use. The final part of the questionnaire contained six questions aimed at gathering data to determine the e-tendering system's accessibility. A copy of the questionnaire is attached in Appendix A.

4 Data Analysis and Results

The survey was distributed to 350 users who dealt with the e-tendering system. A total of 127 complete and reliable responses were received from the distributed survey, resulting in a response rate of 36.2%.

4.1 Analyzing the Demographic Data

Demographic data are important, as they provide an overview of a targeted population in research. An examination of the demographic data collected from the survey conducted in this research is shown below. Table 1 illustrates the respondents' genders, ages, educational levels, and types (categories). The details of each point are discussed next.

Table 1 Responses to demographic questions

#	Categories	Options	Frequency	%
1	Gender	Male	72	56.7
		Female	53	41.7
		Prefer not to say	2	1.6
		<i>Total</i>	<i>127</i>	<i>100</i>
2	Age	18–34 years	46	36.3
		35–54 years	64	50.3
		55 years and greater	17	13.4
		<i>Total</i>	<i>127</i>	<i>100</i>
3	Educational level	High school diploma	9	7.1
		Bachelor's degree	80	63
		Master's degree	33	26
		PhD	2	1.6
		Others	3	2.3
		<i>Total</i>	<i>127</i>	<i>100</i>
4	Type	Tender Board employee	24	18.8
		Purchasing authority	29	22.7
		Supplier	56	43.8
		Other	18	14.7
		<i>Total</i>	<i>127</i>	<i>100</i>

Gender Analysis The first question of the demographic data defined the genders of the respondents. The male gender represented 56.7% of the respondents, and the second option, female, represented 41.7%. The remaining 1.6% preferred not to say.

Age Analysis The second question defined the ages of the respondents. The data were divided into three groups. The first group was aged between 18 and 34 years and represented 36.3%. The second group was 35–54 years old, which represented 50.3% or most of the participants. The third group was in the age range of 55 years and more and represented 13.4%.

Educational Level Analysis The third question described the participants' educational levels classified into four groups. The first group represented high school diploma education with 7.1% of the participants. The second category represented participants with bachelor's degrees (63%), the third educational category was labeled as master's degrees and represented 26% of the participants, and the last group comprised PhD holders (1.6%). Some participants chose "Other," and the percentage was 2.3%. From the above data, it is clear that most participants were bachelor's degree holders, which may explain why the majority age of the participants was between 35 and 54 years old.

Position Analysis The fourth question described the type of respondent. They were classified into three groups: Bahrain Tender Board employees (18.8%), purchasing authorities (22.7%), and suppliers (43.8%). The suppliers represented (43.8%) of the respondents, which represents most of the participants. Some respondents answered the question with their job titles, with a percentage of 14.7%.

4.2 Descriptive Analysis

Descriptive statistics can be used to describe single or multiple variables. This type of analysis can help summarize correlations between variables. In this case, one dependent variable was discussed, which was the value of the tenders during COVID-19, and four dependent variables were mentioned earlier. Each of these variables is descriptively analyzed in the following paragraphs.

We identified the factors representing the independent variables in the literature review. The impact of these factors is shown in the tables below with the related questions and perspectives of the participants for each one.

4.2.1 Safety and Security Factor Analysis

The results of the first question for this factor indicated that most of the respondents agreed that *safety has an effect on the quality of project management*. The responses were as follows: 69 participants agreed (54.3%), 34 strongly agreed (11.8%), and 9

disagreed (7.1%). However, no participant strongly disagreed with the first statement. The results showed a standard deviation of 0.821, which was lower than 1, and a mean of 4.008 (Table 2).

For the second question, most of the survey participants agreed that *digital communication is generally secure and safe*. Seventy-five participants agreed (59.1%), 24 were neutral (18.9%), 16 strongly agreed (12.6%), 10 disagreed (7.9%), and 2 strongly disagreed (1.6%). The standard deviation was 0.84, lower than 1, and the mean was 3.732.

The third question responses indicated that the majority of the survey participants agreed that *privacy is maintained within digitalized project management*. Of the total participants, 75 agreed (59.1%), 25 were neutral (19.7%), 15 strongly agreed (11.8%), 10 disagreed (7.9%), and 2 strongly disagreed (1.6%). The resulting standard deviation was 0.835, and the mean equaled 3.717.

The replies to the fourth question showed that most respondents agreed that *security has affected the values of the tenders*. The responses were as follows: 53 agreed (41.7%), 34 were neutral (26.8%), 21 disagreed (16.5%), 17 strongly agreed (13.4%), and 2 strongly disagreed (1.6%). The results revealed a standard deviation of 0.975, which was lower than 1, and a mean of 3.488.

The fifth question's results exhibited that most of the respondents agreed that *the risk of digital project management is minimum if not zero*. Fifty-three participants agreed (41.7%), 34 were neutral (26.8%), 26 disagreed (20.5%), 9 strongly agreed (7.1%), and 5 strongly disagreed (3.9%). As shown in Table 2, the standard deviation was 0.997, lower than 1, and the mean was 3.276.

Table 2 Perspectives on digital communication safety and security

Statement	Frequency %					SD	Mean
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
Safety has an effect on the quality of project management.	26.8	54.3	11.8	7.1	0	0.821	4.008
Digital communication is generally secure and safe within the project management process.	12.6	59.1	18.9	7.9	1.6	0.84	3.732
Privacy is maintained within digitalized project management.	11.8	59.1	19.7	7.9	1.6	0.835	3.717
Security has affected the values of the tenders.	13.4	41.7	26.8	16.5	1.6	0.975	3.488
The risk of digital project management is minimum if not zero.	7.1	41.7	26.8	20.5	3.9	0.997	3.276

4.2.2 Cost Factor Analysis

The results of the first question about the cost factor showed that the majority of the survey respondents agreed that *electronic devices are affordable and can be provided by the company*. The responses of the participants indicated that 79 agreed (62.2%), 22 were neutral (17.3%), 17 strongly agreed (13.4%), 8 disagreed (6.3%), and 1 strongly disagreed (0.8%), with a standard deviation of 0.774, which was lower than 1. The mean equaled 3.811.

The majority of the respondents agreed that *cost has an effect on the quality of project management*, as shown by the results of the second question. Sixty-one participants agreed (48%), 35 were neutral (27.6%), 20 strongly agreed (15.7%), 11 disagreed (8.7%), and there were no responses for strongly disagree. The results had a standard deviation of 0.837, lower than 1, and a mean of 3.709.

For the third question, the majority of the survey respondents agreed that *cost has affected the values of the tenders*. The responses were as follows: agree, 52 (40.9%); neutral, 40 (31.5%); disagree, 17 (13.4%); strongly agree, 14 (11%); and strongly disagree, 4 (3.1%). The results revealed a standard deviation lower than 1 at 0.964 and a mean that equaled 3.433.

The results of the last question showed that most respondents were neutral about the statement *digital communication tools are expensive*. There were 43 neutral responses (33.9%), 34 disagreed (26.8%), 33 agreed (26%), 11 strongly agreed (8.7%), and 6 strongly disagreed (4.7%). The standard deviation was 1.033, which was higher than 1, and the mean was 3.071.

The details for the cost factor are shown in Table 3.

4.2.3 Ease-of-Use Factor Analysis

The results of the first question for the ease-of-use factor indicated that the majority of the participants strongly agreed and agreed that *digitalized processes and services are easy to use*. The responses were as follows: 71 participants agreed (55.9%), 36

Table 3 Perspectives on digital communication cost

Statement	Frequency %					SD	Mean
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
Electronic devices are affordable and can be provided by the company.	13.4	62.2	17.3	6.3	0.8	0.774	3.811
Cost has an effect on the quality of project management.	15.7	48	27.6	8.7		0.837	3.709
Cost has affected the values of the tenders.	11	40.9	31.5	13.4	3.1	0.777	3.433
Digital communication tools are expensive.	8.7	26	33.9	26.8	4.7	1.033	3.071

strongly agreed (28.3%), 16 were neutral (12.6%), 3 strongly disagreed, and 1 disagreed (0.8%). The standard deviation was lower than 1 and equaled 0.808, while the mean equaled 4.071.

The second question's responses showed that most agreed that *ease of use has an effect on the quality of project management*. Sixty-nine participants agreed (54.3%), 31 were neutral (24.4%), 24 strongly agreed (18.9%), 2 strongly disagreed (2.6%), and 1 disagreed (0.8%), with a standard deviation lower than 1 (0.773) and a mean of 3.882.

The results of the third question indicated that most of the respondents agreed that *digital services are user-friendly*. Among the participants, 65 agreed (51.2%), 29 were neutral (22.8%), 23 strongly agreed (18.1%), 6 disagreed (4.7%), and 4 strongly disagreed (3.1%). The mean equaled 3.764, and the standard deviation was 0.912, which was lower than 1.

The respondent details of the fourth question were as follows: 65 participants agreed (the majority at 51.2%), 26 were neutral (20.5%), 23 strongly agreed (18.1%), 11 disagreed (8.7%), and 2 strongly disagreed (1.6%). The mean was 3.756, and the standard deviation was lower than 1 at 0.906.

The fifth question asked whether *digitalized processes and services allowed the participants to recover from mistakes quickly and easily*. The results revealed that 58 participants agreed (47.7%), 31 were neutral (24.4%), 25 strongly agreed (19.7%), and 13 disagreed (10.2%). There are no responses for strongly disagree. The mean equaled 3.748, and the standard deviation was lower than 1 at 0.891.

The results of the sixth question showed that the majority agreed that *digitalization requires the fewest steps possible to accomplish it*. The results were as follows: 64 agreed (50.4%), 26 were neutral (20.5%), 20 strongly agreed (15.7%), 16 disagreed (12.6%), and 1 strongly disagreed (0.8%), with a standard deviation lower than 1 (0.916) and a mean of 3.677.

For the last question (*ease of use has affected the values of the tenders.*), the majority of the responses were agree and neutral. The results were as follows: 48 participants agreed (37.8%), 46 were neutral (36.2%), 19 disagreed (15%), 13 strongly agreed (10.2%), and 1 strongly disagreed (0.8%). The standard deviation was lower than 1 and equaled 0.895, and the mean equaled 3.417. Table 4 shows the details of ease of use.

4.2.4 Accessibility Factor Analysis

The results of the first question of the accessibility factor showed that the majority of the participants agreed and strongly agreed that *digitalization allows them to get or provide services quickly*. The results were as follows: 78 agreed (61.4%), 33 strongly agreed (26%), 11 were neutral (11, 8.7%), and 5 disagreed (3.9%). No participants strongly disagreed with the statement. The standard deviation equaled 0.706 (lower than 1), and the mean equaled 4.094.

The results of the second question indicated that most of the survey respondents agreed and strongly agreed that *the system can be accessed from anywhere*. The

Table 4 Perspectives on digital communication ease of use

Statement	Frequency %					SD	Mean
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
Overall, digitalized processes and services are easy to use.	28.3	55.9	12.6	0.8	2.4	0.808	4.071
Ease of use has an effect on the quality of project management.	18.9	54	24.4	0.8	0.016	0.773	3.882
Digital services are user-friendly.	18	51.2	22.8	4.7	3.1	0.912	3.764
I can use the system and provide or get services successfully every time.	18.1	51	20.5	8.7	1.6	0.906	3.756
Digitalized processes and services allow me to recover from mistakes quickly and easily.	0.197	0.457	0.244	0.102		0.891	3.748
Digitalization requires the fewest steps possible to accomplish it.	0.157	0.504	0.205	0.126	0.008	0.916	3.677
Ease of use has affected the values of the tenders.	0.102	0.378	0.362	0.15	0.008	0.895	3.417

responses showed that 75 participants agreed (59.1%), 33 strongly agreed (26%), 9 disagreed (7.1%), 7 were neutral (5.5%), and 3 strongly disagreed (2.4%). The standard deviation was 0.904 (lower than 1), and the mean was 3.992.

For the third question (*overall, online systems and websites are easy to access.*), the majority agreed and strongly agreed. Sixty-two participants agreed with the statement (48.8%), 37 strongly agreed (29.1%), 15 were neutral (11.8%), 10 disagreed (7.9%), and 3 strongly disagreed (2.4%). The results revealed a standard deviation of 0.970 (lower than 1) and a mean of 3.945.

The fourth question’s results exhibited that the majority of the survey respondents agreed that *accessibility has an effect on the quality of project management*. The results comprised 68 participants who agreed (53.5%), 28 who strongly agreed (22%), 21 who were neutral (16.5%), 9 who disagreed (7.1%), and 1 who strongly disagreed (0.8%). The standard deviation equaled 0.857 (lower than 1), and the mean equaled 3.890.

The results of the fifth question showed that the majority agreed that *services are always online and available*. The results were as follows: 74 participants agreed (58.3%), 24 strongly agreed (18.9%), 19 were neutral (15%), 9 disagreed (7.1%), and 1 strongly disagreed (0.8%). For this question, the mean was 3.874, and the standard deviation was 0.826 (lower than 1).

Most of the survey participants agreed and were neutral about the last question (*accessibility has affected the values of the tenders*). The results were as follows: 19 strongly agreed (15%), 44 agreed (34.6%), 43 were neutral (33.9%), 19 disagreed

Table 5 Perspectives of the participants on accessibility

Statement	Frequency %					SD	Mean	
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree			
Digitalization allows me to get or provide services quickly.	26	61.4	8.7	3.9		0.706	0.499	4.094
The system can be accessed from anywhere.	26	59	5.5	7.1	0.024	0.904	0.817	3.992
Overall, online systems and websites are easy to access.	29	48.8	11.8	7.9	2.4	0.97	0.941	3.945
Accessibility has an effect on the quality of project management.	22	54	16.5	7.1	0.8	0.857	0.734	3.89
Services are always online and available.	0.189	0.583	0.15	0.071	0.008	0.826	0.682	3.874
Accessibility has affected the values of the tenders.	0.15	0.346	0.339	0.15	0.016	0.974	0.949	3.465
Ease of use has affected the values of the tenders.	0.102	0.378	0.362	0.15	0.008	0.895	3.417	

(15%), and 2 strongly disagreed (1.6%). The standard deviation was lower than 1 (0.974), and the mean was 3.465. Table 5 shows the details for accessibility.

4.3 Hypothesis Testing

To answer the research question, tests were conducted to check the validity of the research hypotheses. We used the T-test for the analysis. This type of test was chosen, as it was used by other researchers in similar studies (Table 6).

4.3.1 Testing the First Hypothesis

H1: Safety and security affected tender values in Bahrain during the COVID-19 pandemic

This hypothesis illustrates the relationship between safety and security and the changes in the tenders’ values. The mean equaled 3.633, which was between agree and neutral. The standard deviation was less than 1, so all of the respondents had similar responses. The significance was less than 0.05, so the null hypothesis is rejected, and the alternative hypothesis is accepted. Therefore, security and safety impacted tender values.

Table 6 T-test results

Dependent variable	Hypothesis	Mean	SD	T-test	Sig.
Safety and security	The safety and security factor affected tender values in Bahrain during the COVID-19 pandemic.	3.633	0.570	12.560	0.001
Cost	The cost factor affected tender values in Bahrain during the COVID-19 pandemic.	3.744	0.587	14.344	0.001
Ease of use	The ease-of-use factor affected tender values in Bahrain during the COVID-19 pandemic.	3.859	0.577	16.846	0.001
Accessibility	The accessibility factor affected tender values in Bahrain during the COVID-19 pandemic.	3.500	0.513	11.035	0.001

Based on the findings from the literature review, safety and security was one of the reasons for transitioning to online communication during the pandemic. As many studies have stated, COVID-19 accelerated the process of virtual communication by forcing a large fraction of the global workforce to switch to working from home, and its effects on productivity and which factors played a role in making work from home more or less productive than working in the office were investigated. Furthermore, per the study conducted in Bahrain, safety was a factor that affected employees, and it was a driver of their attitudes. The studied organization shifted to online services to promote the mental health of their employees.

4.3.2 Testing the Second Hypothesis

H2: Cost affected tender values in Bahrain during the COVID-19 pandemic

This hypothesis concerns the relationship between cost and the changes in the tenders’ values. The mean equaled 3.744, which was between agree and neutral. The standard deviation was less than 1, indicating that all respondents agreed with the statements. The significance was less than 0.05, so the null hypothesis is rejected, and the alternative hypothesis is accepted. Thus, cost had an impact on the tenders’ values.

The respondents regarded cost as the second most important factor affecting the value of the tenders. It is important to note that the literature review highlighted the particular significance of the cost factor; for instance, Gibbs et al. (2021) mentioned that an important source of changes in virtual workforce productivity is higher communication and coordination costs. The cost factor can be seen from two different perspectives. On the employer side, a study conducted in Bahrain stated that digital communication could boost productivity, reduce turnover, and lower organizational costs. On the system user side, a good network connection and a computer are required, which are considered extra costs (Moovala, 2020).

4.3.3 Testing the Third Hypothesis

H3: Ease of use affected tender values in Bahrain during the COVID-19 pandemic

This hypothesis examines the relationship between ease of use and the changes in the tenders' values. The mean was 3.859, which was closer to the "agree" response. The standard deviation was less than 1, indicating that all of the respondents had similar responses. The significance was less than 0.05, so the null hypothesis is rejected, and the alternative hypothesis is accepted. It can be concluded that ease of use affected the tenders' values.

The quantitative research results showed that ease of use was the most significant influence factor in relation to the change in tender value in the Kingdom of Bahrain, as it had the highest mean. This highlights the importance of the ease of use of the system. Interestingly, the findings of the study strongly aligned with the literature review. In these contexts, the ease of use of systems could be considered both a benefit and a liability to some projects (Marion & Fixson, 2021). The Kingdom of Bahrain promoted digitalization through the Cabinet's directives for all ministries and authorities, such as the Bahrain Institute of Public Administration, to make quick digital shifts for their services, as they concluded that it would be easier and more practical to provide their services online.

4.3.4 Testing the Fourth Hypothesis

H4: Accessibility affected tender values in Bahrain during the COVID-19 pandemic

This hypothesis examines the relationship between accessibility and the changes in the tenders' values. The mean was 3.500, which fell between agree and neutral. The standard deviation was less than 1, so all of the responses were similar. The significance was less than 0.05, so the null hypothesis is rejected, and the alternative hypothesis is accepted. Thus, accessibility impacted the tenders' values.

As with the previous variables, the respondents reported a positive association between this factor and tender values. Ismael (2021) acknowledged that it is necessary to make digital data accessible to everyone for reliability, interaction density, efficiency, and actuality. In Bahrain, studies have found that digital communication faces some challenges, and Moovala (2020) revealed that not having access to the tools or information needed for work and not having a workspace are the major challenges that face online jobs. In addition, communication between colleagues can be difficult.

From the above, we can confirm the relationships between the variables "safety and security," "cost," "ease of use," and "accessibility" and the dependent variable, "tender values in Bahrain during the COVID-19 pandemic." Our hypotheses can be accepted, which agrees with the study of Oumlil and Aderkaoui (2020).

5 Conclusion and Recommendations

5.1 Conclusion

This research studied the main digital communication factors that affected project management in the Kingdom of Bahrain during the COVID-19 pandemic and caused an increase in tender values. A quantitative approach was applied by distributing an online survey. The selected sample included 127 respondents representing e-tendering system users in Bahrain. Quantitative analysis and descriptive analysis were performed, and hypothesis testing demonstrated the significant influence of the digital communication factors identified. The findings of the study confirmed that all the factors – safety and security, cost, ease of use, and accessibility – impacted tenders in the Kingdom of Bahrain and increased their values.

5.2 Recommendations

This study aimed to investigate the digitalized communication factors that had a significant effect on tender values in the Kingdom of Bahrain. Great steps were taken by the kingdom to adopt digitalized services and provide adoption capabilities to different parties, such as government employees, citizens, customers, and suppliers, to ensure social distancing during the pandemic. In addition to the findings and conclusion of the study, we recommend the following to help clarify the importance of the factors and the steps to be taken in the field of digitalized communication:

The high adoption of digitalized communication in the coming years is the first element to focus on. Digitalization by the government and private sectors should be encouraged to cope with technology that is improving day by day and innovations and ideas. More than traditional methods, digitalization will create movement in the country's economy and lead to additional economic growth in the future.

Second, safety and security factors should be handled with utmost care when adopting or managing a project, as the study shows that these factors are highly effective for successful project management.

The third element to consider when adopting a new project and managing it is the cost. The study shows that e-system costs can affect the value of tenders. Hence, low costs to achieve digitalized systems and services will increase communication.

The fourth consideration in adopting a new project and managing it is the ease of use. It is one of the main points to focus on in the first stages of project management. The study shows that the ease of use of the e-tendering system is very important to users. Moreover, many users are likely to shift from one communication method to another simply because of ease of use.

The fifth element, which is accessibility, can increase the dependability and level of communication. The more accessible a digitalized communication channel (the e-tendering system in our research) is, the more likely it is that users will depend on the service and boost their level of communication.

To summarize, for successful digitalized communication and strong project management, the safety and security, cost, ease-of-use, and accessibility factors should be focused on.

This research may be of great value to the Bahrain Tender Board, and the findings can be used to evaluate the e-tendering system to control and enhance the process. As ease of use is the most influential factor, we recommend that the system should be improved to be easier for users by providing training, user manuals, and instructions.

Finally, we recommend that the Bahrain Tender Board replace the hard documents of the initial bonds with digitalized bonds (bank transfers) for more security, to prevent the loss of documents and to save time and effort.

References

- Albinali, E. A., & Hamdan, A. (2021). The implementation of artificial intelligence in social media marketing and its impact on consumer behavior: Evidence from Bahrain. In B. Alareeni, A. Hamdan, & I. Elgedawy (Eds.), *The importance of new technologies and entrepreneurship in business development: In the context of economic diversity in developing countries*. ICBT 2020. Lecture Notes in Networks and Systems, vol. 194. Springer, Cham. https://doi.org/10.1007/978-3-030-69221-6_58
- Alexandra, M. (2020). *Challenges of digitalization and e-procurement systems in the procurement field in the case of Genpact*. Retrieved October 24, 2022, from <https://www.researchgate.net>
- Almaz, M., Elvir, A., Rifat, S., Vladimir, V., & Tatyana, B. (2020). *Approaches to information security in educational processes in the context of digitalization*. Retrieved October 23, 2022, from https://www.temjournal.com/content/92/TEMJournalMay2020_708_715.pdf
- Amoah, J., Khan, Z., Wood, G., & Knight, G. (2021). *COVID19 and digitalization: The great acceleration*. Retrieved October 23, 2022, from <https://www.sciencedirect.com/science/article/pii/S0148296321005725>
- Ary, B., Eliyana, A., Syabarrudin, A., Arief, Z., & Emur, A. P. (2020). *Digitalization in banking sector: The role of intrinsic motivation*. Retrieved October 22, 2022, from <https://www.sciencedirect.com/science/article/pii/S240584402032644X>
- Ayyash, I. N. (2022). The impact of social media on employee productivity at the workplace. *International Journal of Business Ethics and Governance*, 5(1), 59–69. <https://doi.org/10.51325/ijbeg.v5i1.96>
- Bahrain Tender Board annual report. (2020). Reviewed July 15, 2022, from the Website: <https://www.tenderboard.gov.bh/MediaHandler/ImageHandler/Pdf/annualreport/Tender%20Board%20Annual%20Report%202020%20Eng.pdf>
- Barkhordari, M., Nourollah, Z., Mashayekhi, H., Mashayekhi, Y., & Ahangar, M. S. (2017). Factors influencing adoption of e-payment systems: An empirical study on Iranian customers. *Information Systems and e-business Management*, 15, 89–116.
- Bohrer, L. (2021). *Can a company save money with remote work?* Retrieved March, 2022, from <https://www.lano.io/en/blog/can-a-company-actually-savemoney-with-remote-work/>
- Borg, J., Zhang, W., Smith, E., & Holloway, C. (2021). Introduction to the companion papers to the global report on assistive technology. *Assistive Technology*, 33(1), 1–2.

- Chipato, P. (2017). *An investigation on the impact of electronic payment system on financial performance of commercial banks. A case study of Standard Chartered Bank (2013–2015)* [Business Studies (Honours) Degree in Banking and Finance].
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Gibbs, M., Mengel, F., & Siemroth, C. (2021). *Work from Home & Productivity*. https://bf.uchi-cago.edu/wp-content/uploads/2021/05/BFI_WP_2021-56.pdf
- Guggenmos, F., Häckel, B., Ollig, P., & Stahl, B. (2022). *Security first, security by design, or security pragmatism – strategic roles of IT security in digitalization projects*. Retrieved October 22, 2022, from <https://www.sciencedirect.com/science/article/pii/S0167404822001420>
- Hantrais, L., Allin, P., Kritikos, M., Sogomonjan, M., Anand, P., Livingstone, S., Williams, M., & Innes, M. (2021). *COVID19 and the digital revolution*. Retrieved May 3, 2022, from <https://www.tandfonline.com/doi/full/10.1080/21582041.2020.1833234>
- Ismael, B. (2021). Digitalization and evaluation of accessibility in the tourism use of handicrafts: Tarakli example. *Journal of Gastronomy, Hospitality and Travel*, 4(2), 569–585.
- Karthick, A. V., & Gopalsamy, S. (2023). Role of IoT in business sustainability. In J. Aloysius Edward, K. P. Jaheer Mukthar, E. R. Asis, & K. Sivasubramanian (Eds.), *Current trends in economics, business and sustainability*. ICEBS 2023. Contributions to Environmental Sciences & Innovative Business Technology. Springer, Singapore. https://doi.org/10.1007/978-981-99-3366-2_2
- Khalaf, A., Radhi, A., Al Mascati, M., Moosa, M., Hamdan, A., & Syed-Ahmad, S. (2023). The impact of social media on e-commerce and marketing. In B. Alareeni, A. Hamdan, R. Khamis, & R. E. Khoury (Eds.), *Digitalisation: Opportunities and challenges for business*. ICBT 2022. Lecture Notes in Networks and Systems, vol. 621. Springer, Cham. https://doi.org/10.1007/978-3-031-26956-1_15
- Khalifa, Z., Hammad, W., AlMadhoob, H., & Bayoumi, M. (2021). *Communication limitations during COVID19 pandemic: Challenges and solutions for public sector in the Kingdom of Bahrain*. Retrieved May 3, 2022, from <https://ieeexplore.ieee.org/document/9581745/authors#authors>
- Kilimis, P., Zou, W., Lehmann, M., & Berger, U. (2019). *A survey on digitalization for SMEs in Brandenburg, Germany*. Retrieved October 24, 2022, from <https://www.sciencedirect.com/science/article/pii/S240589631931506X>
- Kurdy, D. M., Al-Malkawi, H.-A. N., & Rizwan, S. (2023). The impact of remote working on employee productivity during COVID-19 in the UAE: The moderating role of job level. *Journal of Business and Socio-economic Development*. <https://doi.org/10.1108/JBSED-09-2022-0104>
- Marion, T. J., & Fixson, S. K. (2021). The transformation of the innovation process: How digital tools are changing work, collaboration, and organizations in new product development. *Journal of Product Innovation Management*, 38, 192–215. <https://doi.org/10.1111/jpim.12547>
- Mary Josephine, M., & Muninarayanappa, M. (2023). Industry 4.0 - It's impact and scope towards sustainable business operations. In J. Aloysius Edward, K. P. Jaheer Mukthar, E. R. Asis, & K. Sivasubramanian (Eds.), *Current trends in economics, business and sustainability*. ICEBS 2023. Contributions to Environmental Sciences & Innovative Business Technology. Springer, Singapore. https://doi.org/10.1007/978-981-99-3366-2_15
- Moovala, V. (2020). Challenges and Benefits of 'Work from Home' for Employees in the Kingdom of Bahrain. Retrieved February 15, 2022, from <https://www.bibf.com/inc/uploads/2020/12/Challenges-and-Benefits-of-Work-from-Home-for-employees-in-the-Kingdom-of-Bahrain.pdf>
- More, A. B. (2023). Implementing digital age experience marketing to make customer relations more sustainable. In A. Nayyar, M. Naved, & R. Rameshwar (Eds.), *New horizons for industry 4.0 in modern business*. Contributions to Environmental Sciences & Innovative Business Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-20443-2_5
- Mwiya, B., Chikumbi, F., Shikaputo, C., Kabala, E., Kaulung'ombe, B., & Siachinji, B. (2017). Examining factors influencing e-banking adoption: Evidence from bank customers in Zambia. *American Journal of Industrial and Business Management*, 7, 741–759.

- Nguyen, M. H., Gruber, J., Fuchs, J., Marler, W., Hunsaker, A., & Hargittai, E. (2020). *Changes in digital communication during the COVID19 global pandemic: Implications for digital inequality and future research*. Retrieved October 22, 2022, from <https://journals.sagepub.com/doi/full/10.1177/2056305120948255>
- Oumlil, R., & Aderkaoui, A. (2020). Technology acceptance, a relevant step to digitalize Moroccan human development public organizations. *Revue Management & Innovation, 1*, 119–136. <https://www.cairn.info/revue--2020-1-page-119.htm>
- Razzaque, A., & Hamdan, A. (2020). Social networking with internet of things aid Bahraini medical professionals' decisions through their knowledge sharing. In A. Hassanien, R. Bhatnagar, N. Khalifa, & M. Taha (Eds.), *Toward Social Internet of Things (SIoT): Enabling technologies, architectures and applications*. Studies in Computational Intelligence, vol. 846. Springer, Cham. https://doi.org/10.1007/978-3-030-24513-9_10
- Robbins, S. P., & Judge, T. (2007). *Organizational behavior*. Upper Saddle River, NJ: Pearson/Prentice Hall.
- Runde, C. (2021). *Digital accessibility: A pandemic look back—and forward*. Retrieved October 24, 2022, from <https://it.wisc.edu/news/digital-accessibility-apanemic-look-back-and-forward/>
- Shamim, M. (2022). *The effects of COVID19 on project management processes and practices*. Retrieved October 22, 2022, from <https://www.cajotas.centralasianstudies.org/index.php/CAJOTAS/article/view/861/848>
- Shoaib, H. M. (2022). Digital transformation as a mediating variable in the relationship between organizational culture and job satisfaction. *International Journal of Business Ethics and Governance, 5*(1), 70–104. <https://doi.org/10.51325/ijbeg.v5i1.99>
- Sidek, N. (2015). *Determinants of electronic payment adoption in Malaysia: The stakeholders' perspectives* [Doctoral thesis].
- Simion, C., Popa, S., & Albu, C. (2018). Project Management 4.0 - Project Management in the digital era. Retrieved October 24, 2022, from http://conference.management.ase.ro/archives/2018/pdf/1_11.pdf
- Tounekti, O., Ruiz-Martínez, A., & Skarmeta-Gómez, A. (2017). An evolution analysis of electronic payment systems and mobile payment systems characteristics. *Journal of Current Issues in Media and Telecommunications, 9*(2/3), 1–12.
- Vo-Thanh, T., Zaman, M., Hasan, R., Akter, S., & Dang-Van, T. (2022). The service digitalization in fine-dining restaurants: A cost-benefit perspective. *International Journal of Contemporary Hospitality Management, 34*(9), 3502–3524. <https://doi.org/10.1108/IJCHM-09-2021-1130>