



TOPIC: E-procurement adoption in Botswana construction companies: An exploratory assessment using regression analysis to empirically test a conceptual model

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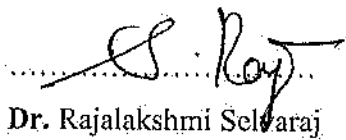
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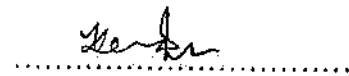
CERTIFICATION

The undersigned certifies that he/she has read and hereby recommends for acceptance by the College of Science a thesis titled: **E-procurement adoption in Botswana construction companies: An exploratory assessment using regression analysis to empirically test a conceptual model**, in fulfilment of the requirements for the degree of Master of Science in Information Systems of the BIUST.



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Dedication

This thesis is dedicated to *Tebogo Gaborutwe, Barulaganye Gaborutwe, Matshidiso Gaborutwe, Trevor Gaborutwe, Leatile Gaborutwe, Rebaone Gaborutwe, Kutlo Gaborutwe* and my parents *Emang Tebele* and *Oakantse Tebele*.

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List of Abbreviations

IS- Information Systems

ICT- Information Communication Technologies

IT – Information Technology

EDI – Electronic Data Interchange

GDP-Gross Domestic Product

SME- Small and Medium Enterprises

DOI- Diffusion of Innovation

TOE- Technology-Organisation-Environment

SPSS - Statistical Package for the Social Sciences

Abstract

Construction industry contributes significantly to the economy of many countries. It is responsible for the buildings and roads used by people in their everyday lives. However, with the amount of construction projects increasing, the need to exchange relevant documentation and sharing of information among the industry stakeholders has increased tremendously. Nevertheless, the introduction of e-procurement systems in the construction sector has addressed the aforementioned issues. It has improved the efficiency and effectiveness of the procurement cycle time to a greater extent. This system facilitates the exchange of information in real time among stakeholders.

Despite the benefits of this system being realized, its adoption within the construction industry is still very slow and it is clear that, e-procurement system is not being utilized. In seeking reasons why e-procurement is progressing slowly in the construction industry, this study extended and tested e-procurement adoption model proposed by Gunasekaran and Ngai [20] among construction companies in Botswana, so as to identify the factors that influence the adoption of this system. The original model by Gunasekaran and Ngai consists of four factors which include perceived barriers, perceived benefits, critical success factors and organizational performance. Nevertheless, taking into consideration that, Gunasekaran and Ngai overlooked other potential factors in their model, the study modified the original model to add two factors which include, management readiness and technology readiness in order to build a more comprehensive model.

The study depended entirely on quantitative methods to best answer the research questions. In this investigation, the questionnaire was used to collect data from executive managers, quantity surveyors and project managers of various construction companies in Botswana to obtain their views regarding the factors influencing the adoption of e-procurement system. Data obtained from the questionnaire was recorded in SPSS software and binomial logistic regression was used to validate the model and give insights into the factors that significantly affect the adoption of an e-procurement system. The study found out that perceived barriers, organizational performance, management readiness and technology readiness affect e-procurement adoption to a greater extent however, perceived benefits and critical success factors do not show any relationship with e-procurement adoption.

Chapter 1

1.0 Introduction

Botswana as one of the developing countries is flooded with a vast amount of construction projects, including roads and buildings in an attempt to improve the livelihood of its people. As a result, the construction industry has become a significant component of the economy for many countries [1], [2], [3] and Botswana is no exception. This is because of the contribution it makes in creating employment, and facilitating regional development and innovation as stated by [3], [22]. However, with the increasing number of construction works every year, the need to exchange relevant documentation and demand for information among relevant stakeholders have also increased which called for better solutions to improve the procurement cycle time within the construction industry.

The technological developments have provided stakeholders within the construction industry with state of the art solution, which is better than the traditional methods of procurement. In particular, the emergence of the internet, information and communication technology (ICT) applications led companies to shift their operation from the traditional way to the virtual e-world [4], [7]. The electronic procurement system or e-procurement as it is called has changed the way the construction industry operates. It is rather important to note that, e-procurement integration in construction is essential to improve efficiency and effectiveness [5], [11], [15], [16], [23]. For example, this system is helping the majority of construction companies in developing countries to gain better access to information, thus improving their daily business operations [3], [6].

Furthermore, the system improves logistics and reduces operational costs by improving supply-chain management within the construction industry [4]. In addition, a number of studies reported empirical evidence that the adoption of this innovation has a positive impact on sustainable development and improving the economy of the country [1], [3], [4]. Therefore, this system needs to be put in use to create a platform that will enable contractors and other stakeholders to easily connect, share and access information and also allowing contractors to have greater control over the utilization of this innovation.

We should also bear in mind that, e-procurement adoption is no longer an afterthought, rather it is a must. It is vital for companies to provide its customers with a cost effective solution and life-cycle costs for sustainable value. This system allows customers to order goods directly from their personal computers through the web in real-time, for example, requests and orders are channelled through various forms of databases. It also allows individual employees to search for items, check availability, place and track orders and initiate payment of delivery [8], [9].

E-procurement has gained popularity not only within the construction industry, but also countries have embraced this innovation especially in the public sector. This innovation is adopted to deal with procurement activities within the public sector and further deal with issues relating to accountability and transparency. In the United States of America, the system was reported in early 2000's and by the end of the same year, almost all the state functions have either adopted all forms if not some of the procurement processes, for instance, some were involved in e-bidding [4], [10]. In similar vein, a review conducted by a commonwealth of Australia, the national governments of Italy, New Zealand and Western Australia revealed that, the use of e-procurement systems for public sector activities in their countries is already in place [11].

In Africa, e-procurement is the new intervention for public sector procurement activities and it has gained popularity. Countries like Tanzania has adopted this system to facilitate e-advertising, e-contracting, e-payment, e-informing and e-evaluation in order to maintain an online presence for all public procurement activities [12]. In Kenya, the government has adopted the system to make sure that all public procurement activities are done on the internet. Further, it is mandatory in Kenya for procurement of all public goods, works and services to be conducted using online platforms [11].

1.1 State of e-procurement in Botswana

Also, in recent years, the government of Botswana has been looking for strategies to diversify the economy by encouraging organizations from various industries and sectors to participate in the adoption of electronic services. By African standards, Botswana has a good degree of e-readiness [17], although the country's networked readiness rankings have been stagnant over the past years as can be observed from the Global Information Technology Report (GITS) of 2012 [18]. However, these rankings have not prevented the country from fulfilling its initiatives of going electronic. The Public Procurement and

Asset Disposal Board (PPADB), a parastatal body under Ministry of Finance and Development Planning introduced an integrated procurement management system to improve the public procurement process [2]. The rationale behind the introduction of this system was to reduce the procurement cycle time and improve service delivery to various stakeholders, i.e. the system was able to assist contractors in Botswana to submit their applications for registration online, track status of application, receive notifications and requests for renewal of applications [2].

In conclusion, both the government and construction industry share the same experience regarding the benefits realized due to the successful adoption of e-procurement system. However, researchers have indicated that these industries differ regarding the drivers leading to its adoption [11], [13]. For example, in the construction industry, the system is driven by technological, environmental and organizational factors [4]. The adoption of this innovation in construction also requires resources and specialized skills. In addition, the process requires a well-coordinated change management systems and training programs [11]. Therefore, the availability of these resources together with well formulated initiatives among companies will lead to the successful adoption of this system. Avgerou [19] argues that, policymakers in developing countries need to combine the adoption of new technologies with a process of organizational innovation appropriate to their local socio-economic context as this will lead to the successful adoption of this system.

In spite of their differences, these industries are both faced with an array of challenges regarding the adoption of this system. This counter argument is supported by evidence from Corsi's [13] research, which he advocated that, the adoption of e-procurement comes with a number of challenges. He sub grouped these challenges into organizational and economic-legal challenges. Organizational challenges include: restructuring difficulties and resistance to change while economic-legal challenges include: regulatory framework, technological requirement, capital requirement and the general education level of the employees [14]. Consequently, these challenges have contributed to the slow adoption of this system, particularly in the construction industry. Prior studies [5], [6] have indicated that its adoption is slow in construction and this is an indication that the system is not being utilized. This calls for models that are comprehensive to explain factors that influence the adoption of an e - procurement system within the construction industry.

In an attempt to find out why e-procurement is progressing slowly, Gunasekaran & Ngai [20] developed e-procurement adoption model which explained four factors that influence the adoption of this system which include perceived benefits, perceived barriers, organizational performance and critical success factors, however, this model is criticized based on the fact that it overlooked other potential factors that can predict the future adoption of e-procurement system. In that regard, this study has modified Gunasekaran and Ngai model to add two factors which include management readiness and technology readiness in order to build a more comprehensive model and has been used as a theoretical foundation for this research.

1.2 Problem Statement

E-procurement has been identified as a key area where information systems enabled innovations yield significant benefits for organizations [21]. Regardless of the recognition of the value of e-procurement systems, it is evident from the literature [5], [6] that E-procurement systems adoption in construction is slow especially in comparison to other industries. This is a clear indication that this system is not being utilized.

In an attempt to address the aforementioned issue, Eadie et al. [5] examined the drivers and barriers for e-procurement in construction within Northern Ireland. Another study by Gunasekaran & Ngai [20] developed a model to understand the factors that affect the adoption of an e-procurement system among general goods and service firms in Hong Kong. According to e-procurement adoption model, there are four factors that influence the adoption of this system which include perceived benefits, perceived barriers, critical success factors and organizational performance. However, this model has never been tested within the construction industry, let alone in Botswana. Furthermore, the model was criticized based on the fact that it overlooked other factors such as the availability of technological resources within an organization and the readiness of managers in taking risks associated with e-procurement which plays a critical role when adopting the system. Hence, the adoption of electronic procurement systems remains a critical area of investigation in information systems research [22].

To find out why e-procurement is progressing slowly in the construction industry, this study tests e-procurement adoption model by Gunasekaran & Ngai [20] among

construction companies in Botswana. The study further modifies this model to add two factors that were overlooked by prior researches.

1.3 Objectives

1.3.1 General objective

To extend and test e-procurement adoption model among construction companies in Botswana.

1.3.2 Specific objectives

1. To assess the key factors in the original model that influence the adoption of the system.
2. To assess the impact of technology readiness and management readiness on e-procurement system adoption.
3. To test and validate e-procurement adoption model within the construction industry in Botswana.

1.4 Research Questions

1. What are the key factors in the model influence the adoption of the system?
2. Does management and technology readiness influence the adoption of e-procurement system?

Both questions 1 and 2 were hypothesized into influential relationships to best answer them.

1. What are the key factors in the original model influence the adoption of the system?
 - H1: Perceived benefits have a significant relationship with e-procurement adoption.
 - H2: Perceived barriers have a significant relationship with e-procurement adoption.
 - H3: Critical success factors have a significant relationship with e-procurement adoption.
 - H4: Organisational performance has a significant relationship with e-procurement adoption.

2. Does management and technology readiness influence the adoption of e-procurement system?

- H5: Management readiness has a significant relationship with e-procurement adoption.
- H6: Technology readiness has a significant relationship with e-procurement adoption.

1.5 Justification of study

The study is driven by the lack of comprehensive models in information systems that explain the factors affecting the adoption of an e-procurement system within the construction industry. Prior studies in information systems's literature have overlooked other factors that give insights on why the system is progressing slowly, particularly in the construction setting. Therefore, this study contributes to the body of information systems through extending Gunasekaran and Ngai model [20] by adding two factors. The Gunasekaran and Ngai model have mostly concentrated on four factors which are limited in terms of explaining the key factors that influence the adoption of e-procurement system. This study modified this model and added management and technology readiness elements in order to come up with a more comprehensive model.

Secondly, there is also a lack of empirical evidence within the construction industry to support the underlying model. This is significant in a sense that, the research further validates the e-procurement adoption model within the construction industry which has never been done before. It is anticipated that if the model works, it can be used to overcome the problem of slow adoption of the system within the construction industry through explaining the factors that influence the adoption this system.

The study of this nature has never been done in the context of Botswana. This study gets an insight into other factors affecting e-procurement adoption among construction companies in Botswana. The study is one of its kinds and serve as guidance for the researchers (by proving a model that can be used as a theoretical foundation for their studies), managers (as it contributes to better understanding of their competitive environment), software vendors (as it offers insights into the extent and the nature of potential demand for their services) in Botswana.

1.6 Scope of the study

This study solely focused on testing e-procurement adoption model to identify factors influencing the adoption of e-procurement system within the construction industry, with specific reference to large construction companies in Botswana. The roles or significance of e-procurement system within the construction industry have been mentioned in section 1.0 and further explained in the literature review. There is a need to incorporate e-procurement and its activities within the construction industry to improve procurement cycle time. Information technologies including e-procurement has the ability to play a fundamental role in construction industry success and competitiveness; therefore it is vital for managers to understand which forms of e-procurement best align with the organisation strategies in achieving both intra and inter firm integration.

1.7 Organization of the thesis

The thesis is organized into five chapters. Chapter one introduces the area under study, together with state of e-procurement in Botswana and the background of the problem. Chapter two gives insights into the concept of e-procurement, together with prior empirical studies related to the factors associated with e-procurement adoption. Chapter three focuses on methods, tools and techniques applied in order to best answer the research questions. Chapter four focuses on data analysis and presents the findings of the research. Chapter five discusses in detail the results of the study and further concludes the research together with recommendations for further studies.

Chapter 2

2.0 Literature Review

2.1 Introduction

The literature search was undertaken to better clarify and understand the problem domain. The literature review helps in identifying the research gaps and relates the study to the trends of e-procurement adoption among construction companies.

The chapter is divided into six sections. Section 2.2 elaborates on the value of the construction industry and how this industry has contributed to the economy of countries. Section 2.3 gives an insight into the concept of e-procurement, including its definitions, types of e-procurement innovations together with their functions and advantages as stated by earlier studies.

Section 2.4 is a literature review on the adoption of an e-procurement system in construction, e-procurement adoption strategies presented by prior studies followed by theoretical background which details the factors that influence the adoption of this system, successes and failures. The model used to guide this study is further discussed and its limitations are stated. Section 2.6 describes the underlying model in this research; the key factors of the model are discussed in detail and a brief explanation on why this model is extended. The chapter depicts literature gaps in section 2.8 from which this study seeks to address and finally summarized in section 2.9.

2.2 Value of construction Industry

The construction industry worldwide often engages in short-term activities in relation to project delivery. In other words, it can be defined as temporary in nature as its activities run for a specific period of time or have start and finish time [25]. Nevertheless, this industry contributes significantly in terms of the development process and economy in both developed and developing countries. In support of this argument, a study by Mahinda [25] posited that, the construction sector is one of the most significant contributors to the economy of many countries in terms of Gross Domestic Product (GDP). Empirical evidence can be derived from Agung [26] study which indicates that, the construction sector constitutes about 40%-60% of GDP in most developing countries and also

contribute up to one third of the investment in physical properties in the economy of most developed countries.

The industry does not only provide finished products but also a key source of employment which generate job opportunities to millions of unskilled, semi-skilled and skilled labour. This point is also sustained by the work of Khan [28], who states that, “high-income or developed countries produce 77 per cent of global construction output with 26 per cent associated with total employment” [28]. In addition, a report by Geneva [29] indicates that, “low and middle income countries produce up to 23 per cent of output and 74 per cent of employment”.

As indicated by Mahinda [25], the construction sector plays a critical role in producing the much needed infrastructure which include hospitals, schools, offices, houses and many more buildings, including roads, airports, power systems; irrigation and agriculture systems; telecommunications etc. This industry significantly contributes to economic activities which often deal with the creation and renovation of physical properties which are in the form of buildings; thereof, it shows how a given country's economy is moving [28]. These infrastructures are often used by many productive activities which include services, manufacturing, utilities and other industries. It is important to note that the projects from this industry are long lasting compared to other industries. For instance, structures mostly in developed countries have an average life span of 80–90 years and in many countries, there are buildings, bridges and other structures hundreds of years old [27].

Even though the value of the construction industry has been realized in many countries, without technologies and tools available in place, it is often difficult to manage daily operations more so that many stakeholders are involved in the construction projects to be delivered well in time. The industry is increasingly realizing the importance of internet-enabled applications and is adopting many of such applications. This is further supported by Mastor & Jabatan [30] who stated in their study that, some companies have invested considerable amount of time and resources in the development and adoption of e-procurement systems. The industry stakeholders such as shareholders, contractors, suppliers, subcontractors and construction managers can have immediate access to information and real time collaboration as facilitated by this application. This has led to fundamental changes in the business processes associated with project delivery.

2.3 Concept of e-procurement

As mentioned in (section 1.0), the use of the internet has offered the best opportunity for e-procurement, which provides electronic alternatives to traditional paper-based processes [31], [36]. According to Thomson & Singh [32], traditional means of conducting purchasing processes can be very inefficient and often more complex. Therefore, the use of electronic services in procurement processes can be advantageous and a better solution to address the shortcomings offered by the traditional processes. Thomson & Singh [32] further emphasized that, the increased adoption of the internet for business use led different organizations to migrate from traditional paper-based processes to e-procurement.

There are many e-procurement definitions from the literature; some authors advocate that, “e-procurement is the streamlining of the procurement process by eliminating paper-based documents and rather conducting parts or all of the purchasing process via web-based communication systems” [33]. For some authors, e-mail ordering is perceived as part of e-procurement, others emphasize the act of ordering online and some refer e-procurement as ordering software [33], [34]. Nevertheless, there is no universal definition of the concept of e-procurement. For example, Tatsis et al. [34] define e-procurement as “the integration, management, automation, optimization and enablement of an organization’s procurement process, using electronic tools and technologies, and web-based applications.” While De Boer et al. [35] posited e-procurement as a tool that, “facilitates, simplifies and enhances the buying process on several levels and often includes multiple functionalities, such as e-sourcing and e-tendering”.

These definitions are often used interchangeably; however, this study puts more emphasis on e-procurement in the construction industry, which often dwells on seven forms of procurement innovations. According to Tran & Huang [37], there are seven different innovations in construction e-procurement which include e-informing, e-tendering, e-awarding, e-catalog, e-invoicing, e-contracting and e-payment. These e-procurement innovations can support specific procurement processes and an organization may adopt only one or many of the e-procurement innovations simultaneously into their organization [37]. For example:

- *E-informing* is an innovation which helps organizations with quotes of requirement, bid results and related information electronically [37], [38].
- *E-catalog* offers an electronic representation of information about an organization's products and services to different stakeholders [37].
- *E-payment* facilitates electronic payment and settlement of accounts, issuing of bills and issuing of invoices between trading partners or stakeholders [38].
- *E-tendering* removes the inefficiencies, delays and costs of manual contract processing by facilitating the exchange of contract documentation electronically through to contract management, evaluation and selection of the contractors thus minimizing human effort [4].
- *E-awarding* deals with opening and evaluation of tenders which complements the legal regulations and the evaluation of tenders are achieved with the use of the established methods [39].
- *E-invoicing* deals with electronic issuing and processing of invoices [39]. Korkman et al. [40] advocated that, e-invoicing monitor's day to day transactional documents between stakeholders and ensure the terms of their trading agreements are being met.
- *E-contracting* is responsible for digitizing paper contracts and using fast communication channels for contract establishment [41]. According to a report by Dynamic [39], e-contracting establishes manages and monitors contracts, collates bid history, monitors performance against agreed service level agreements, key performance indicators and alerts stakeholders to key activities, such as contract renewal dates.

2.3.1 Value of e-procurement

Nonetheless, eliminating traditional paper-based documents and adopting any of these e-procurement innovations is considered to offer numerous benefits [33]. The benefits are discussed below:

- *Improved general condition:* E-procurement systems provide useful information about the suppliers and their products. According to Flicker & Holler [42] companies involved in e-procurement have their purchasing staff spending less time on operative tasks and more time on strategic issues.

- *Shorter purchasing process:* due to the fact that e-procurement systems are automated, this has led to many organizations reducing their cycle time in purchasing [34].
- *Higher price transparency:* one of the benefits of e-procurement is that, it allows partners to make comparisons across equivalent products together with their prices which often improve purchasing and enhancing transparency. It was further stated that, the long standing relationships between vendors often leads to discounted prices [43].
- *Lower administrative costs:* on their review of different studies, Schoenherr & Tummalala [44] stated that, e-procurement has drastically enhanced efficiency by reducing transaction costs. The researchers further postulated that, automation with e-procurement has incorporated different stages for users, which include sourcing, negotiation, ordering, receipt and post-purchase review and this has improved the customer's buying experience [45]. Some studies revealed that, companies which adopted an e-procurement system were able to reduce costs from 60% to 80% [46].
- *Improved collaboration with suppliers:* The successful adoption of e-procurement creates long term relationships between suppliers and enterprises. Better contract compliance and a lower error rate can be further achieved through this collaboration [33].
- *System improvement:* The use of e-procurement system can improve the flow of information which creates better internal and external communications between the stakeholders. For example, Zunk et al. [33] stated that, employees using e-procurement in their organizations can gain direct access to the supplier's system.
- *Acquisition of data in the system:* one of the advantages of e-procurement system is that, it has the capability to record all phases conducted within the procurement process in a centralized system. For example, data about actual spending with the supplier and associated product can be analyzed immediately [33].

However, findings from different studies that investigated the benefits associated with the successful adoption of an e-procurement system are mixed. For example, Salkute & Manager [47] divided benefits of e-procurement into two categories which include efficiency and effectiveness. The researchers found the benefits relating to efficiency as faster cycle time, lower procurement costs and reduced unauthorized buying while the

benefits relating to effectiveness were identified as proactive management of procurement data and increased control over the supply chain.

These mixed results could be due to the fact that, companies often use different strategies to adopt the system, therefore different benefits might be realized with each respective adoption strategy. *The next section discusses e-procurement adoption strategies and factors influencing the adoption of e-procurement systems in construction as identified by earlier studies.*

2.4 Adoption of E-procurement

2.4.1 E-procurement adoption strategies

According to Davila et al. [48] there are three strategies companies use to adopt an e-procurement system, namely aggressive, passive and 'wait and see' strategies.

2.4.1.1 Aggressive strategy

Firstly, companies may adopt an aggressive strategy; in this strategy, an organization or company believe that their competitors are adopting e-procurement system, thus forcing them to take on an aggressive approach [48]. Davila et al. [48] & Salkute [47] postulated that, organizations with aggressive strategies are often great at predicting the actions and strategies of competitors hence gaining a competitive advantage. In their study reporting the state of e-procurement technologies, David et al. found out that, 3% of organizations have adopted aggressive strategy and invested heavily to gain a competitive advantage in the field.

2.4.1.2 Passive strategy

Secondly, the passive strategy is also used among construction companies. According to Davila et al. [48], the logic behind this approach is that the firm is normally moving fast into e-procurement solutions and often invest massively to gain a competitive advantage. The results from Davila et al. show that, 4% of companies are adopting a more passive strategy. Conversely, the researchers advocated that, the strategy is often riskier if a company does not have a well-defined solution and may end up betting on the wrong technology, however, Salkute [47] argued that the risk depends on how quickly organizational learning can be absorbed and companies should refrain from creating absorptive capacities that the wait-and-see companies seems to be developing.

2.4.1.3 Wait and see strategy

The final approach is the “wait and see” strategy, this is where companies are aware of the developments (new innovations) but often times do not perceive the development as being worth shifting their current procurement processes to the e-world [48], [47]. That is, companies do not invest in new innovations until the best e-procurement model is defined. This approach has been identified as the most common strategy adopted within the construction industry and consequently led to slow adoption of e-procurement system [47]. Davila et al. [48] further indicated that, 70% companies are taking the wait and see approach and further advocated that, most of these companies are aware of the developments but are reluctant to commit resources.

Regardless of the current strategy of a company, the overall consensus is that adopting e-procurement technology is vital to enhance the performance of an organization, however, it is imperative to bear in mind that, the successful adoption of this system is influenced by different factors. As can be expected, this area has been widely researched and many theories have been put into practice to help us understand the factors surrounding the success and failures of this system.

2.5 Theoretical Background

Despite the efforts to identify these factors, the issue of slow adoption of an e-procurement system, especially within the construction industry continue to haunt many researchers. This section discusses the factors that have been identified by earlier empirical studies in an attempt to address the aforementioned issue.

2.5.1 Perceived benefits and barriers

In construction e-procurement literature, the benefits and challenges of e-procurement system have been identified broadly. Previous researches on construction organizations have discovered that, perceived benefits of e-procurement system significantly influence the willingness of a company to participate in adopting the system [20], [51], [52], [49]. However, Tran [37] & Martin [49] both argued that, the perceived benefits of innovation are insufficient to drive organizations into adopting the innovation or new technology therefore, firms also need to overcome obstacles to successfully innovate.

Perceived barriers also play a vital role in the firm's decision to adopt e-procurement system. Empirical evidence from different studies does support this claim; the firm's decision to adopt the system is influenced by barriers or obstacles faced when trying to innovate. For instance, a study conducted in Atlantic Canada on barriers to e-procurement adoption within the construction industry found out obstacles being technical and organizational [50]. The researchers clarified that, technical issues often deal with the integration of e-procurement systems with the already existing work processes and procurement systems, security of the automated procurement process and their findings were similar to other researches [4], [51], [52]. However, Eadie et al. [51] & Hawking [52] further identified other barriers as legal issues, lack of infrastructure, lack of technical expertise and lack of awareness of e-procurement.

2.5.2 Organizational factors

The organizational context describes the features of an organization. The organizational factor is most common in Diffusion of Innovation (DOI) and Technology-Organization-Environment (TOE) models [53], [54]. According to these models, the most common organization characteristics include firm size, degree of centralization, formalization, complexity of its managerial structure and employee readiness. This factor puts more emphasis on the structure and processes of an organization that limit or facilitate the adoption of innovations. Prior studies have reported evidence about the relationships between these characteristics and e-procurement adoption. For example,

Mambo et al. [56] investigated factors affecting implementation of an e-procurement system in Kenya. The results of their study indicated that, the perception of managers about their organization and new technology is critical in adopting e-procurement system. However Panagrotis [55] also argued that, managers' attitude towards new technology or innovation and risks associated facilitate the adoption of a system. Management commitment, manager's awareness, and top management support have also been identified as significant factors affecting the adoption of e-procurement system [51], [57].

Moreover, some studies on e-procurement in the construction industry have found out that, manager's resistances to change, such as conserving their business practices and culture are strong factors influencing adoption of an e-procurement system within construction industry [51], [58], [59]. Reddick [60] also indicated that, positive support for electronic

procurement by management and high performing management are critical for e-procurement adoption.

Firm size has also been indicated as a factor influencing the firm's decision to adopt e-procurement systems. For example, a study of Tran et al. [5] about construction enterprise's readiness level in implementing e-procurement, the study found out that, organizations that are large and have strong centralized offices are more likely to adopt e-procurement systems. Zunk et al. [33] also examined the adoption of e-procurement solutions in Austria construction. The findings of their study show that, e-procurement is not frequently adopted in the construction industry and this is due to fact that the construction industry is dominated mostly by Small-Medium (SMEs) companies as compared to only a few big players. The researchers further stated that, this has led to slow adoption of an e-procurement system as SMEs lack expertise in process design, purchasing, etc., and so they fail to consider e-procurement while running their daily business operations.

Given the advantages of e-procurement as outlined earlier in this study, it is quite surprising that, e-procurement system often faces internal resistance by the workers within an organization. According to Mahinda [25] the readiness of employees within an organization significantly affects the firm's decision to adopt. For instance, if employees do not understand, let alone perceive automating procurement processes as being beneficial, there will be a lack of confidence and security in executing this new technology. This in turn will cause delays and even reluctance to adopt e-procurement system. Dholakia et al. [61] advocated that, skills and knowledge of employees play a critical role in the adoption of a new technology to a large extent. The researchers further emphasized that, adopting a new technology requires skills and knowledge to operate in the organization and most organizations do not adopt because employees are not familiar or competent with new innovation. Empirical evidence indicates that, organizations whose employees have the necessary skills and technical know-how adopt e-procurement applications [52].

2.5.3 Environmental factors

The environmental context is the place where an organization conducts or carries out its business. This factor is most common in TOE model [54]. Tornatzky and Fleisher [54] define this factor as being external to an organization and often present limitations and opportunities for technological innovations. According to Tornatzky and Fleisher, market

conditions, in terms of competitive market forces and market uncertainty, competitors, regulations, relationships with the government and relationships with trading partners are major factors in the innovation process. Empirical evidence was found to support the TOE theory that intense competition among organizations stimulates the rapid adoption of an innovation and that, when firms are confronted with a high degree of market uncertainty, they are more likely to pursue an aggressive adoption strategy to remain competitive. For example:

In their research, Tran et al. [5] advocated that, market and competitive demands are key impact factors in the innovation process. They further emphasized, the rate of adoption of new technology depends on the interactions between adopters. In support of Tran et al., Panagrotis [55] stated that, imitation effects on adopters play a critical role in the diffusion of innovation. Thus, one can considerably conclude, the level of e-procurement adoption in competitors and business partners influence the readiness level of an enterprise to adopt e-procurement system.

Soares-Aguiar & Palma-dos-Reis [62] examined factors that foster the adoption of electronic procurement systems; the results indicated, a firm's e-procurement adoption decision is influenced by how ready its trading partners along the value chain are to adopt an e-procurement system. This is because for an electronic trade to take place, it is important that, all trading partners adopt compatible electronic trading systems and provide internet-enabled services for each other [62].

2.5.4 Technological factors

In the existing literature, technological resources have been consistently identified as an important factor for successful adoption of information systems [62], [63]. According to TOE and DOI models, technology plays a critical role in the firm's decision to adopt and embrace an information system [53], [54]. Examples include prior technology usage, and number of computers in an organization [53], [54]. Empirical evidence from prior studies also supported the idea that, technological factor does play a critical role in the firm's decision to adopt e-procurement system.

For example, a research on factors that foster the adoption of electronic procurement systems [62], the results revealed technology competence as a factor affecting the firm's decision to adopt an e-procurement system and therefore the firms with higher levels of

technology competence adopted e-procurement system. The research further highlighted based on empirical evidence that, firms with higher levels of IT infrastructure and higher levels of IT expertise adopted e-procurement systems. This is consistent with the results of prior studies that have found it to be a significant factor for initiating innovation's adoption [56], [64], [65]. This implies that, technological resources are an important factor for successful adoption and implementation of innovation systems.

Talhuri et al. [66] identified internal business risks, arguing that, adopting an e-procurement solution not only require that the system itself successfully performs the purchasing process, but should integrate with the existing information infrastructure. This is further supported by Venkatesh [67], who stated in their research, integration with available technology infrastructure may cause operation breakdown.

The next sub section discusses the model used to guide this study together with its fundamental factors that influence the adoption of e-procurement system. The limitations of this model are stated, together with the justification on why this model is extended.

2.6 E-procurement adoption Model

In 2008, Gunasekaran & Ngai [20] developed and validated the e-procurement adoption model to explain the factors that influence the adoption of e-procurement system. According to e-procurement adoption model, there are four specific factors that are fundamental determinants of e-procurement adoption: perceived benefits, perceived barriers, organizational performance and critical success factors. This model was tested on data collected from companies in Hong Kong. The cross sectional survey was undertaken and self-administered questionnaires were mailed to key informants in randomly selected companies from Hong Kong Stock Exchange. Empirical evidence indicated that, all the four factors influence the adoption e-procurement system.

Later in 2009, Gunasekaran et al. [68] extended e-procurement adoption model to explain another factor that influence e-procurement adoption and modified it to fit small to medium enterprises. The study focused on the status of e-procurement in small and medium sized enterprises (SMEs) located in the South-coast of Massachusetts. The results from a questionnaire- based survey employed showed that, company readiness has a significant influence on e-procurement adoption and researchers concluded based upon an argument of Tran et al. [5] that, organizations that are large, have innovative managers and

have good consolidated offices are more likely to adopt this innovation than SME's. Thus, one can reasonably conclude that an organization's readiness in terms of its people, IT resources and its procurement process influence e-procurement adoption success.

Nevertheless, this study adopted the original e-procurement adoption model which emphasizes four factors that influence the adoption of e-procurement system. The decision is based on Tran et al. [5] argument that, firm size has a significant impact on e-procurement adoption therefore this study is based on large construction companies in Botswana hence the extended model was not adopted or used as a theoretical foundation for this research.

2.6.1 Limitation of the original e-procurement adoption model

First and foremost, the e-procurement adoption model has never been tested within the construction industry. According to Eadie et al. [4], e-procurement in construction performs differently from that of general goods and manufacturing services. This is because the construction industry is much more complex due to the fact that there are lots of stakeholders who feed information into the industry. This is an indication that, these industries could be affected by different factors, but some can be common across therefore this model needs to be tested in other industries before generalizing the results to the entire industries.

Secondly, the original e-procurement adoption model is criticized based on the fact that, it overlooked other factors that can be used in understanding the adoption of an e-procurement system at firm level. The researchers indicated in their conclusion the need to investigate other factors that might impact the adoption of this system in order to come up with a more comprehensive model. The e-procurement adoption model has overlooked the technological resources available within an organization. The availability of IT resources like IT skilled personnel and availability of IT infrastructure has a tremendous impact on the firm's decision to adopt a new innovation. If an organization's basic technology is ready, then it's highly likely that it will adopt the system hence the significance of this factor.

Furthermore, this model has not considered the readiness of management in an organization. It is imperative to understand whether the management is ready to take risks associated with the adoption of this system and also worth taking into consideration

whether managers are ready to change the organizational culture. Management is responsible for changing the structure of an organization therefore, if they are not ready to take such risks, then it's highly likely that an organization will not adopt the system hence this factor is worth exploring.

Despite these criticisms, it is however important to note that, e-procurement adoption model make an important contribution to our understanding of the factors that influence the adoption of e-procurement system.

2.7 Conceptual Model

This section discusses in detail the factors of e-procurement adoption model. Firstly, graphical presentation of the research model is depicted in figure 2.1. Followed by discussion of each individual factor and explanation on how management and technology readiness were conceptualized. This model is based on a literature survey and empirical studies. The factors of adopting e-procurement system are (1) Perceived benefits, (2) Perceived barriers, (3) critical success factors, (4) organizational performance, (5) management readiness and (6) technology readiness.

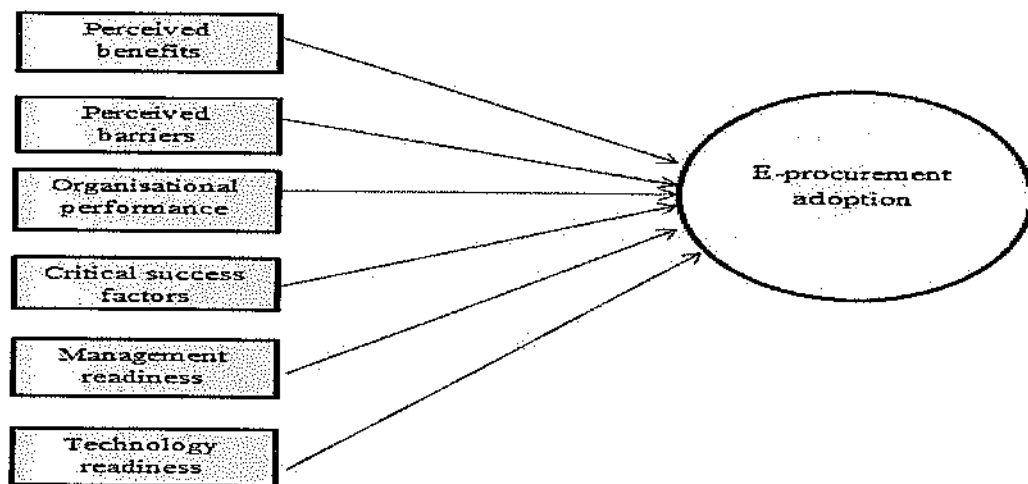


Figure 2-1 Research model

2.7.1 Perceived benefits

Perceived benefits are referred to as the anticipated advantages of an e-procurement system that can be provided to an organization. Among the existing studies are those on the benefits of e-procurement, for example [69], [70], [71]. Aggregate findings of these

researches shown that, there are many benefits of e-procurement in construction in relation to costs and time savings; improved quality of construction products and services, client and user satisfaction, efficiency and effectiveness in the management of construction projects. Organizations are likely to adopt an e-procurement system if they believe it will yield positive or beneficial results.

2.7.2 Perceived Barriers

Laryea & Ibem [72] described barriers as “those factors or circumstances that prevent the implementation of an e-procurement system”. Prior empirical studies emphasized that, it is rather vital for companies to understand the barriers to adopting an information system [4], [72]. Eadie et al. [4] investigated the impediments to the uptake of e-procurement in construction among construction companies in Northern Ireland. The researchers identified the obstacles to the adoption of e-procurement across the globe as related to, managers being unaware of e-procurement, lack of skills and legal and security issues. It is clear from this review that barriers are a contributing factor in slow uptake of e-procurement.

2.7.3 Critical success factors

Critical success factors can be defined as, the efficient processes which are free from excessive idle times, which offer continuous improvement of the e-procurement processes, and adequate training is given to the employees in order to help them take advantage of the new system [73]. In short, critical success factors can be defined as indicators that show the successful adoption of an e-procurement system, for example, enhanced content management, top management being able to support the system and employees being comfortable with using the system. Gunasekaren & Ngai [20] emphasized that, if the organization believes the new processes designed for automation will be successful, then it's highly likely that the organization will adopt the innovation.

2.7.4 Organizational performance

Organizational performance is defined as any change in the process or technology that has a positive impact on a company's performance [20], [68]. E-procurement reduces overall procurement costs compared with traditional methods, shorter-order processing and fulfillment cycles, reduction in administrative costs, improved strategic sourcing, and reduced inventory costs and enhanced competition [74]. If organizations believe that

successful adoption of an e-procurement system is likely to enhance organizational performance, then it is likely that the organization will adopt the system.

2.7.5 Management readiness

A research by Mambo et al. [56] indicated that, the management team is faced with responsibilities of changing the way an organization operates, for example, managers are responsible for setting the vision and mission of an organization, adjusting organizational structures and devising policies and approaches required to successfully adopt the system. If the e-procurement system does not have the full support of the management team or the management is resisting change, there is a high possibility that the adoption will fail. Following the work of Mambo et al. [56] on top management support, this research conceptualized management support as management readiness (reflecting the propensity that the managers are ready to take risks associated with e-procurement adoption). It is important to make sure that the management has given full support for the adoption of e-procurement.

2.7.6 Technology Readiness

Technology readiness refers to a combination of factors that facilitate and enable the technological capacity of an organization to adopt e-procurement [62]. Some empirical studies have identified technological factors as an important determinant of e-procurement adoption [62], [65]. Following the work of Soares-Aguiar & Palma [62] on technological factors affecting e-procurement uptake, the study conceptualized technological factors as technology readiness (reflecting the availability of IT resources required for the adoption of an e-procurement system). Enterprises with robust IT infrastructure, IT expertise, IT compatibility and security measures in place may risk the adoption of this new technology.

2.8 Research Gap

The literature review has provided literature for this study. Previous studies have adequately described the numerous factors that influence e-procurement adoption. The most commonly identified factors in the literature were relating to organizational factors, technological factors and environmental factors. These studies have investigated the factors from a specific angle or across different industries/settings from manufacturing, general goods and services and construction industry to a certain extent. Surprisingly, the

issue of slow adoption of this system despite its enormous benefits continue to persist especially within the construction industry.

There are studies done on the adoption of e-procurement by construction companies in developed and developing countries. However, none of the studies were able to test the e-procurement adoption model proposed by Gunasekaren & Ngai [20] within the construction industry. Thus, this study validates this model in the context of Botswana, specifically within the construction industry.

Furthermore, the model proposed by Gunasekaren & Ngai [20] overlooked other factors that can be used to understand the future adoption of e-procurement among construction companies. This study further extends this model to address this shortcoming by adding two factors that were conceptualized based on prior studies.

2.9 Summary of Literature Review

The e-procurement system addresses the shortcomings of traditional procurement in the construction setting. It is believed that with the use of this system, construction stakeholders will be able to gain access to information and improve daily operations which will help in delivering construction projects well on time. In addition, this system helps in maintaining the much needed information which supports managers to make informed decisions.

In other hand, the adoption of this system has not achieved its intended benefits because construction companies do not utilize it productively. The factors that emerge from the literature review are technology related, environmental and organizational factors. However, these studies have overlooked at other factors. The e-procurement adoption model has also defined its factors, but, these factors were tested in general goods and service industry. Therefore the results cannot be generalized to the context (construction industry) specified in this study. The construction sector is performing differently from that of general goods and services as mentioned in Section 2.4.2.1.

This chapter provided an overview of models and empirical studies that have investigated the underlying factors that can be used to understand why this system is progressing slowly within the construction industry. Different factors have been identified; however, the problem of slow adoption still persists, let alone in the construction industry.

Chapter 3

3.0 Methodology

3.1 Introduction

The adoption of an e-procurement system within the construction industry often entails complex processes. Prior empirical studies identified various factors that can be used to understand the adoption of an e-procurement system at firm level and further studies were recommended to investigate other factors that can be used to improve the adoption of e-procurement systems among construction companies.

Two research questions were derived and six hypotheses were formulated depicting the influential relationships between the study variables. The first four hypotheses were derived from the already existing factors in the model (perceived benefits, perceived barriers, organizational performance and critical success factors). The last two hypotheses were derived from conceptualized factors (technology readiness and management readiness) that were used to extend the model.

Nevertheless, this chapter endeavours to explain the research approach, philosophy, design and methodology in the current study, as well as to verify the choices made in the study. The research design is useful so that appropriate research methods are used to ensure the achievement of the goals and objectives set out in Chapter One. Hence, the reason for clarifying the research design and methodology: Firstly, this is to provide the blueprint for the research. Secondly, this allows the researcher to antedate the appropriate research design which ensures the reliability and validity of results. The data collection method, sampling technique used in the study are discussed together with data analysis techniques.

3.2 Research Approach

For the purpose of this study, quantitative approach was adopted. Quantitative research method is the research method dealing with numbers and anything that is measurable in a systematic way of investigation of the problem being studied [76], [77]. Researchers using the quantitative method usually identify one or a few factors that they intend to use in their research work and proceed with data collection related to those factors using questionnaires that will be discussed further in this chapter.

3.3 Research Philosophy

A research philosophy is a belief about the way in which data about a phenomenon should be gathered, analysed and used [76]. Various research philosophies have been studied by different researchers, for example, the research by Battacherjee [75] states two researches philosophies being positivists and interpretism. Cresswell [76] advocates for Post Positivist Worldview (Positivist), Constructivist Worldview, Transformative Worldview and Pragmatic Worldview philosophies. However, this study was underpinned by the positivist philosophical research paradigm. According to Cresswell [76], positivist determines effects or outcomes based on careful observation and measurement of the objective reality that exist in the world. In most cases, the research starts with a theory, and then data is collected to support or oppose the theory and make necessary revisions which qualifies the current research for this philosophy. The Positivist studies predominantly use quantitative data.

3.4 Research design

Cresswell [76] describe a research design as a plan or structure for an investigation or a list of specifications and procedure for conducting and controlling a research project. In other words, it can be described as a framework or master plan detailing the strategies and methods for conducting a research. A research design depicts the methods and procedures that are used to collect and analyse data needed by the researcher.

This research is non experimental in nature and follows a survey research design to study the factors influencing the adoption of e-procurement system in Botswana. According to Battacherjee [75], survey research normally uses standardized questionnaires for data collection about people and their preferences, thoughts and behaviours in a systematic manner.

This design is suitable for this research because surveys are excellent techniques for measuring a wide variety of unobservable data, such as people's preferences, traits, attitudes, beliefs and behaviours. Further, it is ideal because the study sought to collect data about a population that is too large to observe and also the results obtained from the sample are generalizable to the entire population.

3.5 Research methods

The research methods include techniques and tools used by researcher to best test the hypothesis which helped in answering the research questions. The research hypothesis were derived from prior empirical studies [20], [56].

3.5.1 Hypothesis

This section depicts the variables in the model that were tested from data collected among construction companies in Botswana to best answer the research questions. The six key independent variables (perceived benefits, perceived barriers, critical success factors, organizational performance, management readiness and technology readiness) were tested in this study. These factors were verified through hypothesis testing. The dependent variable in this study is e-procurement adoption. It is a discrete binary variable (dichotomous) that is assigned a “1” if the company has already adopted an e-procurement system, Otherwise e-procurement adoption holds a “0.” The research questions, methods and hypothesis are presented below (*see table 3.1*).

Research questions of the investigation	
	Method (s)
Q1. What are the key factors in the original model that influence the adoption of e-procurement system? ○ H1: Perceived benefits have a significant relationship with e-procurement adoption. ○ H2: Perceived barriers have a significant relationship with e-procurement adoption. ○ H3: Critical success factors have a significant relationship with e-procurement adoption. ○ H4: Organizational performance has a significant relationship with e-procurement adoption.	Questionnaire survey
Q2. Does management and technology readiness influence the adoption of e-procurement system? ○ H5: Management readiness has a significant relationship with e-procurement adoption. ○ H6: Technology readiness has a significant relationship with e-procurement adoption.	Questionnaire survey

Table 3-1 Research questions

3.5.2 Data collection

Data collection was carried out using a questionnaire. Closed ended questions were used in order to understand the extent to which pre-defined factors influence the adoption of e-procurement system. The next section discusses and justifies the data collection instrument used, followed by methods used in validating the research instrument.

3.5.2.1 Questionnaire

A questionnaire is a tool used to gather information from the respondents regarding their views, feelings and beliefs [83]. Major advantages of questionnaire identified by literature is that, data can be collected quickly from a large number of participants and relatively inexpensively. Secondly, the sample can be very large and geographically representative. Thirdly, when constructed properly, a questionnaire provides data that can be organized easily, tabulated and analyzed [82]. The development of the questionnaire is further discussed in the next sub heading “*Research instrument*”

The questionnaire was useful in this study to gather information about the views of different managers (Executive managers, Quantity surveyors and Project managers) of construction companies about factors they consider important when adopting e-procurement system. The information would help in understanding which factors have a significant impact on e-procurement adoption.

Research instrument

A self administered questionnaire technique was used in this study. Hard copies were distributed to different construction companies and soft copies were emailed. All items for the variables were adapted from previous studies [20], [68], [78] which were modified to fit the context of this research. Variables in the model were operationalized by multi-item measures which consisted of 5 items per variable. The reason for using multi-item measures is because they are reliable and less prone to random measurement errors. These items were measured on a five-point scale ranging from (1) strongly disagree and (5) strongly agree.

Pilot Testing

Fifteen construction companies were randomly selected to participate in pilot testing. According to the rule of thumb, at least 12 participants should be selected in order to test the internal reliability of the questionnaire using Cronbach alpha. This is further supported by Isaac & Michael [82] in their discussion of exploratory and pilot studies that, samples for pilot testing should be between 10 and 30. The purpose of the pilot testing is to establish the validity and reliability of the research instrument as stated by the researchers, [79], [80].

Reliability of the research instrument

Construct composite reliability co-efficient (Cronbach alpha) was used to test the reliability of the research instrument. The overall Cronbach's alpha reliability values should exceed the prescribed threshold of 0.7 [77]. The reason for choosing Cronbach's alpha coefficient of reliability is that it gives an unbiased estimate of data generalizability and often used when the research instrument has multiple Likert questions.

Validity of the research instrument

Nevertheless, the study used both face and content validation methods to ascertain the validity of the questionnaire. To ensure content validity, the research instrument was given to 10 executive managers in construction companies to comment on its design and suggest rewording to improve readability. For face validation the research instrument was given to an expert in procurement to see if the measurement variables measures what they are intended for. Furthermore, Construct validity was ensured through using component principal analysis to remove items with lower factor loadings.

3.5.2.2 Participants and Sampling

The subject of this study are large construction companies in Botswana. The participants included executive managers, quantity surveyors and project managers of construction companies. The reason for selecting managers above is because the group is involved in various stages of the procurement processes; as such, it is believed that, they exhibit experience that would help in understanding the factors that are considered significant when adopting e-procurement system.

Sampling technique and size

The study employed simple random sampling in coming up with a sample of construction companies that were approached to answer the questionnaire. Simple random sampling is a technique in which all possible subsets of a population are given an equal probability of being selected [81]. This method is suitable for this research because the results are easily generalizable and also unbiased. Integrated Procurement Management System (IPMS) helped in obtaining the required subjects to be approached as it had a list of registered construction companies in Botswana together with their locations and physical addresses. This made it easier throughout the administering of questionnaires.

A sample of 200 construction companies was drawn in this study upon which the questionnaire was distributed to. However, there is a controversy amongst researchers surrounding the sample size required to conduct binomial logistic regression. Some authors suggest the minimum sample should be 200 participants King & Zeng [84], while Nemes et al. [85] suggested a figure closer to 500 participants as being needed. Schmidt [86] argues that, the minimum number of participants should range from 15 to 20 per variable. Following Schmidt [86], the study used 15 participants per variable which indicate that for all six independent variables at list 90 or more responses were required for this study in order to conduct binomial logistic regression and the results can be generalized to the entire population. Therefore, the total of 90 participants or more would work on this study.

3.5.3 Data analysis

Questionnaire analysis

The pilot test responses were first encoded into MS Excel 2010. The data was then exported to the Statistical Package for Social Science (SPSS). Cronbach Alpha was used to analyze data so as to test the internal consistency of the research instrument. In this study, the acceptability of the research instrument was assumed when α value was greater than 0.7.

The responses from companies on predefined factors were also encoded into MS Excel 2010. Data was then transferred to SPSS software. Descriptive statistics and inferential statistical method binomial logistic regression was used to analyze data. Because the

dependent variable in the questionnaire is dichotomous and independent variables are ordinal, binomial logistic regression was chosen for validating the model as it met these assumptions. Statistical significance in this study was assumed when the p value is less than 0.05. This means if the p value is less than 0.05 the study rejects the null hypothesis and accepts the alternate that there is a significant relationship between the study variables.

3.6 Summary

This chapter provided a detailed overview of techniques, methods and tools that facilitated the success of data collection, its analysis and results presentation. The research approach and methods were discussed in detail and justifications were made to explain their relevance in this study. The reliability and validity of the research instrument were also taken into consideration in this thesis. In addition, sampling procedure was explained to guide researcher on the sample sizes required to conduct the study of this nature. Further, data analysis procedures were discussed in detail and justifications were made on why these approaches were adopted in this study.

Chapter 4

4.0 Data Analysis and Findings

4.1 Introduction

This chapter brings the presentation of the findings and analysis derived from self-administered survey. The data were collected from construction companies in Botswana registered with Public Procurement and Asset Disposal Board. The data was collected and then processed in response to the problem posed in chapter 1 of this thesis.

This chapter at the outset provides the response rate, background of the respondents by analyzing their demographic details. Results from the pilot study are also presented in this chapter. This is followed by analysis of data, findings and the summary. Tables and figures have been used to facilitate a simplistic reader-friendly writing. Finally, the summary of this chapter is provided. This chapter solely focuses on presenting the gathered data in a meaningful way to facilitate the discussion, which will be presented in Chapter 5.

4.2 Pilot study Results

4.2.1 Face and Content Validation

In this study, the research instrument was pretested before it was distributed. In the first face of pretesting, the questionnaire was given to four postgraduate students and one professor. Secondly, the experts were also given the research instrument to assess and give opinions on whether the factors influence the adoption of e-procurement system. The questionnaire was corrected based on the comments/suggestions given by the panel of survey pretesting. The modifications made mainly related to the instructions in the survey and rephrasing of some measurement items. Next, the feedback was obtained from three executive managers of construction companies. The managers suggested the checkboxes should be included under items measuring the factors to make it easier for respondents using soft copies to select their answers. The questionnaire was amended prior to this recommendation. Since there were no major comments received, the questionnaire was considered ready for data collection.

4.2.2 Reliability Test

An internal consistency technique using Cronbach’s alpha was then applied to measure the reliability of the research instrument of pilot respondents. An alpha coefficient higher than 0.885 indicates that, the gathered data have a relatively high internal consistency and could be generalized to reflect the opinions of all respondents in the target population. A total of 30 multi item measures were included in the research instrument. The final reliability score ranges between 0.833 and 0.898 (see *table 4.1*) which is within the acceptable good test score range of .7 to .9. See *appendix 2* for item-total statistics.

The results from the analysis are indicated below:

Factor	No of items	Cronbach's Alpha Value
Management Readiness	5	.833
Technology Readiness	5	.864
Perceived Barriers	5	.826
Perceived Benefits	5	.893
CSF	5	.864
Organisational Performance	5	.898

Table 4-1 Reliability analysis from pilot study

4.3 Response rate

A total of 132 responses were received from the targeted 200 potential respondents, which constitute a 66% response rate for the survey (*see table 4.1*). This is a reliable response rate for data analysis as Mugenda & Mugenda [24] pointed out that, for generalization, a response rate of “50% is adequate for analysis and reporting, 60% is good and a response rate of 70% and over is excellent”. Out of 132 respondents, 80.3% (106) have completed all of the questions that were required to be answered and 19.7% (26) have either exited the survey half way or have not attempted to answer some of the questions. However, the response rate proves eagerness of the respondents’ to participate in the survey.

Response	Frequency	Percentage (%)
Filled in questionnaires	132	66
Unreturned questionnaires	68	34
Total	200	100

Table 4-2 Response Rate

4.3.1 Demographic Characterization

4.3.1.1 Organization and Respondent characteristics

In this section, the study presents the characteristics of organizations from the collected data. The characteristics of respondents (who completed the survey on behalf of organizations) are also presented to demonstrate their degree of knowledge about the organization.

4.3.1.1.1 Organization characteristics

The characteristics of an organization included the type of sector and the results on whether or not the organization has adopted e-procurement system. Overall the organizations were mostly of building construction and a majority of organizations indicated that they did not adopt an e-procurement system.

Type of Sector

The organizations in the data set were divided into five types of industry ($M=2.34$, $SD=1.241$). The majority of (36.8%) of construction companies belong to a Building construction sector. 28.3% of organizations belong to the Road construction industry while the lowest percentage (4.7%) is made up of Mechanical and Electrical engineering (see *Figure 4.1* for further details on distribution by sector type).

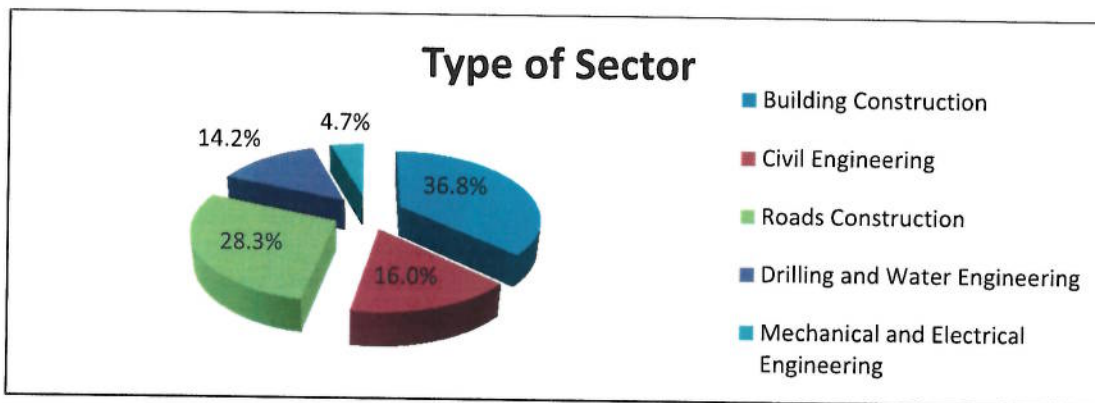


Figure 4-1 Company's type of sector

E-procurement adoption

Figure 4.2 illustrates the summary of the findings on the adoption of e-procurement system among construction companies. According to the findings, the majority (50.9%) of the respondents pointed out that, their companies have not adopted an e - procurement system, 49.1% indicated that, e-procurement is adopted in their respective companies. This implies that the adoption of an e- procurement system is relatively low among construction companies in Botswana.

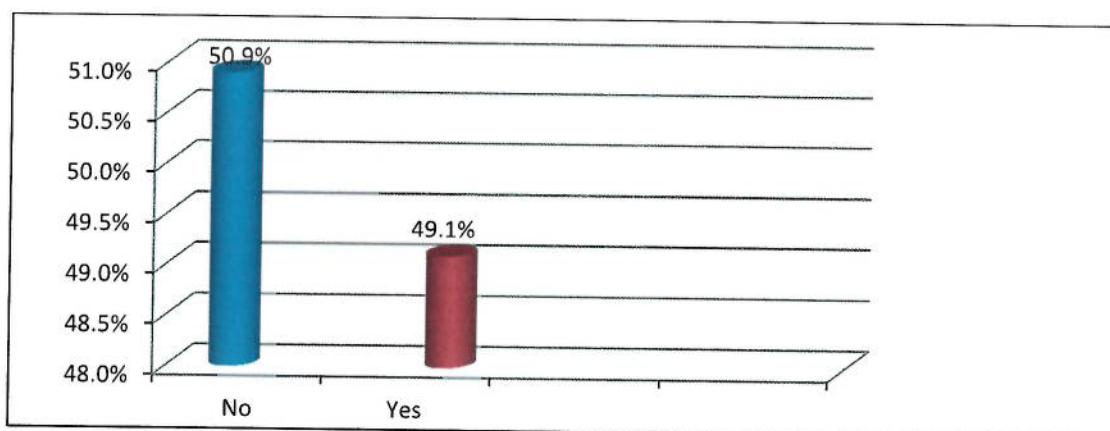


Figure 4-2 E-procurement adoption distributions

4.3.1.1.2 Respondent characteristics

The study established the background information of the respondents. This is vital as, it would somewhat reflect on the reliability of information based on information given by the respondents. In seeking the general information, the researcher requested the respondents to indicate the position held and how long the respondents had worked for the organization.

Respondent's Position

The study looked at the positions held by the respondents within their organizations. From the findings, (54.7%) of the respondents were executive managers, 38.7% were project managers and 6.6% were quantity surveyors (see *figure 4.3*).

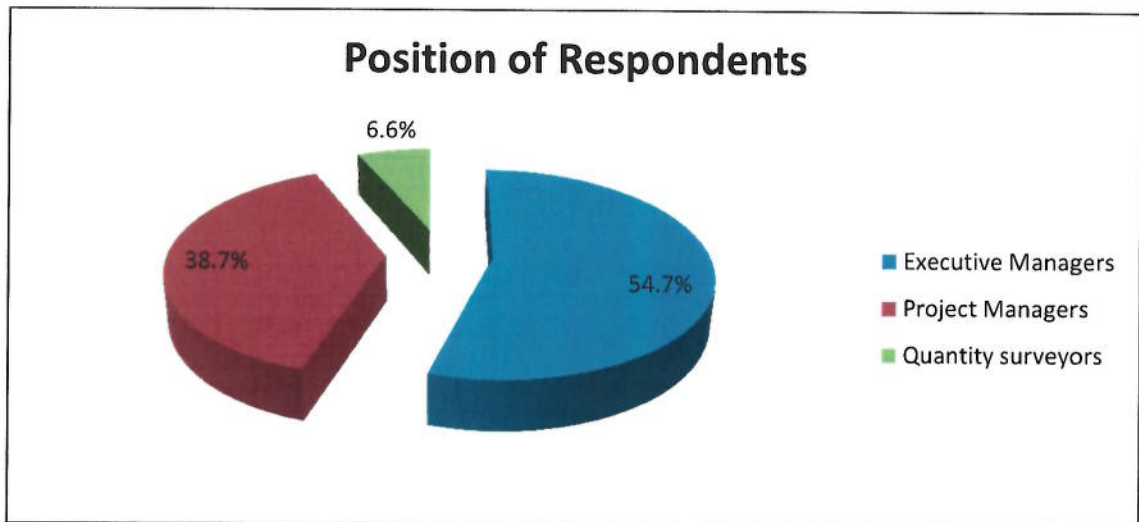


Figure 4-3 Respondents Position

Duration of Service

Figure 4.4 illustrates working duration of the respondents in their respective organizations, from the findings, most (35.8%) of the respondents had worked in their company for less than 5 years, 23.6% had worked for a period of 6-10 years, 17.1% had worked for a period of above 20 years, 16% had worked for a period of 11-15 years while the rest (7.5%) had served in the company for a period of 16-20 years. This implies that most of the respondents of this study had worked for a long time, thus they were reliable with the information that the study required pertaining to their organizations.

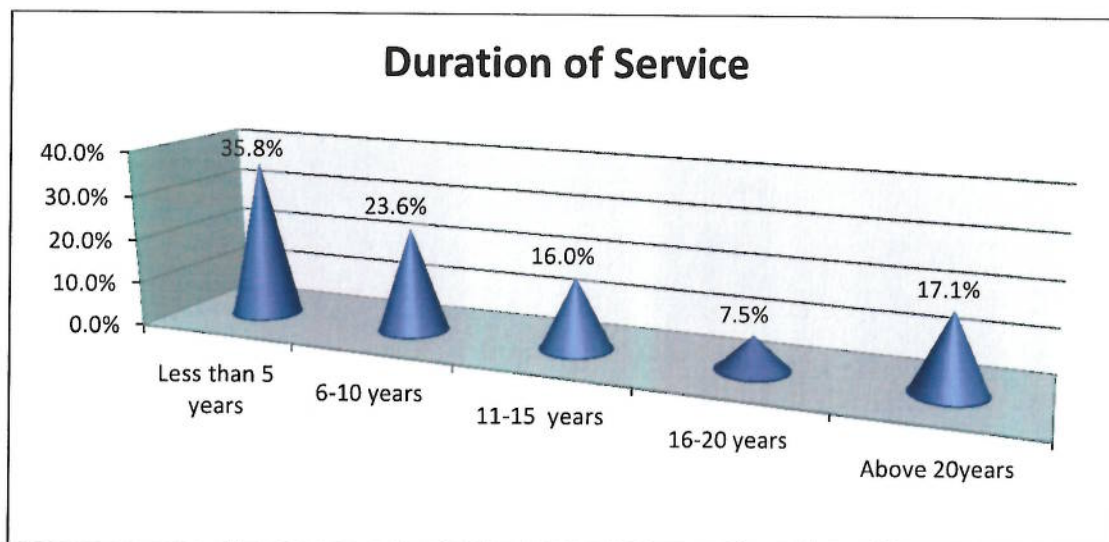


Figure 4-4 Duration of Service

4.4 Preliminary data analysis

4.4.1 Factor Analysis

Principal component analysis was used to select a subset of variables from a larger set, based on the original variables with the highest correlations. The analysis was conducted using principal component analysis with Oblimin with Kaiser Normalization rotation method. According Hang et al. [87], principal component analysis is a technique used to emphasize difference and bring together strong patterns in a dataset. The researchers further postulated that, principal component analysis is applied to define how and to what extent the items in the survey instrument are linked to their underlying factors. The Kaiser-Meyer-Olkin (KMO) was used to measure the adequacy of the sample. This test measures the strength of relationships among variables [88]. From Table 4.3 below, the Kaiser-Meyer-Olkin measure has a value of 0.823 and a significance value of 0.000 which is less than 0.05 and this indicate that, the sample is adequate to carry out factor analysis. Kaiser [88] recommends accepting values greater than 0.5 as acceptable. This designates that, the variables will yield reliable factors which can be analyzed independently.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.823
Bartlett's Test of Sphericity	Approx. Chi-Square	2.844E3
	df	435
	Sig.	.000

Table 4-3 KMO and Bartlett's Test

Principal component analysis was able to identify whether the selected items appeared in one or more than one factor. Factor loadings were used to present these relations. Items were retained and removed based on the following criteria: (i) items with loading of 0.40 or more were retained; (ii) items with loading less than 0.40 were removed from further analysis; (iii) items with loading beyond 0.40 on two or more components were removed. Mabert et al. [89] recommends 0.4 as minimum acceptable values. Table 4.4 exhibits the results from factor analysis detailing the factor loadings of each item.

ITEM	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
MR4	.978					
MR3	.973					
MR5	.966					
MR2	.942					
MR1	.833					
POP2		.878				
POP3		.822				
POP1		.798				
POP4		.793				
POP5		.753				
PBR2			.849			
PBR1			.753			
PBR5			.626			
PBR3			.586			
PBR4			.407			
CSF5				.875		
CSF4				.824		
CSF2				.685		
TR4					.837	
TR2					.806	
TR3					.666	
TR5					.623	
PBE5						-.884
PBE4						-.836
PBE1						-.513

Table 4-4 Principal Component Analysis results

Factor loadings for construct management readiness

From the table 4.4, items (MR1, MR2, MR3, MR4, and MR5) were loading beyond 0.4 and all items were retained in this study to determine the role of management readiness in e-procurement adoption.

Factor loadings for construct organizational performance

Items (POP1, POP2, POP3, POP4, and POP5) were loading together for construct organizational performance and the results in Table 4.4 indicate that all items were retained as their loading values were beyond 0.4.

Factor loadings for construct perceived barriers

Table 4.4 indicates that all items (PB1, PB2, PB3, PB4, and PB5) loadings were beyond 0.4 therefore all the items were retained by the study to determine the extent to which perceived barriers affect e-procurement adoption.

Factor loadings for construct critical success factors

Items (CSF2, CSF4 and CSF5) factor loadings were beyond 0.4 as depicted in table 4.4 and these three factors were retained by the study to measure the degree to which critical success factors influence e-procurement adoption. Two item's (CSF1 and CS3) factor loading values were lower than 0.4 therefore the items were dropped from further analysis.

Factor loadings for construct technology readiness

Table 4.4 indicates that factor loadings for items (TR2, TR3, TR4 and TR5) were beyond the threshold (0.4) and these factors were retained by the study. However TR1 was dropped from further analysis because its factor loading value was below 0.4.

Factor loadings for construct perceived benefits

Three items (PBE1, PBE2 and PBE5) were retained by the study to measure the extent to which perceived benefits influence e-procurement adoption because the factor loading values were beyond 0.4. However, two items (PBE3 and PBE4) were removed from further analysis because the factor loading values were below 0.4 on three components.

4.4.2 Multi-collinearity

Multi-Collinearity is a condition which occurs when two or more independent variables or predictors as sometimes called are highly correlated with each other [24], [90]. A strong correlation designates that, two or more variables are highly related or exhibits a strong relationship between them while weak correlation simply shows that, independent variables hardly relates to each other. The coefficients of correlation can range from -1.00 to 1.00 which means, the value of -1.00 specifies a negative relationship and the value of 1.00 shows a positive relationship [91],[95]. It is often difficult to understand which variable contribute mostly to the explanation of the dependent variable if two or more independent variables are highly correlated. Researchers have argued over which value should be used as a threshold for multi-collinearity. According to Green et al. [92], the

results should be declared free of multi-collinearity if their coefficients are below 0.9 while Lehmann et al. [93] argues 0.7 should be the cut off. However, this study adopted Field's [94] threshold who suggests that multi-collinearity is showed by correlation coefficients higher than 0.8. The correlation matrix exhibited in Table 4.5 depicts that none of the correlation coefficients are above the 0.8 level thereby indicating that there is no problem of multi-collinearity.

	Management Readiness	Perceived Barriers	Organisational Performance	Technology Readiness	Perceived Benefits	CSF
Management Readiness	1.000	.262	.149	.151	-.358	-.094
Perceived Barriers	.262	1.000	.139	.241	-.398	-.019
Organisational Performance	.149	.139	1.000	.299	-.525	.019
Technology Readiness	.151	.241	.299	1.000	-.106	-.003
Perceived Benefits	-.358	-.398	-.525	-.106	1.000	-.227
CSF	-.094	-.019	.019	-.003	-.227	1.000

Table 4-5 Correlation Matrix

With reference to table 4.5, the six key independent variables were assessed for multi-collinearity. The correlation coefficients for all independent variables were below the threshold value of (0.8) therefore, the results are free of multi-collinearity. For example, the coefficients were ranging from -0.03 to -0.5. Management readiness was correlated against other variables; perceived barriers, organizational performance, perceived benefits and critical success factors and the values were 0.3, 0.15, 0.15, -0.4, -0.1 respectively. Perceived barriers were also correlated against other independent variables and the conclusion can be drawn that the issue of multi-collinearity does not exist in this study.

The next section present means and standard deviations of independent variables and findings from binomial logistic regression analysis pertaining to factors associated with the adoption of e-procurement system.

4.5 Model Testing

In this study, the dependent variable, namely e- procurement adoption was measured as a dichotomous variable which returned a binary response i.e. Yes=1 if the company has adopted an e-procurement system and No=0 if the company have not adopted e-procurement system. The independent variables were ordinal and measured on a five point likert scale.

4.5.1 Means and Standard Deviations of Variables

The descriptive statistics explain the nature and features of the collected data. In this study, the mean rankings were used to show the degree in which respondents agree or disagree with the questions in the research instrument. The mean of each variable was calculated from the coded responses. The value of “1” was used to represent strongly disagree and “5” represented strongly agree. From table 4.6 below, the results showed that most of the respondents agreed that management readiness affect e-procurement adoption within the construction industry to a greater extent with a mean of 21.47, followed by organizational performance which had a mean of 21.65. Perceived barriers were also considered important with a mean of 19.98 followed by technology readiness with a mean of 15.85. Perceived benefits and critical success factors were the least ranked in terms of affecting e-procurement adoption, which had a mean of 13.85 and 13.29 respectively. Table 4.6 shows the means and standard deviations of independent variables based on data acquired from construction companies in Botswana.

Factor	N = 106	
	Mean	Std. Deviation
Management Readiness	21.4717	4.55278
Perceived Barriers	19.9811	4.46144
Organisational Performance	21.6509	4.29184
Technology Readiness	15.8491	3.30019
Perceived Benefits	13.8491	1.58440
CSF	13.2925	2.01880

Table 4-6 Means and standard deviations of different variables

4.5.2 Binomial Logistic Regression

Binary Logistic regression analysis was used in this study because, it is considered to have fewer assumptions (that is, independent variables do not have to be normally distributed, linearly related and dependent variable has to be a binary variable). Further, researchers have generally found binomial logistic regression to be more robust and easier to interpret [95]. In addition, binomial logistic analysis should be a preferred technique because the output from the analysis is very similar to regression and is therefore easier to draw inferences [96].

Table 4.7 shows the results from logistic regression including the classification accuracy, significance level of variables and model fit.

Construct	B	S.E.	Wald	df	Sig.	Exp(B)
Management Readiness	.482	.150	10.291	1	.001	1.620
Perceived Barriers	.383	.145	9.767	1	.003	1.586
Organisational Performance	.281	.104	7.297	1	.007	1.325
Technology Readiness	.651	.167	15.294	1	.000	1.918
Perceived Benefits	-.366	.277	1.745	1	.186	.693
CSF	.118	.168	.494	1	.482	1.125
Chi-square (df=6, p<0.01)	90.9					
-2 Log likelihood	56.007					
Nagelkerke R ²	.768					
Correctly classified adopters (%)	86.5					
Correctly classified non- adopters (%)	88.9					
Correctly classified overall (%)	87.7					
Chance accuracy	50.9					
Hosmer and Lemeshow Test						
Chi-square (df = 8)	2.422					
Significance	.965					

Table 4-7 Binary Logistic Regression Analysis

Table 4. 7 shows the result of logistic regression analysis for our hypotheses on the adoption of an e-procurement system. The test result is significant (chi-square = 90.9, df = 6, $p < 0.01$) which indicates that, the survey data adequately fit the model.

Shtatland et al [97] and Reed & Wu [106] states that, “pseudo R^2 measures of fit is undeniable in logistic regression and it is considered the most popular fit in statistical modelling”. This measure takes values between 0 and 1, and becomes larger as the model fits better or when more variables are added [97]. The value of Nagelkerke R^2 indicates that, 76.8% of the variation in the dependent variable is explained by the model. This is a clear indication that, the model is useful in showing the factors that influence the adoption of e-procurement system. Finally, the results also show that, the overall percent correctly classified is 87.7% compared to 50.9% obtained by chance.

According to Hox [98], “diviance statistics is a measure of lack of fit between the data and the model”. The null hypothesis often tested states that, the “observed data is consistent with the model”. The Hosmer and Lemeshow Goodness-of-Fit Test provides an overall test of the fit of the data to the model. Furthermore, it is more robust than chi-square test [99]. If the Hosmer and Lemeshow Goodness-of-Fit test statistic is greater than 0.05 then the model adequately fit the survey data. With reference to table 4.7, the value of 0.965 achieved by survey data indicates a good fit of data to the model therefore the null hypothesis is accepted.

The result of the binary logistic regression model is shown in Table 4.7. Based on the logistic regression analysis, four variables were found to be significantly related to the dependent variable. The significance was assumed when the p value < 0.05.

4.5.3 Factors associated with e-procurement adoption

4.5.3.1 Perceived benefits findings (H1)

Perceived benefit is a construct representing the relative advantages offered by e-procurement adoption within the construction industry. The logistic analysis performed on perceived benefits is depicted in table 4.7 ($p=0.186$) which is greater than 0.05. This revealed no significant relationship between perceived benefits and e-procurement adoption.

4.5.3.2 Perceived barriers findings (H2)

Perceived barrier is a construct representing factors that inhibit the successful adoption of e-procurement system. Based on the results from logistic analysis perceived barriers significantly associate with the adoption of an e-procurement system with the value at ($p=0.003$) which is less than 0.05.

4.5.3.3 Critical success factors (H3)

The logistic analysis performed on critical success factors shows p value (0.482) > 0.05 which revealed that there is no significant relationship between critical success factors and e-procurement adoption.

4.5.3.4 Organizational performance (H4)

The value in table 4.7 from logistic analysis indicates that, there is a significant relationship between organizational performance and e-procurement adoption with $p=0.007$ which is less than 0.05.

4.5.3.5 Management Readiness findings (H5)

Management readiness is a construct representing the propensity that managers are ready to adopt e-procurement system. Based on the results from logistic analysis, management readiness is significantly related to e-procurement adoption with p value= 0.001 which is less than 0.05.

4.5.3.6 Technology Readiness findings (H6)

The hypothesis states that technology readiness has a significant relationship with e-procurement adoption. The data analysis using logistic regression shows a positive main effect, $p=0.00$ which is less than 0.05, this indicates that there is a significant relationship between technology readiness and e-procurement adoption.

4.6 Summary

To sum up, this chapter explicitly presented several statistics together with related analysis. Critical information was reported from various statistical tests; the study had statistically sufficient and relevant response rate of 66% from the target sample of 200 construction companies in Botswana. Furthermore, the study received responses from a dynamic set of respondents with regards to their position at work and work experience further ensuring richness and quality on the information provided for this study.

The internal consistency was tested together with distribution of samples, followed by factor analysis performed to reduce the huge volume of data into very manageable data set; five items had lower factor loadings which were below the threshold of 0.4 and these items were removed from further analysis.

Finally, the significance test indicated a need for binomial logistic regression test as the dependent variable was dichotomous (binary variable) and independent variables were ordinal. The test of binomial logistic regression reported that out of six factors only four have a significant relationship with e-procurement adoption and their significance was assumed when the p value is less than 0.05. The results show that, management readiness, technology readiness, perceived barriers and organizational performance affect e-procurement adoption to a greater extent while critical success factors and perceived benefits were not found to affect the firm's decision to adopt. Additionally, the results showed that, 76.8% of variance in the dependant variable is explained by the model which indicate that, this model is statistically valid and robust in helping us understand the factors that influence the adoption of this system.

Chapter 5

5.0 Discussion of Results

5.1 Introduction

The purpose of this paper was to extend and test e-procurement adoption model within the construction industry in Botswana so as to understand the magnitude to which these factors affect e-procurement adoption. This chapter discusses the interpretations of the findings in Chapter four and draws conclusions and offers recommendation from the study. The data was analyzed using descriptive statistics and inferential statistical analysis. These techniques provide useful information in finding out factors influencing the adoption of e-procurement among construction companies in Botswana. These factors were hypothesized into six influential relationships and from the results presented in chapter four, out of six factors tested, only four were found to significantly affect the adoption of this system. This chapter explains the results in details and provide supporting evidence from prior empirical studies on IS adoption together with a researcher's opinion on why these results were obtained, in addition, limitations and suggestions for further research are also stated.

5.2 Factors influencing the adoption of e-procurement system among construction companies

This section discusses the factors that influence the adoption of e-procurement system among construction companies in Botswana.

5.2.1 Management Readiness

The study found management readiness to be an important determinant of e-procurement adoption. A number of prior studies have provided empirical evidence to support this argument [38], [56], [100], [101], [102], [103], [104], [105], [106]. Management's vision and commitment to an innovation is very vital to get much needed support and adequate resources to adopt the system. For the past years, it has been believed in information system's implementation literature that top management support is a predetermining factor in the successful adoption of the new IS [107], [108].

Company managers within the construction industry in Botswana are really interested in the adoption of the system within their respective organizations. Moreover, managers in

most of the organizations are extremely committed to e-procurement adoption with monitoring processes, changing the organizational structures, setting new visions and goals for their companies, devising strategies of activities which all together affect the adoption of this system to a greater extent. Premkumar [108] pointed out that, the support of the management team is critical, especially for communications technologies because, it includes a relationship with trading partners. It is also important for establishing business agreements for adopting and using the technology with its trading partners.

Taking into consideration the fact that, some managers may decide not to go for adopting e-procurement if they cannot in any way see the value of this system on both short-term and long-term performance of their companies, it is very imperative to urge if not convince managers to learn more about e-procurement and make them see the real benefits of this innovation so as to enable their respective companies to adopt and keep up with the competition and new technologies.

5.2.2 Technology Readiness

Technology readiness was also found to affect the adoption of an e-procurement system to a greater extent. This is consistent with the findings of prior empirical studies which have also found it to be an influential factor in the firm's decision to adopt the system [38], [56], [100], [101], [102], [103], [104], [105]. The availability of computer technologies, information security measures in place and availability of robust networking infrastructure all together determines the readiness of a company as far as technology is concerned, thus impact the firm's decision to adopt e-procurement as the most preferred mode. The e-procurement system is considered more appropriate to be used in the new era rather than the manual way.

ICT is the basis of any e-procurement system; therefore construction companies in Botswana strive to provide a well technological environment that will embrace e-procurement system. According to Gibbs et al. [104], companies should provide flexible systems and networks. The researcher further emphasized that, both hardware and software systems, system incompatibilities and integration together form a key part of successful adoption of this system, hence, companies should ensure that there are no system incompatibilities when adopting new IT innovations.

Managers within construction companies should be aware that technology readiness is made up both by physical infrastructures and intangible knowledge, such as IT skills especially employee IT skills. Therefore, managers of companies should invest highly in physical infrastructure and hiring of employees with technical know-how. Employees with less IT skills in the company should be provided with training programmes that will help them with skills on how to use the system. Policy makers should also minimize tax laws to promote the construction of IT infrastructures which will help in providing the technological environment for the successful adoption of this system.

5.2.3 Perceived benefits

Research on IS adoption and implementation has recognized the value of perceived benefits of the technology in the adoption of an information system [109]. Perceived benefits are often referred to as 'relative advantage' in literature. Even though the variable "perceived benefits" has been operationalized a bit differently in some studies, it has constantly been found to be a significant factor of IT system adoption [109], [110].

Surprisingly, in this study, the results of the logistic regression analysis indicate that, perceived benefits do not affect e-procurement adoption. This is supported by the results of Nelson & Shaw [111] and Lin & Raman [112] on e-commerce adoption, which researchers found that, relative advantage does not significantly affect the firm's decision to initiate IT innovation. Teo et al. [113] also found that relative advantage does not affect e-procurement adoption.

The contradiction in the results might be due to the fact that, in Botswana construction industry, non-adopters supersedes adopters therefore, there may still be some non-adopters among construction companies who do not perceive the benefits of e-procurement to be significant, most likely because of their inexperience with it. Another possible reason as to why perceived benefits were not found to significantly affect the adoption of this system may be that, since the benefits tend to be widely reported in the press, respondents are generally aware of them, and hence the result of benefit is not significant. The last possible explanation may be that, most companies in Botswana have adopted the "wait and see" adoption strategy, that is, companies are aware of the system, but often times do not perceive the innovation as being worth shifting their current procurement processes to the e-world. Previous literature has confirmed that this strategy is mostly adopted among

construction companies and consequently has contributed to the slow adoption of this system.

The adoption of this system depends on how different companies devise their strategic initiatives in adopting e-procurement, however, such initiatives could be costly therefore, organizations may look at it as a long-term investment. According Teo et al. [113], when considering the adoption of e-procurement, organizations sometimes may be more concerned with the benefits that the innovation can bring and how it can provide more strategic gains, rather than the actual benefits of an e-procurement system.

5.2.4 Perceived barriers

In addition, perceived barriers were found to significantly affect e-procurement adoption. The importance of perceived barriers is consistent with Hsiu et al. [107] study of factors affecting the adoption of e-commerce, which revealed that perceived barriers correlates significantly with the success of the adoption. It is also consistent with Teo et al. [103] study, which found that, adopters of B2B e-commerce were significantly affected by barriers such as technological issues, management support; Grover [114] also found a significant relationship between perceived barriers and the adoption of EDI. In similar vein, Rai et al. [38] found that, perceived barriers support was associated with e-procurement assimilation while Premkumar [108] also found barriers to be an important determinant of the adoption of computer-mediated communication technologies. This suggests that, perceived barriers in organization's initiative are essential in determining its adoption.

These results indicate that, most of construction companies in Botswana have not adopted an e-procurement system because of, unavailability of IT infrastructure, lack of software security measures and lack of management support to facilitate the adoption of this system. The perceived challenges may also be related to technical issues such as lack of information from the system providers when new versions of the system are launched and poor IT skills of the employees.

5.2.5 Organizational performance

In the organizational performance dimension, perceived organizational performance was statistically significant facilitator for e-procurement adoption in Botswana construction

industry. This is a clear indication that, managers are aware that, the system can improve long term and short term performance, streamline costs of an organization.

Most studies have conceptualized organizational performance as a dependent variable; Zakari et al. [115] conducted a study on e-procurement and performance of services organizations in Uganda and found that e-procurement significantly improved the performance of an organization in terms of effectiveness and efficiency. Ongore & K'Obonyo [116] did an empirical review on the effects of selected corporate governance characteristics on firm performance in Kenya and found a positive relationship. The study conducted by Barngetuny & Kimutai [117] concur that, there is a positive relationship between e-procurement and firm performance.

The first research to conceptualize perceived organizational performance as an independent variable was Gunasekaren et al. [20] and empirical evidence indicates that, companies from Hong Kong realized the successful implementation of the system improved organization's competitiveness and strategic alliance and networking. However, the study did not use inferential statistical methods to test the significance or relationship of this variable i.e., they used descriptive statistical methods (*means and standard deviations*) to identify the extent to which organizational performance affect e-procurement adoption.

According to Chang et al. [118], the improvement of performance is an indicator of successful adoption of e-procurement among small to medium enterprises. In their study, the researchers asked respondents to rank expected future improvements, and improvements their organizations had realized from e-procurement. The results indicated that, a perceived organizational performance change with e-procurement adoption is a significant issue while adopting this system.

To the best of our knowledge, this is the first study to test using inferential statistical method the significance/relationship of perceived organizational performance on e-procurement adoption as an independent variable. The results indicate that, the firm's decision to adopt the system is influenced by their perception on long term improvements offered by the system to the performance of an organization. Many construction companies in Botswana have realized that, automating their procurement processes had significant improvements on the performance of an organization let alone help them to

stay competitive. However, this study suggests that, more empirical studies should be conducted to support this theory.

5.2.6 Critical success factors

The study, however, did not find a significant relationship between critical success factors and adoption of e-procurement system. Many studies have not included critical success factors as a variable to explain the adoption of IS. However, Mose et al. [21] investigated critical success factors of e-procurement adoption in Nairobi manufacturing companies and the results indicated that, critical success factors influence e-procurement adoption. The respondents indicated issues like performance monitoring and user acceptance as critical factors in determining the adoption of this system.

One plausible explanation for this contradictory result may be due to the fact that, this study operationalized the independent variable somewhat differently from Mose et al. [21] that is, none of the measurement items in our study is similar to Mose et al. Therefore, more studies need to be taken to validate the measurement items for the construct critical success factors. Another possible explanation for the discrepancy in the results may be due to the fact that, construction companies which have not adopted the system in Botswana are more than those who have adopted thus non-adopters cannot confirm that critical indicators of successful adoption of the system have been realized.

Furthermore, e-procurement is an evolving technology in Botswana thus many construction companies have adopted mostly one form of e-procurement which is e-informing, however, the measurement items for construct critical success factors in this study were open mostly to other forms of e-procurement which may have not been adopted by many companies hence they disagreed on the importance of this factor in determining the firms decision to adopt the system.

5.3 Conclusion and Recommendations

This section gives insights into the contribution of this study, recommendations arising from the research, limitations of the study while also providing areas for further research which couldn't be covered by this research. The last subsection draws conclusion from the study.

5.3.1 Contributions of Study

The research questions in this study (*as introduced in section 1.4*) were:

1. What are the key factors in the original model influence the adoption of the system?
2. Does management and technology readiness influence the adoption of e-procurement system?

Both research questions were addressed by including into the research model (*see figure 2.1*) all the factors likely to affect e-procurement adoption (as suggested by the literature) and by testing the model against data collected from construction companies in Botswana. The results indicated that, from the six variables tested; only four were found to significantly affect the adoption of the system.

5.3.1.1 Practical implications

This section discusses the implications of this study to practice, including implications for managers, software vendors and the government.

Implications for software vendors

Vendors are provided with an insight into the factors that are significantly associated with e-procurement adoption. Equipped with this information, vendors can thus come up with more improved and efficient strategies for their e-procurement software. For example, software vendors can focus their attention on making company managers aware of the benefits of e-procurement and make them understand the importance of having technological resources in order to speed up the adoption. Vendors should also realize that, although larger firms appear relevant to adopting e-procurement, SME's also contribute significantly in the market therefore, they should also turn their focus into convincing small and medium sized firms to adopt the system.

Technology readiness was found to influence the adoption of this system; hence, this has implications for the managers of technology vendor firms which develop e-procurement systems. The software vendors can use the results from this study to develop systems which are compatible with existing business practices as well as the existing ICT infrastructure for their clients.

Implications for company managers

Construction companies in Botswana also tend to take a wait and see strategy rather than aggressive attitude in adopting the system. Managers can use the results from this study to understand that, successful adoption of an e-procurement system provides an organization with competitive advantages and the ability to cope with the ever changing business environment.

Of course, the wait and see strategy may be due to unsuccessful cases of adoption of new technologies that they have experienced or heard of. A better knowledge of the development of information systems should be helpful to practicing managers in understanding the conditions under which e-procurement systems are most appropriate to their organizations, hence, the results from this study provide managers with a better understanding of factors associated with the adoption of e-procurement, which will be a useful reference for them to develop appropriate e-procurement strategies.

Implication for the government

Lastly, understanding the factors associated with the adoption of e-procurement, government policy makers could come up with appropriate measures to facilitate the adoption of e-procurement. For example, government could provide financial support and amend tax laws so as to promote the adoption of e-procurement and its diffusion among companies. The government could also play a lead role in adopting e-procurement which in turn can influence construction companies to adopt e-procurement system as, these companies are the lead stakeholders for government projects.

5.3.1.2 Theoretical implications

This section discusses the contribution of this study to the theory, including support for the underlying model, the viability of conceptualizing organizational performance as an independent variable, testing the validity of two independent variables (*technology readiness and management readiness*) which has been used to extend the original model and the contribution from the construction industry in Botswana context.

Demonstrating the viability of conceptualizing organizational performance as an independent variable

This study provides empirical support for the construct organizational performance, which has been somewhat conceptualized as a dependent variable in many studies. This is the second study to conceptualize organizational performance as an independent variable and the first to test the relationship using inferential statistical method. The results indicate that, successful adoption of e-procurement is influenced by the organization's perception that the system will enhance its performance in terms of lowering long and short term operational costs and enhancing competition in the market.

Validity of management and technology readiness as added variables to the original model

The Gunasekaran and Ngai model have mostly concentrated on four factors which are limited in terms of explaining the key factors that influence the adoption of the system. This study extended Gunasekaran and Ngai [20] model, adding management and technology readiness elements in order to come up with a more comprehensive model. Both management and technology readiness were found to affect the adoption of the system which provides evidence in explaining why e-procurement adoption within the construction industry is progressing slowly.

Contribution to the existing model

This research confirms the importance of key variables tested in prior model on the adoption of e-procurement among companies in Hong Kong by Gunasekaran and Ngai [20]. Specifically, our findings confirm that perceived barriers and organizational performance are key determinants of adoption of e-procurement system among construction companies, therefore empirical results from this study contributes by supporting the underlying model. Nevertheless, perceived benefits and critical success factors were not found to affect the adoption of the system. One possible explanation for contradictory results may be that, the model was tested from two different industries therefore factors associated with e-procurement adoption in construction may vary from that of general goods and services industry.

Validated e-procurement adoption model within the construction industry in Botswana

This is the first study to test e-procurement adoption model within the construction industry let alone in Botswana (*there is no previous study on the subject in Botswana*). This research provides concrete empirical support for the theories of e-procurement adoption among construction companies. Empirical evidence indicates that, the model work within the construction industry in terms of explaining the factors that influence the adoption of this system. The model of this study can be used as the theoretical foundation for future researches in information systems, particularly within the construction industry.

5.3.2 Recommendations of the Study

The study recommends that, construction companies should be involved early in the adoption process of e-procurement, because this will help them in defining and devising strategies for the improvement of the procurement process. This will somehow help in the change management.

Management among companies should set the vision and come up with clear goals that complement the objectives of an organization. Furthermore, companies should lay down comprehensive strategies and exceptionally formulated policies to enable the adoption of this innovation. In addition, the management should commit financial resources to support in the necessary development of e-procurement infrastructure for easy adoption.

The study also recommends that, companies that have not adopted the system should critically assess the benefits of this system and take a closer look into the costs associated with e-procurement adoption, so as to understand and successfully come up with a much needed strategy to deal with the results associated with the adoption of this system.

Furthermore, construction companies should provide a learning platform for its employees to improve and ensure the optimal use of the adopted procurement system. There is also need for companies to create and develop the IT competencies of their staff. This will help employees to acquire the requisite technical know-how and skills which are needed for the successful adoption of an e-procurement system. This can be done through extensive trainings more importantly, these trainings should be practical in order to familiarize employees with the system. Employees who are competent and familiar with using the system will take a shorter period of time to complete tasks, thus enhancing productivity of an organization through reducing operational time.

The study finally recommends that, companies should invest heavily to ensure that IT infrastructures are in place and complete with protective measures against security risks. Companies should also play a crucial role in ensuring that much required technologies are available in the organization so as to support e-procurement adoption.

5.3.3 Limitations of the study

Responses

The study provided an opportunity to look at e-procurement adoption among construction companies in Botswana. In the course of carrying out the study, a few limitations were experienced. One of the challenges experienced was the administration of questionnaires to construction companies' staff. Some of the staff were reluctant in the answering of questionnaires, and others took longer to submit back the questionnaires affecting the time schedule of the data analysis.

The study obtained 106 valid responses from construction companies in Botswana. The relatively small dataset limited for statistical analysis and therefore low response rate may have resulted in bias.

Cross validation

If different constructs were measured using different methods, the validity of our conclusion would have improved significantly, for example, some factors like management readiness could be measured through direct interviews with company managers. This could reduce the possibility of common method bias [121].

In addition, it would be desirable to conduct the study with different several populations such as SME construction companies to demonstrate that the same or comparable results are obtained. Further, the results would have been better if the study included construction companies from different regions of Botswana.

In conclusion, these approaches would have resulted in greater validity, but were not possible because of time and resource limitation.

Limitation with the model

Firstly, e-procurement adoption model does not capture external factors such as trading partner readiness and government policies which may be important factors in e-

procurement adoption. Secondly, the model does not include other potentially important factors, such as the employee readiness which may also be the most important factor in determining the adoption of this system.

5.3.4 Suggestions for Further Research

Research in this field is continually growing, generating areas for further researches to be conducted. The same goes for this study, which validated e-procurement adoption model to show the factors that influence the adoption of this system among construction companies in Botswana through a quantitative approach. The researcher suggests the following areas for further research. First, further studies can look into the risks associated with the adoption of an e - procurement system; this can be done through conducting a comparative study between large and small to medium companies as risks associated may differ respectively.

Secondly, the e-procurement adoption model does not capture external factors that influence the adoption of this system at firm level, such as government policies, trading partner's readiness and political influences which needs to be further examined by other studies. In addition, since successful e-procurement adoption is dependent on a number of factors which may advance and change in a longitudinal sense, it will be important to carry a longitudinal study to measure the aforementioned factors.

The results of this study provide empirical evidence that supports the need for a more context-based models of e-procurement adoption. Therefore, further studies can develop models specifically for a certain context that being country specific or industry specific.

Further, whilst there are many theoretical studies of e-procurement adoption, comparisons across industries are lacking. To promote this system adoption and their comparison across industries, it is critical to clarify the factors that explain e-procurement adoption, and to conduct a deep analysis to understand if different industries, e.g. manufacturing, construction and health institutions are affected by the same factors when adopting this system.

Lastly, as e-procurement is gaining popularity in developing countries, it is essential for researchers to conduct country specific researches to understand the adoption of e-procurement among state corporations and parastatals.

5.3.5 Conclusion

E-procurement adoption enables the firm to perform electronic transactions along value-chain activities [119]. To promote e-procurement adoption, it is critical to clarify the factors that explain its adoption, and make a deep analysis to understand to what extent these factors influence the adoption of this system within the construction industry. This study investigated empirically the major determinant factors for the successful adoption of e-procurement among construction companies in Botswana through extending and testing an e-procurement adoption model. The results indicate, that the research model was statistically valid and comprehensive/robust to explain the factors that influence the adoption of this system at firm level.

In order to address the research questions, the study employed a quantitative approach which includes a questionnaire survey to collect data from construction companies in Botswana. The research questions were hypothesized into six influential relationships upon which were tested from the survey data using binomial logistic regression. The results from the survey show that, technology readiness, management readiness, perceived barriers and organizational performance are major determinant factors of e-procurement adoption among construction companies in Botswana. The results further designated that, perceived benefits and critical success factors does not affect the firm's decision to adopt the system. These findings can be used to develop strategies to promote the adoption of e-procurement by construction companies. This study is also helpful to developing validated predictors of enterprises' e-procurement adoption in developing countries and understanding the diffusion of e-procurement within the country specifically Botswana.

As e-procurement is becoming predominant and highly demanded within the construction industry, it is vital to appreciate the factors that influence the adoption of this system at firm level because improved adoption strategies and the introduction of this system may lead to effective and efficient procurement cycle. Also in a recent journal on e-procurement, Mohamed & Milimu [120] stated the importance of understanding the challenges of e-procurement adoption and the need for improvements to be learnt to optimize and improve this system adoption.

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Appendices

Appendix 1: Study Questionnaire



TOPIC: E-procurement adoption in Botswana construction companies: An exploratory assessment using regression analysis to empirically test a conceptual model

This survey is conducted to understand the factors that influence the adoption of e-procurement system among construction companies.

E-procurement in construction is defined as the process involved in the creation, management and fulfillment of contracts relating to the provision of goods, services, engineering and construction works or disposal.

All responses will be strictly confidential and you will not be identified in any way. Your responses will be combined with others for statistical analysis only. Your participation is extremely important to me. I would like to **thank you** in advance for your assistance.

Kindly complete the questions below.

A. ABOUT THE ORGANISATION

In this section, we ask about you and your Organisation

A1. Which type of sector is your organisation involved in?

- ☐ Building construction
- ☐ Civil engineering
- ☐ Roads construction
- ☐ Drilling and water engineering
- ☐ Mechanical and Electrical engineering

A2. What is your present job position in your organisation?

- ☐ Executive manager
- ☐ Project manager
- ☐ Quantity surveyor

A3. How long have you been with the organisation?

- ☐ Less than 5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ 20+ years

A4. Is your organisation using an e-procurement system?

- ☐ Yes
- ☐ No

A. MANAGEMENT READINESS

In this section, we address the extent of commitment and resource support given by managers of an organisation to adopt e-procurement system.

Please indicate with an 'X': **Management Readiness in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
Management is interested in the adoption of e-procurement system.	☐	☐	☐	☐	☐
Management has effectively communicated its support for e-procurement adoption to employees.	☐	☐	☐	☐	☐
Management is committed to the adoption of e-procurement system within an organisation.	☐	☐	☐	☐	☐
Management is willing to take risks involved with the adoption of e-procurement system.	☐	☐	☐	☐	☐
Management is willing to invest funds to adopt e-procurement system.	☐	☐	☐	☐	☐

B. TECHNOLOGY READINESS

In this section, we address the extent to which technological resources influence the adoption of e-procurement system.

Please indicate with an 'X': **Technology Readiness in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
E-procurement adoption is compatible with our current information technology infrastructure.	☐	☐	☐	☐	☐
Our organization has technical experts.	☐	☐	☐	☐	☐
Our organization has computers.	☐	☐	☐	☐	☐
Our organization has networking and IT infrastructure.	☐	☐	☐	☐	☐
Our organization has software security measures.	☐	☐	☐	☐	☐

C. POTENTIAL BARRIERS

In this section, we address the factors that impede the successful adoption of e-procurement system.

Please indicate with an 'X': **Potential barriers in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
Lack of knowledge about e-procurement system.	☐	☐	☐	☐	☐
Insufficient financial support.	☐	☐	☐	☐	☐
Internet security concerns.	☐	☐	☐	☐	☐
Lack of management support and commitment.	☐	☐	☐	☐	☐
Fear of change to a new system.	☐	☐	☐	☐	☐

D. POTENTIAL BENEFITS

In this section, we address the degree to which e-procurement adoption is perceived by your organisation as being beneficial.

Please indicate with an 'X': **Potential benefits in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
E-procurement improves competitive advantage.	☐	☐	☐	☐	☐
E-procurement reduces operation costs.	☐	☐	☐	☐	☐
E-procurement improves contract compliance.	☐	☐	☐	☐	☐
E-procurement improves access to information.	☐	☐	☐	☐	☐
E-procurement improves communication between stakeholders.	☐	☐	☐	☐	☐

E. CRITICAL SUCCESS FACTORS

In this section, we address the critical success factors in adopting e-procurement system.

Please indicate with an 'X': **Critical success factors in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
Centralized control and management of e-procurement initiatives.	☐	☐	☐	☐	☐
Communication between participants.	☐	☐	☐	☐	☐
Enhanced content management.	☐	☐	☐	☐	☐
Management involvement and support.	☐	☐	☐	☐	☐
Involvement of stakeholders.	☐	☐	☐	☐	☐

F. PERCEIVED ORGANISATIONAL PERFORMANCE

In this section, we address the extent to which e-procurement adoption can improve the performance of an organisation.

Please indicate with an 'X': **Perceived organisational performance in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
Successful e-procurement adoption can improve short term organizational performance.	☐	☐	☐	☐	☐
Successful e-procurement adoption can improve long term organizational performance.	☐	☐	☐	☐	☐
Successful e-procurement adoption can improve cost performance in organization.	☐	☐	☐	☐	☐
Successful e-procurement adoption can improve organization competitiveness.	☐	☐	☐	☐	☐
Successful e-procurement adoption can improve strategic alliance and networking.	☐	☐	☐	☐	☐

Appendix 2 Pilot study Results

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR00001	77.3000	156.233	.214	.746
VAR00002	77.3000	156.233	.214	.746
VAR00003	77.3000	151.122	.284	.742
VAR00004	77.7000	149.567	.505	.732
VAR00005	77.3000	151.122	.284	.742
VAR00006	77.7000	149.567	.505	.732
VAR00007	77.3000	156.233	.214	.746
VAR00008	77.3000	156.233	.214	.746
VAR00009	77.3000	156.233	.214	.746
VAR00010	77.3000	151.122	.284	.742
VAR00011	77.7000	149.567	.505	.732
VAR00012	77.3000	151.122	.284	.742
VAR00013	77.7000	149.567	.505	.732
VAR00014	77.3000	156.233	.214	.746
VAR00015	77.3000	156.233	.214	.746
VAR00016	77.3000	156.233	.214	.746
VAR00017	77.3000	151.122	.284	.742
VAR00018	77.7000	149.567	.505	.732
VAR00019	77.3000	151.122	.284	.742
VAR00020	77.7000	149.567	.505	.732
VAR00021	77.3000	156.233	.214	.746
VAR00022	77.3000	156.233	.214	.746
VAR00023	77.3000	156.233	.214	.746
VAR00024	77.3000	151.122	.284	.742
VAR00025	77.7000	149.567	.505	.732
VAR00026	77.3000	151.122	.284	.742
VAR00027	77.7000	149.567	.505	.732
VAR00028	77.3000	156.233	.214	.746
VAR00029	75.4000	172.044	-.477	.768
VAR00030	77.0000	178.444	-.487	.783

Appendix 3 Sample answered email-based questionnaire



TOPIC: E-procurement adoption in Botswana construction companies: An exploratory assessment using regression analysis to empirically test a conceptual model

This survey is conducted to understand the factors that influence the adoption of e-procurement system among construction companies.

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Kindly complete the questions below.

G. ABOUT THE ORGANISATION

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- ☐ Mechanical and Electrical engineering

A2. What is your present job position in your organisation?

- ☒ Executive manager
- ☐ Project manager
- ☐ Quantity surveyor

A3. How long have you been with the organisation?

- ☒ Less than 5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ 20+ years

A4. Is your organisation using an e-procurement system?

- ☒ Yes
- ☐ No

H. MANAGEMENT READINESS

In this section, we address the extent of commitment and resource support given by managers of an organization to adopt e-procurement system.

Please indicate with an 'X': **Management Readiness in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
Management is interested in the adoption of e-procurement system.	☐	☐	☐	☐	☒
Management has effectively communicated its support for e-procurement adoption to employees.	☐	☐	☐	☐	☒
Management is committed to the adoption of e-procurement system within an organization.	☐	☐	☐	☐	☒
Management is willing to take risks involved with the adoption of e-procurement system.	☐	☐	☐	☐	☒
Management is willing to invest funds to adopt e-procurement system.	☐	☐	☐	☐	☒

I. TECHNOLOGY READINESS

In this section, we address the extent to which technological resources influence the adoption of e-procurement system.

Please indicate with an 'X': **Technology Readiness in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).**

Factor	1	2	3	4	5
E-procurement adoption is compatible with our current information technology infrastructure.	☐	☐	☐	☐	☒
Our organization has technical experts.	☐	☐	☒	☐	☐
Our organization has computers.	☐	☐	☐	☐	☒
Our organization has networking and IT infrastructure.	☐	☐	☐	☐	☒
Our organization has software security measures.	☐	☐	☒	☐	☐

J. POTENTIAL BARRIERS

In this section, we address the factors that impede the successful adoption of e-procurement system.

Please indicate with an 'X': Potential barriers in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).

Factor	1	2	3	4	5
Lack of knowledge about e-procurement system.	☐	☐	☐	☐	☒
Insufficient financial support.	☐	☐	☒	☐	☐
Internet security concerns.	☐	☐	☒	☐	☐
Lack of management support and commitment.	☐	☒	☐	☐	☐
Fear of change to a new system.	☐	☐	☐	☒	☐

K. POTENTIAL BENEFITS

In this section, we address the degree to which e-procurement adoption is perceived by your organisation as being beneficial.

Please indicate with an 'X': Potential benefits in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).

Factor	1	2	3	4	5
E-procurement improves competitive advantage.	☐	☐	☐	☐	☒
E-procurement reduces operation costs.	☐	☐	☐	☐	☒
E-procurement improves contract compliance.	☐	☐	☐	☐	☒
E-procurement improves access to information.	☐	☐	☐	☐	☒
E-procurement improves communication between stakeholders.	☐	☐	☐	☐	☒

L. CRITICAL SUCCESS FACTORS

In this section, we address the critical success factors in adopting e-procurement system. Please indicate with an 'X': Critical success factors in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).

Factor	1	2	3	4	5
Centralized control and management of e-procurement initiatives.	☐	☐	☐	☐	☒
Communication between participants.	☐	☐	☐	☐	☒
Enhanced content management.	☐	☐	☐	☐	☒
Management involvement and support.	☐	☐	☐	☐	☒
Involvement of stakeholders.	☐	☐	☐	☐	☒

M. PERCEIVED ORGANISATIONAL PERFORMANCE

In this section, we address the extent to which e-procurement adoption can improve the performance of an organization.

Please indicate with an 'X': Perceived organizational performance in adopting e-procurement system ranking them from (1-strongly disagree, 2-disagree 3-Uncertain, 4-Agree, 5-Strongly agree).

Factor	1	2	3	4	5
Successful e-procurement adoption can improve short term organizational performance.	☐	☐	☐	☐	☒
Successful e-procurement adoption can improve long term organizational performance.	☐	☐	☐	☐	☒
Successful e-procurement adoption can improve cost performance in an organization.	☐	☐	☐	☐	☒
Successful e-procurement adoption can improve organization competitiveness.	☐	☐	☐	☐	☒
Successful e-procurement adoption can improve strategic alliance and networking.	☐	☐	☐	☐	☒