

UNIVERSITY OF SOUTHERN QUEENSLAND



**THE POTENTIAL OF PUBLIC
E-PROCUREMENT TECHNOLOGY TO
REDUCE CORRUPTION IN PUBLIC
PROCUREMENT**

A Dissertation submitted by

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ABSTRACT

Public procurement, which accounts for almost 10 to 15 percent of Gross Domestic Product (GDP) in developed countries and almost 20 percent or more of GDP in developing countries, can be a mean for any governments to encourage broader reforms in terms of economic, technological, and social infrastructure improvements. Further, it can be a central instrument to assist in the efficient management of public resources. Corruption has hindered the desired efficiency in procurement process.

Corruption in public procurement is an international issue that is recognised by many government institutions and international organisations including the World Bank, United Nations (UN), Asian Development Bank (ADB), Organization for Economic Co-operation and Development (OECD), Transparency International (TI). It is a threat to economic and human development in all countries and is believed to be increasing at alarming rates, especially in developing countries. Public procurement processes go through different stages including project planning, product design and documentation, tender process, contract award, and accounting and auditing and each stage has a risk of corruption. Several governments have adopted Information and Communication Technologies (ICTs) as a tool to enhance transparency and accountability in the procurement process. The public e-procurement technology, one of the ICT tools, is seen as an essential tool for a sincere attempt to reform the government public procurement processes as well as to reduce the chances of corruption. In addition, it has other numerous perceived benefits that include increasing transparency and accountability, standardising and monitoring, enhancing fair competition amongst bidders, avoiding human interference, reducing human errors and personal discretion in purchasing decision, and maximising value for money.

Nepal is one of the most corrupt counties in South Asia according to Transparency International. Corruption in public procurement is a serious problem in Nepal where the process of awarding public contracts and tenders can be perverted by government officials and is subject to interference. Potential contractors (bidders) are believed to have also used their coercive power to win contracts. Government officers and bidders are involved directly or indirectly and advance their own personal interests.

In this regard, the government of Nepal introduced a public e-procurement to enhance transparency and accountability in public procurement.

In this backdrop, the main objective of this study is to explore perceptions on the potential of e-procurement to reduce corruption in public procurement, which is followed by the main research question, “*which factors are associated with the intent to adopt e-procurement technology as an anti-corruption technology?*”

This study employed the positivist paradigm to examine the intent to adopt e-procurement technology in government and to explore the potential of the technology to reduce corruption in government procurement. The population was drawn from the government departments and its registered bidders in Nepal. A field questionnaire survey was conducted to collect the quantitative data and the study used a convenience sampling approach as determined by the level of interest shown by the participants to respond to the survey. In the end, 46 government officers from seven government departments, and 220 government registered bidders responded by completing a questionnaire. The hypotheses were tested and results were analysed using the Partial Least Squares Path Modelling (PLS-PM) approach for government officer sample data and Structural Equation Modeling (SEM) approach for bidders sample data.

This study reviewed several theories and identified three theories including: Principal-Agent theory, Technology Acceptance Model, and Transaction Cost Theory being most relevant to anti-corruption studies. This study identified seven important anti-corruption constructs including: information asymmetry, monopoly power, trust, perceived usefulness, perceived ease of use, transaction cost, and transparency and accountability and one dependent construct: intent to adopt public e-procurement. This study developed a research model based on a review of three theories and seven anti-corruption factors linking to anti-corruption technologies. The research model was developed based on two stakeholder’s perceptions: those of government officers and government-registered bidders from Nepal.

The statistical results confirmed that the study model was valid and the results suggested that seven anti-corruptions construct were antecedents towards intent to adopt public e-procurement in terms of the perceptions of government officers. The results from the PLS-PM model for government sample data showed that the model explained 89% of the variations of intent to adopt e-procurement. The seven variables significantly influencing intent to adopt e-procurement were 'information asymmetry', 'monopoly power', 'trust', 'perceived usefulness', 'perceived ease of use', 'transaction cost', 'transparency and accountability'. Conversely, five variables were significant to the intent to adopt e-procurement on the perceptions of government registered bidders 'information asymmetry', 'monopoly power', 'perceived ease of use', 'transaction cost', 'transparency, and accountability'. Analysis of the results from the structural equation modeling (SEM) for bidder's sample data indicated that the model explained 57 % of variation of intent to adopt e-procurement. The overall results supported the proposed research model to evaluate the perceptions of the potential of e-procurement to reduce corruption in public procurement.

Overall, these research findings provide a clear guideline for developed and emerging countries with regards to adopting e-procurement technology for the purposes of reducing corruption in public procurement. This study demonstrated a high level of intent to adopt e-procurement having a positive and significant effect on reducing corruption in procurement that may help officials in the governments of emerging countries decide to tackle procurement reform. The main contribution of this study is that it provides a new body of scientific knowledge for governments, practitioners, policy makers, and international organisations (UN, WB, ADB, OECD, and TI) in their endeavours to combat corruption in government procurement processes.

CERTIFICATION OF DISSERTATION

I certify that the ideas, research works, results, analyses and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for another award, except where otherwise acknowledged.

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ABBREVIATIONS

ADB	Asian Development Bank
AGFI	Adjusted Goodness of Fit Index
ASV	Average Shared Variance
AVE	Average Variance Extracted
B2B	Business to Business
B2C	Business to Customer
CFA	Confirmatory Factor Analysis
CPI	Corruption Perception Index
CR	Composite Reliability
DOI	Diffusion of Innovation
DOR	Department of Road
e-Contract Management	Electronic Contract Management
EDS	Emerging and Developing Economics
e-government	Electronic Government
e-Informing	Electronic Informing
e-Intelligent	Electronic Intelligent
e-Markets	Electronic Markets
e-MRO	Electronic Maintenance Resource Planning
e-Ordering	Electronic Ordering
e-Procurement	Electronic Procurement
e-Reverse Auctioning	Electronic Reverse Auctioning
e-Sourcing	Electronic Sourcing
e-Submission	Electronic Submission
e-Tendering	Electronic Tendering
FCAN	Federation of Contractors Association of Nepal
G2C	Government to Customer
G2G	Government to Government
GDP	Gross Domestic Product
GEPSON	Government Electronic Procurement System of Nepal
GFI	Goodness of Fit Index
GTN	Global Trade Negotiations

IA	Information Asymmetry
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
LCD	Least Developed Countries
MP	Monopoly Power
MSV	Maximum Shared Variance
NFI	Normed Fit Index
OECD	Organisation for Economic Co-operation and Development
PCLOSE	Closeness of Fit
PEU	Perceived Ease of Use
PLS-PM	Partial Least Squares Path Modelling
PLS-SEM	Partial Least Squares Structural Equation Modeling
PPMO	Public Procurement Monitoring Office
PPP	Public Procurement Processes
PU	Perceived Usefulness
R^2	Coefficient of Determination
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
TA	Transparency and Accountability
TAM	Technology Acceptance Model
TC	Transaction Cost
UN	United Nations
UNDP	United Nations Development Programme
UNODC	United Nations Office on Drugs and Crime
UNOPS	United Nations Office for Project Services
WB	World Bank
χ^2	Chi-square

LIST OF PUBLICATIONS ARISING FROM THE RESEARCH

List of Refereed Book Chapters:

1. **Neupane, A.** Soar, J. and Vaidya K. 2014, *Anti-corruption capabilities of public e-procurement technologies: Principal-agent theory*, In Joseph Kelvin Bwalya, (ed.) *Technology Development and Platform Enhancements for Successful Global E-Government Design*, IGI Publishing (IGI Global), Hershey, PA. United States.
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List of Refereed International Journal Papers:

3. **Neupane, A.**, Soar J., and Vaidya K. 2014, 'An empirical evaluation of the potential of e-procurement to reduce corruption', *Australasian Journal of Information Systems (AJIS)*, vol. 18, no. 2, pp. 21-44.
4. **Neupane, A.**, Soar, J. and Vaidya K. 2012, 'Perceived benefits related to anti-corruption from e-tendering system in Nepal', *Asian Journal of Information Technology*, vol. 11, no.1, pp. 22-29.
5. **Neupane, A.**, Soar J., and Vaidya K. 2012, 'The potential of e-procurement technology for reducing corruption', *International Journal of Information Technology and Management*, vol. 11, no. 4, pp. 273-287.
6. **Neupane, A.**, Soar J., and Vaidya K. 2012, 'Evaluating the anti-corruption capabilities of public e-procurement in developing country', *The Electronic Journal of Information Systems in Developing Countries*, vol. 55, no. 2, p. 1-17.
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procurement'. In: *5th International Public Procurement Conference (IPPC5)*, 17-19 August 2012, Seattle, United States.

10. Vaidya K., **Neupane A.** 2011, 'The potential of electronic procurement and other tools to combat corruption in public procurement in Nepal', *NRN Australia* 51-61 South Street Granville NSW 2142, 16th July 2011.
11. **Neupane, A.**, Vaidya, K. & Soar, J. 2011, 'The potential of public e-procurement technology to combat corruption: (An experience from developing and developed countries)', *5th International conference on "Information and Communication Technology (ICT) for Development and Education*, Kathmandu, Nepal, November 16-17.

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2. 5th International Public Procurement Conference, Seattle, United States 17-19 August 2012
3. 5th International ICT for Development Conference, Kathmandu 16-17 November 2011 (Skype)

CHAPTER ONE

INTRODUCTION

1.1. Chapter Overview

This Chapter provides the foundation of the dissertation. It begins with an overview of three important key terms which include public procurement, corruption in public procurement, and public e-procurement. The research problem is stated and research questions are provided. The significance of the research is discussed and justified. Research key terms and their uses are provided and an overview of research methodology is discussed. Finally, the contribution of the research is stated and the structure of dissertation is outlined.

A brief graphical layout of the structure of this Chapter is shown in figure 1.1.

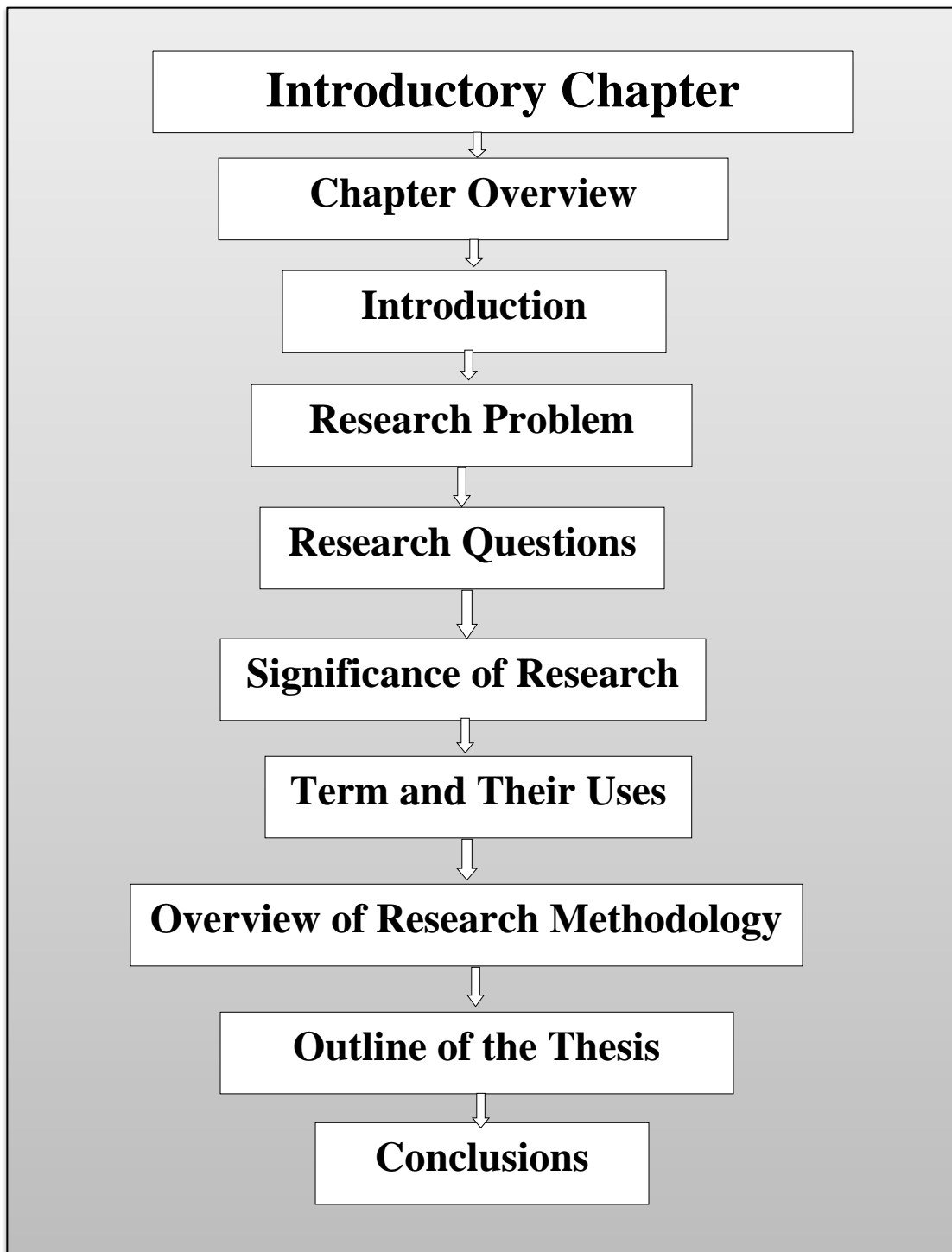


Figure 1.1 Chapter 1 overview

1.2. Introduction

Public procurement is the process of acquiring of goods, services, works, and other supplies on the behalf of public institutions. Vaidya, Callender & Sajeev (2009, p. 474) stated “*governments aspire to use public procurement as a lever of economic, technological or social reform*”. Burton (2005) argued that public procurement is a central instrument to assist in the efficient management of public resources. It supports the work of government and can cover acquisition of items ranging from stationery, temporary office staff, furniture, to complex and high cost areas such as construction, private finance initiative projects, aircraft carriers, and other private financial initiative projects. The United Nations (UN) (1999) report demonstrates that public procurement is a government business system which is concerned about the government procurement process such as preparing project specifications, requesting, receiving and evaluating bids, awarding contracts, and payments. Procurement covers strategy, storage, distribution, contract monitoring, and supplier management. According to Ban Ki-moon (2010) the Secretary General of the United Nations: “*By providing business opportunities to a wider ranges of companies in all countries, procurement can help build strong economies and well-functioning communities*” (UNOPS 2010).

Every year, governments spend trillions of dollars on goods and services, information and communication technology, and construction according to their budgeting processes. Public procurement accounts for almost 10 to 15% of Gross Domestic Product (GDP) in developed countries and almost 20% of GDP in developing countries (GTN 2003). Public procurement of goods and services accounts for a considerable proportion of a country’s expenditure, and in some developing nations, may be as much as 70% (UNDP 2006). Thus, it is a powerful driver of the development of the country (UNOPS 2012).

The term ‘corruption’ is defined by the World Bank (2000) and Transparency International (2006) as “*the misuse of public office for private gain*”. The United Nations Development Programme (2008) defined corruption as the misuse of entrusted power for private gain. The act of corruption can take many forms, including bribery, embezzlement, theft, extortion, abuse of discretion, favouritism, exploiting conflict, interests, and improper political contributions (UNODC 2004). Corruption distorts resource allocation and government performance. It is widely recognised that corruption can severely impede development by weakening national institutions, raising business costs, discouraging domestic investments, eroding trust, and generating a perverse incentive system (Lio,Liu & Ou 2011). Corruption increases operation costs and reduces competition in procurement processes (Amaral,Saussier & Yvrande-Billon 2009).

Corruption is an international issue and is a threat to economic and human development of all countries. International reports from organisations such as the World Bank, the United Nations (UN), Transparency International, and the Asian Development Bank (ADB) demonstrate that corruption in developing countries is at comparatively higher level than in more developed countries (ADB 2007). There are a number of different factors that influence the misuse of public office for private gain such as history, culture, economic development, political institutions, and public policies of the country (Treisman 1999). Corruption, especially in the least developed

countries (LDC) and emerging and developing economies (EDS), is considered to be very serious and at an alarming stage (Iqbal & Seo 2008; Kumar et al. 2007). The annual value of bribes paid worldwide is US \$1 trillion (WB 2004). The cost of corruption equals more than 5% GDP (US \$2.6 trillion) with over US\$1 trillion paid in bribes each year (WEF 2010). This is considered a conservative estimate of actual bribes paid worldwide in both developed and developing countries (WBI 2004).

Electronic procurement can be defined as the use of Information and Communication Technology (ICT) such as the Internet or web-based systems designed to facilitate the acquisition of goods and services by the government or by private institutions (Davila, Gupta & Palmer 2003). It has played a significant role in the successful management of public resources (Mahmood 2010), and most importantly to better enhance the transparency and accountability of government procurement (Croom & Brandon-Jones 2005; Panda, Sahu & Gupta 2010; Vaidya, Sajeew & Callender 2006). For the purpose of this study public e-procurement has been defined as “*the use of any Internet based inter-organizational information systems which automates and integrate any parts of procurement process in order to improve efficiency, transparency, and accountability in the wider public sector*” (Vaidya 2007). The Internet is typically used for providing comprehensive information about bidding at a single web portal that can be accessed by the government and all the registered potential bidders. Reducing corruption in government procurement process is a key component of the agenda for the governments around the world (Henriksen & Andersen 2003). In recent years, the countries of Asia and the Pacific have increasingly adopted ICT systems in order to enhance government services and business transaction (Wescott 2001). Vaidya and Hyde (2011) suggested that e-procurement has been popular in advanced countries like Australia, United Kingdom, and United States as well as in emerging economies including China, India, Mexico, South Korea, and Brazil which are implementing e-procurement initiatives. It is seen as an effective way to better support transparency and accountability (Joongi 2006).

1.3. Research Problem

Corruption is an international issue that is recognised by many government institutions and other international organisations including the World Bank, UN, ADB, Organisation for Economic Co-operation and Development (OECD) and is a threat to economic and human development for all countries. It is important to note that public procurement is a major function of the government and corruption is the most common problem in the public procurement process (Thai 2001). In public procurement process, different actors are involving who take decision based on their own interests rather than a public benefits. Some of key actors involved in procurement process include public officials (who are responsible for procurement and public contract management), politicians (who are influence the decisions at planning, policy, and contracting stages), bidders (who are involved in competing for and delivering on contracts), and others parties such as financial institutions that facilitate corruption by processing the illicitly acquired funds (TI 2010).

Corruption in public procurement is flourishing in many developing countries given a range of factors including lack of political control, lack of transparency and accountability, and weak professionalism of the bureaucracy. Lio, Liu and Ou (2011) and Raymond (2008) pointed out that corruption can hinder the development of any

country by weakening national institutions, increasing business costs, eroding trust, and discouraging external investment.

The basic principle of public procurement is to acquire the right item at the right time, and at the right price. Developing countries are more vulnerable to fraud and corruption during this process and therefore, there is a need for a procurement process that is more transparent and accountable. There are many related aspects of corruption such as unjustified or hidden procurement planning, lack of assessment, political pressure, lack of monitoring capacity, inconsistent cost estimates, and weak professionalisation of the bureaucracy of the country (Del Monte & Papagni 2007; Kolstad & Wiig 2009; Neupane, Soar, et al. 2012; Pellegrini & Gerlagh 2008; Subedi 2006; Ware et al. 2012).

The public procurement process has different phases and each phase provides certain room for corruption. The three main phases of the public procurement process have been illustrated by Matechak (2002), these are: procurement planning and budgeting, procurement solicitation, and contract award and performance. Szymanski (2007) proposed five stages for setting up structures to fight corruption in public procurement, and these are: procurement planning and needs assessments, product design and document preparation, tender processes, contract award and implementation, and accounting and audit. Szymanski (2007) identified the most vulnerable areas for corruption that need attention as: project specification, bid evaluation, and sub-contracting and suggested that the major risks for corruption arise from a lack of transparency, limited access to information, a lack of accountability and a lack of control at each stage of the public procurement process.

Tendering and awarding of contracts is two major areas considered to be most vulnerable in the procurement process for developing countries (Mc Pheraon & Mac Searraigh 2007). It is also the main problem in Nepal because most of the government contracting process is done through a paper based-based system. Due to the traditional paper-based system, there is potential to avoid rule of law for securing contracts (Bhattarai 2011). The tendency is that the potential contractors who use their coercive power, get the contract in some situations, other contractor are simply not able to submit tender document because of the perceived coercive threatening from other influential contractors. In Nepal, it is believed that large contractors can engage “thugs” and use physical force to discourage competition and intimidate officials to secure the contract (Bhattarai 2011). Bidders often form a cartel by which they try to manipulate the decision to award a contract to one of their own members at the expense of other bidders either with or without the involvement of a corrupt government official (Asis et al. 2002). Furthermore, government officers are also involved indirectly and abuse their official power for their private benefits for example, by assigning public contracts and/or tenders to favoured contractors or bidders, or accepting a bribe in exchange for granting a tender (OECD 2010). In some instances, government officials create shortages of goods and services in the market in order to create opportunities for bribery. This eventually leads to institutional corruption in public procurement where the parties with vested interest have opportunities to play their roles in public procurement for their own benefits.

To overcome this serious problem of corruption in public procurement in Nepal and other countries, ICT can be used as one of the anti-corruption strategies by

promoting good governance, enhancing relationships between government employee and citizens tracking of activities, monitoring and controlling the government employee and reducing potential aspects of corrupt behaviours (Bertot, Jaeger & Grimes 2010b) .

ICT enabled technology such as public e-procurement can be an important tool to help reduce corruption in public procurement process (OECD 2008). According to the Asian Development Bank/OECD (2008, p. 129) “*public e-procurement plays an important role for minimising corruption in public procurement*”. E-procurement has other numerous benefits include standardising and monitoring the public procurement, increasing transparency, reducing personal discretion in purchasing decisions, enhancing fair competition amongst bidders, avoiding human interference, and maximising value for money. Further study is necessary to address the corruption issues in developing countries and intent to adopt public e-procurement is the best way of reducing corruption rate that leads to increase in transparency and accountability.

1.4. Research Objectives and Questions

The main objective of this study is to explore perceptions of the potential of e-procurement to reduce corruption in public procurement. Specific objectives are as follows:

- ❖ To evaluate the bidder’s willingness to participate in public e-procurement system
- ❖ To evaluate the government officer’s willingness to participate in public e-procurement system

To achieve above objectives, the following research questions are identified for this research.

Main research question (RQ):

Which factors are associated with the intent to adopt e-procurement technology as an anti-corruption technology? In particular:

- ❖ Is a higher level of perceived ease of use positively related to the willingness to adopt e-procurement as an anti-corruption technology?
- ❖ Is a higher level of perceived usefulness positively related to the willingness to adopt e-procurement as an anti-corruption technology?
- ❖ Is a higher level of perceived trust positively related to the willingness to adopt e-procurement as an anti-corruption technology?
- ❖ Is a lower level of perceived monopoly of power related to the willingness to adopt e-procurement as a form of anti-corruption technology?
- ❖ Is a lower level of perceived information asymmetry related to the willingness to adopt e-procurement as a form of anti-corruption technology?
- ❖ Is a lower level of perceived transaction cost related to the willingness to adopt e-procurement as a form of anti-corruption technology?
- ❖ Is a higher level of perceived transparency and accountability related to the user’s willingness to adopt e-procurement as a form of anti-corruption technology?

1.5. Significance of the Research

There is a plethora of studies on e-procurement system performance benefits (Brun et al. 2010; Chang, Wang & Chiu 2008; Croom & Brandon-Jones 2007; Gunasekaran & Ngai 2008; Ho et al. 2008; Vaidyanathan & Devaraj 2008) that help to identify different key factors of better performance of public or private organisations including perceived direct benefits of e-procurement (Brandon-Jones & Carey 2011; Mitchell 2000; Panayiotou, Gayialis & Tatsiopoulou 2004), perceived indirect benefits of e-procurement (Gunasekaran et al. 2009), perceived cost, firm size, top management support, information sharing culture, business partner influences (Teo, Lin & Lai 2009). Eei, Husain and Mustaffa (2012) pointed out e-procurement's tangible and intangible benefits and they highlighted paybacks such as enhanced efficiency and effectiveness in an organisation through reductions in costs and procurement process cycle times, increased transparency in contracts and overall competitiveness.

E-procurement has been recognised as a core application in e-commerce/e-government (Ronchi et al. 2010). Research on combating corruption or anti-corruption includes: E-government as an anti-corruption tool (Andersen 2008), e-government for improved public sector service delivery in India, Ethiopia and Fiji (Singh et al. 2010), applying E-government Information System for Anti-corruption strategies (Zhang & Zhang 2009), e-government, Transparency and Anti-corruption (Fan, Zhang & Yue 2009), anticorruption effects of information communication and technology and social capital (Shim & Eom 2009), using ICT to combat corruption tools, methods and results (Gronlund et al. 2010), and an institutional analysis of an e-government system for anti-corruption: the case of Online Procedures Enhancement for civil application (OPEN) (Kim, Kim & Lee 2009). According to Kin et al. (2009) study results indicate that the OPEN system made a positive impact in terms of a reduction of corruption within the Seoul Metropolitan Government. Studies regarding public procurement and corruption (Auriol 2006; Lindskog, Brege & Brehmer 2010; Mahmood 2010) indicate that the quality of public administration must be improved and made accountable.

E-procurement may be a more powerful tool than more conventional methods for the minimisation of corruption. It can improve the transparency and integrity of public service processes such as tendering, sourcing, ordering, and auctioning. E-procurement has been recognised internationally as an important instrument for checking corruption and misuse of power (Sohail & Cavill 2008). E-procurement systems implemented in Korea and Mexico are good examples that demonstrate how the innovative use of information technology can prevent and control corruption in public procurement (OECD 2005). Intent to adopt e-procurement systems may help all countries improve transparency, efficiency, and decision-making, reduce cost, monitor supplier performance, and also improve service quality and so on.

The above-mentioned factors suggest that e-procurement is a recent topic and offers great opportunities for leading-edge research. This research may especially help the least developed countries to enhance transparency and efficiency in government work and services as well as in combating corruption. International organisations have identified corruption as a critical issue for developing countries and ICT is seen as a key approach to reduce its incidence and impact (ADB 2007). It is expected that

the finding of this research will be of a great interest and use for government departments that provide public services and for international organisations such as the United Nations, Transparency International, World Bank, Asian Development Bank, Organisation for Economic Co-operation and Development. This research may offer a model for developing countries to assist in reducing corruption through ICT tools.

1.6. Terms and Their Uses

Information Systems: Information Systems (IS) is defined as any organised combination of people, hardware, software, communications networks, data resources, policies, and procedures that store, retrieves, and disseminate information in an organisation (O'Brien & Marakas 2010).

Public Procurement: Public procurement is the process of acquiring of goods, services, works, and other supplies on the behalf of public institutions.

Procurement Processes: Procurement processes is the process of procurement project planning, project design and implementation, tender processes, contract award, and accounting and auditing (Szymanski 2007).

Public e-procurement: Public e-procurement has been defining as inter-organisational information systems, which automates any part of procurement processes in order to improve efficiency, quality, and transparency in government procurement (Vaidya 2007) .

Electronic Government Procurement (e-GP): Electronic government procurement is defined as the use of information technology systems (Internet or any Internet networks), used by governments in order to obtain works, goods and services and consulting services and also manage their relationship with suppliers or contractors (Schapper,Rivolta & Leipold 2005).

E-commerce: E-commerce is defined as very broadly as the online exchange of goods, services, and money among firms, between firms and their customers, and between customers (Valacich,Schneider & Jessup 2010).

Trust: Trust is an important key facilitator of e-commerce (Kartiwi 2006). It builds a good atmosphere between government and bidders in the contracting processes.

Perceived Usefulness and Ease of Use: Perceived usefulness and perceived ease of use is to determine the use behaviour, attitudes, and intensions as it relates to the adoption of any applications or technology (Davis 1989).

Monopoly Power: Monopoly power is one of the important terms in public procurement and it identifies the power of government officers in the provision of goods and services.

Information Asymmetry: Information asymmetry is another key terms of public e-procurement and it arises in the public contract when the public officers have more information than contractors or bidders or vice versa.

Intent to adopt: Intent to adopt is influenced by three factors: perceived benefits of e-procurement, external pressure, and technological readiness. In the developing countries, adoption of e-procurement is in preliminary stage and some of the government already implements and others are in wait and see condition (Vaidya et al. 2006).

1.7. Overview of Research Methodology

A field survey questionnaire was used to collect data. The target sample population of this study were from Nepalese government departments and their registered bidders. The selecting government departments were the Department of Road (DOR), Nepal Electric Authority, Department of Urban Development and Building Construction, Department of Local Infrastructure Development of Agricultural Road, Roads Board Nepal, Public Procurement Monitoring Office, and Department of Water Induced Disaster Prevention. Study was selected 20 government officers and 25 registered bidders for pilot study. Based on the first phase responses, all the questionnaire items were tested for validity and reliability. The final revised questionnaires were used to collect data from 46 government officers and 220 from government registered bidders. The collected data were analysed quantitatively using Partial Least Squares Structural Model (PLS-SEM) SmartPLS 2.0, Structural Equation Modeling (SEM) AMOS 21.0, and SPSS version 19.0. PLS-SEM approach was used to analyse government officers sample data and SEM was used to analyse the bidders sample data. SPSS was used for statistical analysis including descriptive statistics, t-statistics, and Cronbach's alpha for both sample.

1.8. Contribution of the Research

This research will provide new knowledge field of research. The adoption of public e-procurement in government is expected to help both developed and developing countries in enhancing accountability, effectiveness, transparency in public procurement, improving civil servants knowledge, and in reducing time and cost of the procurement. The literature has identified major risks of corruption in public procurement processes.

This study examined the risk of corruption between the principal (government), agents (bidders) based on Principal-Agent Theory, Technology Acceptance Model, and Transaction Cost Theory. The anti-corruption capabilities of public e-procurement technology in principal-agent relation and study developed a conceptual model. This model was validated based on government officers and bidders perceptions on practice and uses of public e-procurement through the field survey questionnaires. The findings of this study helped the public procurement practitioners and government level in better understanding the potential of public e-procurement for minimising the risk of corruption.

1.9. Outlines of the Thesis

The thesis is organised into nine chapters. Chapter One provides background information on the study, research problem, research questions, significance of

research, term and their uses, overview of research methodology and the contributions of the research.

Chapter Two reviews a systematic literature on three key terms used in this study: public procurement, corruption, and e-procurement. This Chapter also discusses the different types of public e-procurement technology. Most importantly, it identifies the risk factors within public e-procurement process where the corruption is more likely to take place vulnerable points. This Chapter also provides the additional background on information of public e-procurement in the Nepalese public sector. It also reviews and discussed the corruption issues of Nepal and discusses the impact of public e-procurement in reducing corruption.

Chapter Three reviews of information systems theories linking to anti-corruption to technologies and justified why these theories are important to this research. The Chapter also lays out the theoretical framework of the study. Three theories: Principal-Agent Theory (Eisenhardt 1989; Jensen & Meckling 1976), Technology Acceptance Model (Davis 1989), and Transaction Cost Theory (Williamson 1981) are the theoretical foundation of the study.

Chapter Four identifies and discusses the anti-corruption factors of e-procurement based on the theories. This chapter also presents the study, research model and research hypothesis based on the relationship between the constructs.

Chapter Five discusses the details of research methodology of the study. It describes research philosophy, research method, research sampling, pilot study, final survey instrument, operationalisation of constructs, data analysis approach, and ethical considerations.

Chapter Six covers the various statistical techniques and tools used to analyse the government officer's sample using Partial Least Squares (PLS) SmartPLS 2.0, and SPSS.

Chapter Seven covers analysis of government registered bidder's sample data that is also covers the various statistical techniques and tools using SEM, and SPSS.

Chapter Eight discusses the results of two stakeholders groups: government and bidders perceptions that are demonstrated in Chapter Six and Chapter Seven. This chapter provides the context and justification of the study by comparing both results with similar studies.

Chapter Nine summaries the research contributions, implication of theoretical knowledge, research limitations, and future opportunities of public procurement and e-procurement for reducing corruption.

1.10. Conclusions

This Chapter has laid the foundation of the dissertation. It provides the background information about public procurement, corruption, and e-procurement in practice. The research problem was justified and research questions were identified. The significance of the research and overview of research methodology were briefly

discussed. The key terms and their uses were explained. The contribution of the research was also discussed. The dissertation's structure has been outlined. The Chapter Two reviews the details of the literature on procurement, corruption, e-procurement, and background information of e-procurement in the Nepalese public sector.

CHAPTER TWO

LITERATURE REVIEW

2.1. Chapter Overview

This Chapter reviews the literature on public procurement, corruption in public procurement, public procurement processes, public e-procurement, different countries case examples, and its perceived benefits that influence the intent to adopt public e-procurement decision for government institutions, and other organisations. It presents the literature contributions for both the academic researcher and public procurement practitioner. It includes the risk factors identified in public procurement processes where the corruption is most likely to take place and the vulnerable points. This Chapter also provides additional background of on the intent to adopt public e-procurement in Nepalese public sector organisations.

A brief graphical layout of the structure of the Chapter is shown in figure 2.1.

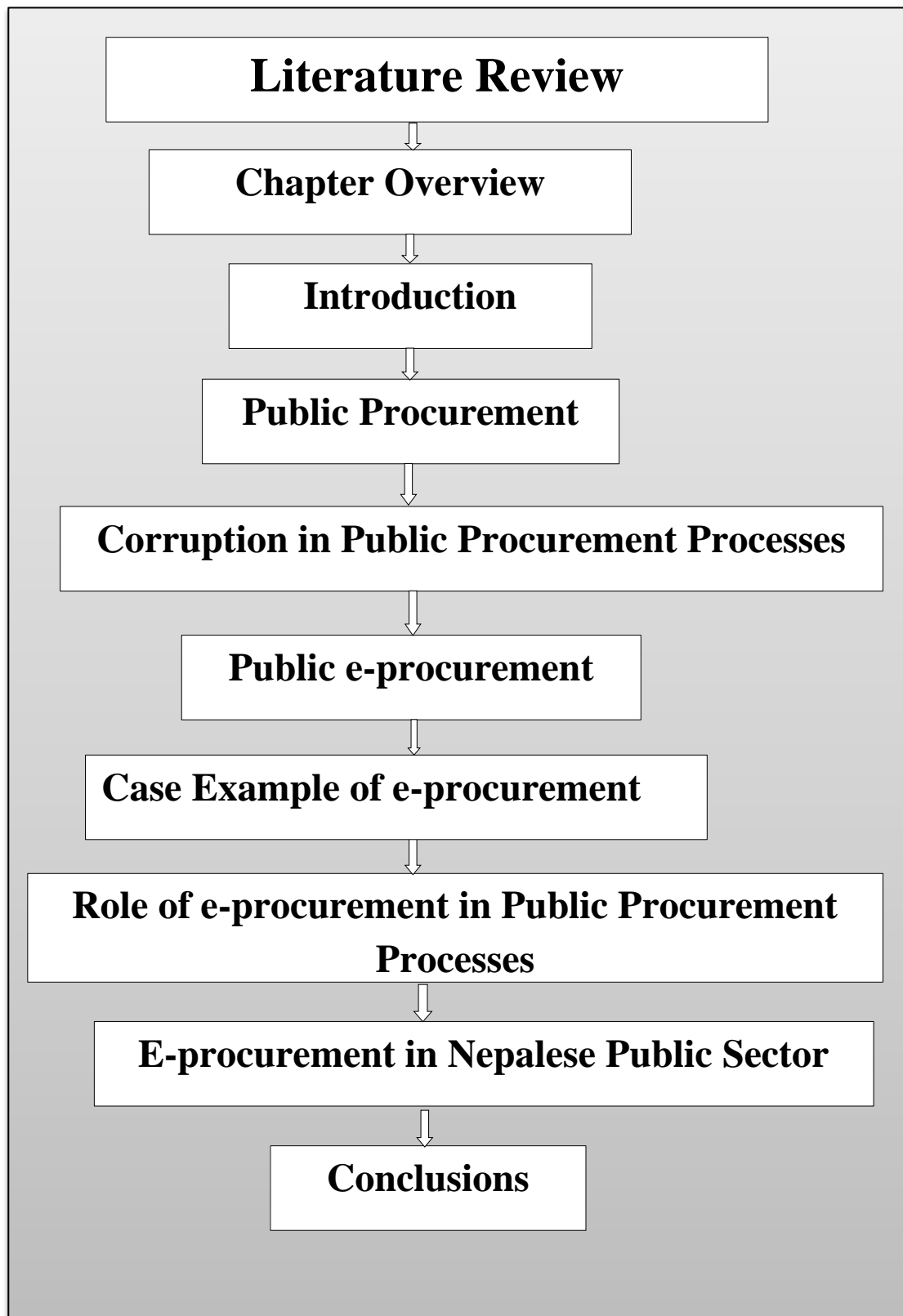


Figure 2.1 Chapter 2 overview

2.2. Introduction

Scholars and leaders in many countries around the world have come to the realisation that the implementation of information and communication technology (ICT) tools such as electronic procurement is an essential to any sincere attempts to reform the government procurement system. Thai (2001) considered that public procurement is a major function of the government, and he argued that government agencies and policy makers, and public procurement professionals, have a great interest in public procurement reforms. Public e-procurement has been a common agenda of many organisations for the promotion of transparency and good governance in procurement processes for many developed and developing nations. Many nations have already implemented and practice public e-procurement for conducting their all the works and services. E-procurement systems have been identified and proven a good system within various government organisations as an effective and prominent tool for institutions' procurement management reforms and establishing a fully transparent and open procurement environment (UN 2011).

2.3. Public Procurement

Public procurement refers to the process whereby public sector organisations acquire goods and services, work and other activities from third parties. Lloyd and McCue (2004, p. 5) defined public procurement as *“buying, purchasing, renting, leasing, or acquiring any supplies, services or construction and also includes all the functions that pertain to obtaining any material, services, constructions or construction services including description of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration”*. Therefore, public procurement is covers all goods, services, and work of the government. Government spends much of their budget on works, goods, and services and can cover acquisition of items example ranging from stationery, temporary office staff, furniture, in complex and high cost areas such as construction, private finance initiative projects, aircraft carriers or support for major change initiatives. In advance procurement covers also strategy, storage, distribution, contract monitoring, and supplier management of the government.

The main objective of the public procurement is: (a) to provide the public accountability, (b) achieve value for money in all public procurement activities, (c) ensure the open, transparent and complaint processes, (c) procurement efficiency, and more consistency, and (d) promote equality of opportunity for all business. Concerning the fact that the main source of government money obtains from the taxpayers, and civil servants are obliged to use the funds in a rational and cost effective manner, with the maximum guarantee the funds will not be misused (Muk et al. 2012). The public wants all the procurement process should be open and transparent as well as to acquire the right item at the right time, and at the right price. In reality, it should not be open and transparent procurement process. There is a great room for corruption.

2.4. Corruption in Public Procurement Processes

Corruption in public procurement process is believed to be rapidly increasing and widespread around the world and is more in developing countries (ADB 2007 ; Iqbal & Seo 2008; Kumar et al. 2007). Poverty and low service salaries can motivate public officials to earn extra income via corruption (Bannon 1999). Other important factors that have driven corruption in public procurement include political instability, lack of transparency and accountability, monitoring and auditing of government works and services, low level of professionalism of the bureaucracy, and a weak separation between the civil society and politics (Del Monte & Papagni 2007; Kolstad & Wiig 2009; Subedi 2006).

Public procurement processes have different phases and each phase has a potential risk for corruption. The three main phases of the public procurement processes were proposed by Matechak (2002): procurement planning and budgeting, procurement solicitation, and contract award and performance. Szymanski (2007) offered five stages for setting up structures to fight corruption in public procurement, these were: procurement planning and needs assessment, product/project design and documentation, tender process, contract award and implementation, and accounting and audit as shown in figure 2.2. Similarly, Ware et al. (2012) viewed procurement as the four stages of project identification and design: advertising, prequalification, bid document preparation, and submission of bids; bid evaluation, post-qualification and award of contract; and contract performance, administration and supervision.



(Source: Szymanski (2007))

Figure 2.2 Public procurement processes

Procurement planning is the first phase of the procurement process used by the government or private companies, which relates to the plan of purchasing activity for specific periods. It is the process of reviewing the existing procurement process, identifying the present and future needs, and an effective way of procuring goods and services (Basheka 2009). Governments want processes that are more transparent and accountable. Different issues such as unjustified or hidden procurement planning, lack of need assessments, political pressure, lack of monitoring capacity of government, inconsistent cost estimates (Ware et al. 2012) have the potential for allowing for corruption in developing countries. In developing countries, there are more opportunities for corruption in the planning phase rather than developed countries. For instance, sometimes the minister, government policy maker, or the

senior officer may plan the unwanted project for their private benefit. They may disclose confidential information; or add extra requirements for the project.

Product design and documentation is the second phase of the public procurement process, which is related to technical specification to the product or project. Sometimes, government officers design the project and technical specification in a favour of a particular supplier. In some cases, they design an unnecessarily complicated tender to hide the corruption.

Tendering and contract awarding is one of the most vulnerable stages of public procurement process where most corruption occurs in developing countries (Mc Pheraon & Mac Searraigh 2007). It is a serious problem in developing countries: in Nepal for example, most of the government contracting processes use paper-based systems, which offer greater potential for corrupt behaviour (Bhattarai 2011). The tendency is that the potential contractors, who use their coercive power, to get the contract. In some situations, other contractors simply are not able to submit tender document because of perceived coercive threatening from other influential contractors. Government officers can be involved indirectly and abuse their official power for their private benefits. This eventually leads to institutional corruption in public procurement where parties with vested interests have opportunities to ‘play’ their roles in public procurement for their own benefits. The accounting and auditing phase is also a vulnerable area for corruption.

Audits are not regularly and systematically performed which makes it harder to detect corruption. Government audit reporting mechanisms are not clear, are dependent, and lack co-operation with other relevant agencies and institution to ensure transparent and effective flow of information for the audit.

2.5. Public E-procurement

2.5.1. Background of Public E-procurement

E-government is quickly becoming one of the important topics among for discussion government officials (Chen 2002) . It can be defined broadly as the use of ICTs in the public sector to improve its operations and delivery of services (Kumar et al. 2007). E-government is about governments interacting, conducting business, and delivering services to their citizens and other organisations electronically through the use of Information and Communication Technology (Pictet & Bollinger 2008). ICT is an enabler in the realisation of e-Government applications that involve Government to Government (G2G), Government to Customer (G2C), Government to Business (G2B), and Business to Customer (B2C) transactions amongst others. These ICT technologies help better delivery of government services to citizens, improved interaction with business and industry, citizen empowerment through access to information, or more efficient government management.

Online procurement (e-procurement) has been identified as the “*most important element of e-business operational excellence for large corporation*” (Barua et al. 2001). Public e-procurement is an inter-organisational information system, which automates any part of the procurement process in order to improve efficiency,

quality, and transparency in government procurement (Vaidya, Sajeew & Gao 2005). Vaidya (2007) defines public e-procurement as follows: “*Public electronic procurement is the use of any Internet-based Inter-organisational Information System, which automates and integrates any parts of the procurement process in order to improve efficiency and quality in procurement, and promote transparency and accountability in the wider public sector*”. Similarly, Agrawal (2007) stated that e-procurement is the value-added application of Internet and e-commerce solutions to facilitate integrate and streamline the entire procurement process, from buyer to supplier and back. Therefore, e-procurement is the part of the ICT revolution that is transforming the way businesses and people conduct their day-to-day activities. According to Davila, Gupta & Palmer (2003) define E-procurement technologies as including the e-procurement software, B2B (Business-to-Business) auctions, B2B market exchange, and purchasing consortia—are focus on automating workflows, consolidating and leveraging organisational spending power, and identifying sourcing opportunities through Internet.

2.5.2. Types of E-procurement Systems

Currently there are different types of e-procurement systems available in the market such as e-Market, e-MRO, e-Sourcing, e-Tendering, e-Ordering, e-Exchange, e-Intelligent, and e-Contract (Chang et al. 2008; Croom 2000; De Boer et al. 2002; Walker & Brammer 2012). Each type of system is built for special purposes and has its own specific functionality and characteristics. Table 2.1 demonstrated the most common types of e-procurement and their explanation.

Table 2.1 Types of e-procurement system

E-procurement system	Description	Authors(S) & Year
e-Informing	Gathering and distributing purchasing information both from and to internal and external parties using Internet technology.	(Boer, Harink & Heijboer 2001; De Boer et al. 2002; Essig & Arnold 2001)
e-Sourcing	Process of identifying new suppliers for specific categories of purchasing requirements using Internet technology.	(De Boer et al. 2002; Fuks, Kawa & Wiczerzycki 2009; Knudsen 2003)
e-Tendering	The process of sending requests for information and prices to suppliers and receiving the response using Internet technology.	(Betts et al. 2010; De Boer et al. 2002)
e-Reverse Auctioning	Internet based reverse auction technology which focuses on the price of the goods and services auctioned.	(Carter et al. 2004; Teich, Wallenius & Wallenius 1999)
e-MRO and Web based Enterprise resource planning (ERP)	The process of creating and approving purchasing requisitions, placing purchase orders and receiving the goods or services ordered via a software system based on Internet technology, e-MRO deals with indirect items (MRO), web-based ERP deals with product-related items.	(Bruno et al. 2005; De Boer et al. 2002; Fink 2006; Gunasekaran et al. 2009)
e-Ordering	The use of Internet to facilitate operational purchasing process, including ordering (requisitioning), order approval, order receipt and payment process.	(Harink 2003; Reunis, Santema & Harink 2006)

E-procurement system	Description	Authors(S) & Year
e-Markets	E-markets are meeting venues for component suppliers and purchasers, who use exchange mechanism to electronically support the procurement process.	(Block & Neumann 2008; Fuks et al. 2009)
e-Intelligence	Management information system with spend analysis tools	(Eakin 2003; Harink 2003)
e-Contract Management	The use of information technology for improving the efficiency and effectiveness of contracting processes of companies.	(Angelov & Grefen 2008; Yang & Zhang 2009)
E-Submission	It is the process of online submission of electronic document like tender document that is specially designed to facilitate the bidders' submissions of their bids through e-submission.	(Neupane, Soar & Vaidya 2012c; Salin & Abidin 2011)

Electronic tendering is popular e-procurement tool which is being used in many nations for the process of sending requests for information and prices to suppliers and receiving the response using Internet technology (Betts et al. 2010; De Boer et al. 2002). It is one of the e-procurement tools which has been defined as “*the electronic publishing, communicating, accessing, receiving and submitting of all tender related information and documentation via the Internet, thereby replacing the traditional paper-based tender processes, and achieving a more efficient and effective business process all parties involved*” (Christenses & Duncan 2006). Therefore, it is a powerful technology among the government agencies for ensuring the transparency (Doyle 2010), enhancing efficiency, increasing accountability, and economic performance of the country.

The e-tendering system publishes the tendering opportunities publicly on the government websites and as a result it can eliminate the probability of risk in government procurement process mainly in project planning, product designing and documentation, tender process, contract awards, accounting and auditing (Szymanski 2007). Similarly, from supplier perspective, it increases sales productivity, accuracy orders, fast receipt of orders, reduces time for receiving payment, real time order status information. These benefits can be linked to different factors such as real time order status link to transparency, effective monitoring linked to lack of control, improved contract compliance linked to lack of accountability, increase information on suppliers to limit access to information. Some of public e-tendering benefits are as follows:

- ❖ E-tendering can centralise data in order to improve audit and analysis (Gupta, Jha & Gupta 2009).
- ❖ E-tendering eliminates the direct human interaction on bidding and other work and services, corruption is decreased significantly, and internal efficiency increases in government department (Kajewski et al. 2001).
- ❖ With an e-tendering system, government can monitor all the works and services easily and efficiently.
- ❖ E-tendering system provides better status in monitoring and tracking of application.
- ❖ It increases transparency in works and services and increases better interaction between supplier and vendors and citizens through online system.

- ❖ Online bidding system automatically reduces the cartel, collusion, and riggings among the bidders.
- ❖ Make a government tender process faster and easier and services available to citizens 24/ 7 and promotes overall e-commerce imitative (Kajewski et al. 2001).

2.6. Case Example of e-procurement

Different countries have already implemented and practiced public e-procurement in public and private levels with different names. The section describes the different countries case example of practicing of e-procurement in public sector.

2.6.1. Example from South Korea

The South Korea began to run the government-procurement system (GePS) in October 2002. The GePS has turned all paper-based procurement activities to Internet-based e-commerce. It provides an integrated information portal where all the public and government organisations are obliged to list their bidding information in clear and transparent way with all the details including project specification, volume, award, criteria of contracts etc.(Joongi 2006; Kim 2003). From the supplier side, it provides a single point of registration to participate in multiple public organisations' bid. It also acts as e-shopping mall, which simplifies the entire process of procurement of public organisations. It also acts as e-shopping mall, which simplifies the entire process of procurement of public organisations. It offers about 23,000 products including office supplies and 97% of office supplies in public and government organisations are purchased from the GePS e-shopping mall (Anthopoulos,Siozos & Tsoukalas 2007). GePS makes the lengthy complex public procurement process very efficient and extremely simple. More importantly, GePS ensures transparency in the entire process of public procurement from the request for purchase, to the invitation of bids, then the awarding of contracts and, finally, payment. Currently, 92% of public bidding processes are done electronically in South Korea (Iqbal & Seo 2008).

2.6.2. Example from Singapore

Singapore is one of the highly developed market-based economies and the most least-corrupt country in the world. The Singapore government uses GeBIZ one-stop e-procurement portal. All public sector works and services such as quotations and tenders are posted on GeBIZ. Suppliers can search for government procurement opportunities, download tender documents and submit bids online (GeBIZ 2005).The main objective of this system is to open and make transparent procurement in accordance with government procurement policies facilitates demand integration, and complete repository of procurement information. GeBIZ highlights the benefits which increase transparency in government procurement, compliance to Government procurement policies and guidelines, global reach to suppliers increased competition and value-for-money increase in procurement efficiency, easy access to business opportunities, simpler to do business, access to historical award information enables supplier to price more competitively in their biddings.

2.6.3. Example from Denmark

Denmark established the public procurement portal (DOIP) in 2002 by Gatetrade.net and it is an electronic market place accessible to all buyers and suppliers in Denmark. It is one of the first public portals in the world with public market place on the Internet and thereby making the public sector a market leader with the area of e-business in Denmark (DOIP 2011). This portal increased efficiency in public purchase of goods and services amount around 100 billion DKK in total annually. In summary, through implementing this system Danish government handles all the procuring goods and services and administrative works automatically, thus making procurement process more transparent and more efficient, resulting in less chance of corruption than other system.

2.6.4. Example from State Government, Andhra Pradesh, India

In India, Government of Andhra Pradesh (GoAP) has implemented e-procurement system since year 2000 for procures goods, services, works and turnkey contracts worth \$2.0 billion every year (Bikshapathi et al. 2006). The procurement system is conducted through centrally from a single unit, as well through individual Government agencies. The government provides different procurement activities such as tenders (open, limit, single), rate contract and some external agencies in transparent manner. In addition, after implementing e-procurement system in government level, it reduces the opportunities for corrupt parties such as eliminate the briber (client) who provide the corruption fees to the government officer. Citizen can download bid document and bill quantities free of cost anywhere and at any time from the Internet. Benefit from e-procurement reduces the time and cost of doing business both vendors and government, realise better value for money spent through increased competition and the prevention of cartel formation, standardise the procurement process across government departments agencies, allow equal opportunity to all vendors, and increase transparency and ultimately reduce corruption. A supplier participating in a tender knows the list of other participating suppliers, the documents furnished by his competitors, price quotations and the evaluation result, as soon as a stage is completed by the departments in the system (Bikshapathi et al. 2006).

2.6.5. Example from Other Countries

Japan uses an e-bidding system for enhancing transparency and efficiency in public works (Umehara 2007). Singapore uses the GeBIZ government e-procurement portal (GeBIZ 2005). All public sector quotations and tenders are posted on this system. New Zealand uses the Go procure system which utilises the Oracle “iprocurement” system, exchange and “isupplier” portal application with the Oracle ebusiness suite including purchasing, accounts payable and general lender. China established a government procurement system in 1996. After implementing procurement system the China procurement increased rapidly from about \$3.1 billion in 1998 to \$213.57 billion in 2004, an average increase of 88.78 percent per year (UN 2006). The Chinese government procurement system has improved the efficiency of financial expenditure, limits corruption and encourages efficient administrative operations (UN 2006). This system plays an important role to national productivity growth in

the removal of non-value added activities in procurement process (Sherah Kurnia & Rahim 2007).

2.7. Perceived Benefits of Public e-procurement

In a review of the literature in public e-procurement, Brun et al. (2010) found evidence for five areas of benefit including greater transparency, control, decentralisation, maverick-buying reduction, and supply based rationalisation. Wen and Wei (2007) discovered that the benefits of public e-procurement to be greater efficiency, lower cost, and time saved per transaction, as well as greater flexibility, and enhanced accessibility of procurement information, faster communication, and quick response time, and improved procurement quality. Gunasekaran et al. (2009) examined the adoption of public e-procurement in SMEs and recommended different key factors that were grouped into perceived benefits and organisational performance of e-procurement. In addition, the potential benefits that could be derived from implementation of e-procurement include the better relationship between vendors, accurate fulfilment of the process, improved purchasing process, improved service, better price from key suppliers, reduced inventory carrying cost, and shorter order cycle time (Gunasekaran et al. 2009). For example another study, Neupane, Soar and Vaidya (2012b) conducted a study into perceived benefits linked to reduced corruption from e-tendering in Nepal, and concluded that e-tendering is perceived to have the potential to improve transparency and accountability, which in turn, can reduce the likelihood of corruption in public tendering. This conclusion supported the findings of previous studies that electronic government applications such as public e-procurement could be used as anti-corruption tools (Andersen, 2008). Citing examples in India, Ethiopia, and Fiji, Singh et al. (2010) noted that public e-government systems could increase transparency by improving public sector service delivery in developing countries such as India, Ethiopia, and Fiji (Singh et al., 2010).

Attaran (2001) the web-based procurement benefits can be grouped into three categories: such as strategic, opportunity and operational. Strategic helps to coordinate purchasing practise and accelerate the flow of information between buyers and suppliers, while opportunity is mainly related to the search for improvements and explore the relations with present or even new suppliers; and finally Operational, which means cheaper and more efficient purchasing processes. The benefits of e-procurement should include reductions in purchasing costs, eliminating administrative costs, enhancing budgetary control, increasing buyer productivity, and providing better information management (Brun et al. 2010; Panayiotou et al. 2004). In summary, through implementation of e-procurement governments can handle all the administrative work automatically, making procurement processes more transparent and more efficient, with less chance of corruption in comparison to paper-based system.

External parties also take advantage of using e-procurement system such as online bidding, online payment, and easy transaction. In this regards, table 2.2 shows that the ICT-enabled connected government such as e-procurement, leads to several benefits both internally for government agencies and externally for consumers.

Table 2.2 Benefits from ICT enabled connected government (e-procurement)

Internal (To government or provider agencies)	External (To Suppliers, citizens, business)
Reduced errors, or avoidance of duplication	Increase sales productivity with 24/ 7 service, faster service delivery
Reduction of transaction costs Reduce prices through increased purchasing leverage and aggregation of demand	Reduce transaction costs
Simplified bureaucratic procedure	Real time order status information
Greater efficiencies and effective monitoring	Increased accuracy orders
Real time order status and improved contract compliance	Fast receipt of orders
Enhance transparency and accountability	Greater openness and transparency
Security of transaction	Reduce time for receiving payment
Increased information on suppliers and buyers	Greater participation and inclusion Greater citizen empowerment

Table 2.2 shows that the benefits of government can linked to different constructs, such as how real time order status links to transparency, effective monitoring links to lack of control, improved contract compliance links to lack of accountability, and increased information on suppliers and buyers is linked to limited access to information.

2.8. Role of Public e-procurement in Public Procurement Processes

The discussion in Section 2.4 of corruption in public procurement has identified that corruption is a serious problems in procurement processes and it is interesting to note that the potentially important role that public e-procurement has to play in reducing corruption (Neupane, Soar & Vaidya 2012a; OECD 2008). Figure 2.3 reveals the steps of procurement processes and lists the anti-corruption factors that are derived from the intent to adopt or implement public e-procurement.

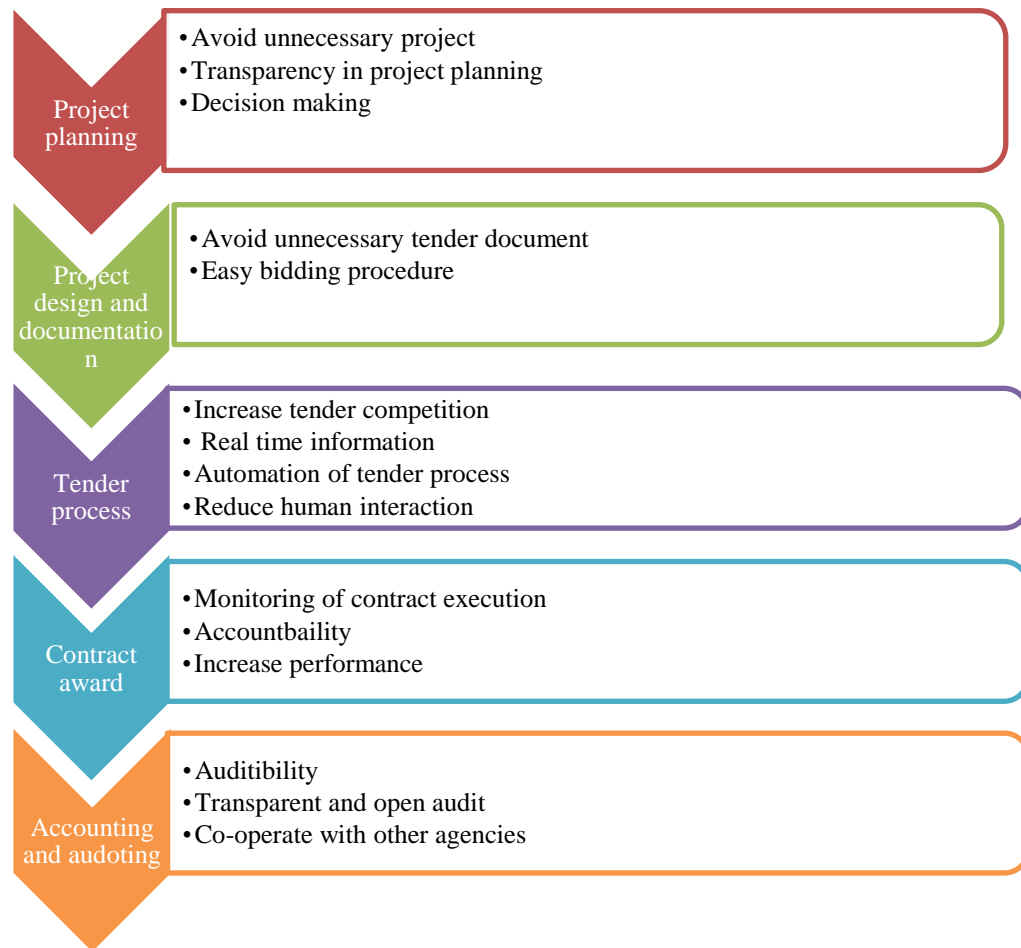


Figure 2.3 Anti-corruption factors of public e-procurement in public procurement processes

Governments want all procurement processes to be transparent and accountable. Different issues such as unjustified or hidden procurement planning, lack of need assessments, political pressure, lack of monitoring capacity of government, inconsistent cost estimate (Ware et al. 2012) can help to cause corruption. For example, sometimes the minister, government, or the senior officer may plan the unwanted project for their private benefit. They may disclose confidential information; or add extra requirements for the project.

To address those issues, public e-procurement can play an important role in preventing and/or reducing the risk of corruption. The public or bidders can view and monitor all the procurement activities through the e-procurement government web portal. It helps by disclosing all of the procurement-related information. The government officer or procurement officer cannot easily hide confidential information to others. All the project technical specifications are posted in e-procurement web-portal so the officers or planning level officers cannot easily add extra specification for their private benefit.

The project design and documentation phase of public procurement processes are reportedly one of most corrupted phase of public procurement processes because it is

related to the technical specification of the product or project. Sometimes, procurement or government officers design the project or product and technical specification in a favour of a particular supplier. In some cases, they design an unnecessarily complicated tender specification for to hide a corruption. Public e-procurement systems can play an important role in providing all the project specification on the web portal, so that all the bidders can view and evaluate all the project specification, and they can create compliance with the standard document.

Another highly vulnerable stage of public procurement processes is the tendering and contract award where most corruption occurs in developing countries (Mc Pheraon & Mac Searraigh 2007). It is reportedly a serious problem in developing countries particularly where government procurement systems are still paper-based systems that offer greater potential for corrupt behaviours. Public e-procurement systems are helpful to minimise the involvement of unwanted persons in the tendering processes that is one of the main problems in developing countries.

In overall, to overcome these problems, public e-procurement can play an important role for minimising the risk of corruption in public procurement process (OECD 2008). It improves the transparency and integrity in public service such as tendering, sourcing, ordering, and auctioning. E-procurement has been recognised internationally as an important instrument for checking corruption and in misuse of power (Sohail & Cavill 2008). Pictet and Bollinger (2008) pointed out that public e-procurement helps to fight against corruption by reducing face-to-face interaction where most requests for bribes take place. Shahkooh, Saghafi & Abdollahi (2008) study concluded that governments are trying to find solutions for reducing corruption in public organisations. Electronic government is one kind of solution to the problems of corruption which removes the opportunities for arbitrary actions. It helps to reduce cartels, collusions, and riggings to the bidders where public procurement is politically influenced like Nepal, Bangladesh, Iraq, Sudan, and Myanmar. In many of the corrupt countries, public bids are awarded without fair competition (Thai et al. 2005).

Recently many least developed countries have focused on e-procurement systems as a key tool to reduce the corruption by opening competition in government procurement processes to the public. Table 2.3 below summarises the contributions of previous studies on ICT help to fight corruption.

Table 2.3 Summary of ICT helps to fight against corruption

Authors(S) & Year	Study area and region	Key findings
(Liu 2008)	Asia Pacific region	ICT can reduce the corruption by improving the enforcement of rules lessening discrediting of officials, and increase transparency.
(Bhatnagar 2003)	Enabling e-government in developing countries: from vision to implementation	E-government can help to reduce corruption, eradicate poverty, and increase transparency.
(Iqbal & Seo 2008)	Republic of Korea	E-governance is an anti-corruption tools
(Croom & Brandon-Jones 2007)	UK public organisations	Changes to governance structures, changes to total cost of acquisition, changes to organisation characteristics.

Authors(S) & Year	Study area and region	Key findings
(Bertot et al. 2010b)	Using ICTs, to create a culture of transparency: e-government and social media as openness and anti-corruption tools for societies	ICT technology can promote the transparency and anti-corruption
(Soreide 2005)	Corruption in public procurement causes, consequences and cures	The report discusses some strategies to reduce the problem of corruption in government acquisitions. Political commitment as the most important contribution to reduce the problem of corruption.
(Thai 2008)	Measuring losses to public procurement corruptions and the UGANDA case	This study is to offer a method of measuring monetary losses to public procurement corruption, but to conform the volume of government revenues lose to procurement corruption

There are many case studies in developing and developed countries of the use of public e-procurement system for reducing the risk of corruption. For example, e-procurement systems implemented in South Korea, Singapore, New Zealand, Denmark, India (Andra Pradesh), and Mexico are some examples that demonstrate the innovative use of information technology to prevent and control corruption in public procurement (OECD 2005).

The existing literature has identified the various benefits of using public e-procurement in the public organisation. Some of the benefits are as follows:

- ❖ E-procurement can centralise data in order to improve audit and analysis (Gupta et al. 2009).
- ❖ E-procurement eliminates the direct human interaction on bidding and other work and services, corruption is decreased significantly, and internal efficiency increase in government departments (Ndou 2004).
- ❖ From an e-procurement system, government can monitor all the works and services more easily and efficiently (Aman & Kasimin 2011; Kaliannan & Awang 2009).
- ❖ E-procurement system provides better status monitoring and tracking of applications.
- ❖ It increases transparency in works and services and improves better interaction between supplier and vendors and citizens through online system (Adebisi, Ayo & Adebisi Marion 2010).
- ❖ Online bidding system automatically reduces the cartel, collusion and riggings among the bidders (Pathak et al. 2006).

Adoption and implementation of e-procurement system may help all the countries to improve transparency and efficiency, reduce cost, better decision-making, supplier performance monitoring, and quality of service and so on, it plays a vital role to reduce corruption in public procurement. The most important perceived anti-corruption factors of public e-procurement technology are: real time access procurement information, automation of procurement system, more completion in public tendering, reduces human interference in public tendering, transparency, efficiency, quality, and accountability in public procurement. Developed countries

have already implemented and practiced e-procurement in public and private levels. For example, Singapore, Australia, New Zealand, UK, USA, Denmark, and Japan, have already materialised public e-procurement and received many perceived benefits of e-procurement performance in public and private sectors. In the context of developing countries, adoption of e-procurement in government level is in a preliminary stage. Some of the developing countries' governments already have e-procurement and others are in a piloting phase. Some governments have a position of 'wait and see' for e-procurement performance.

2.9. E-procurement in the Nepalese Public Sector

The Nepalese e-government master plan was developed in 2006, with the main objective being the building of a more efficient, productive, transparent, and responsible government that provides value-added quality service through ICT. The Nepalese government has progressively developed and implement IT-related policy, strategy, and legal framework including Information Technology Policy 2000, Telecommunication Policy 2004 and Electronic Transaction Act 2007 (Pariyar 2007). The Nepalese Governments Public Procurement Act 2007 is one of the prime pieces of legislation designed to reform government procurement systems to make them more transparent, allowing for accountable government, fair, competitive, and efficient public procurement processes by ensuring equality of opportunity for the bidders to participate in public procurement processes without any discrimination (*Nepal public procurement strategic framework* 2010).

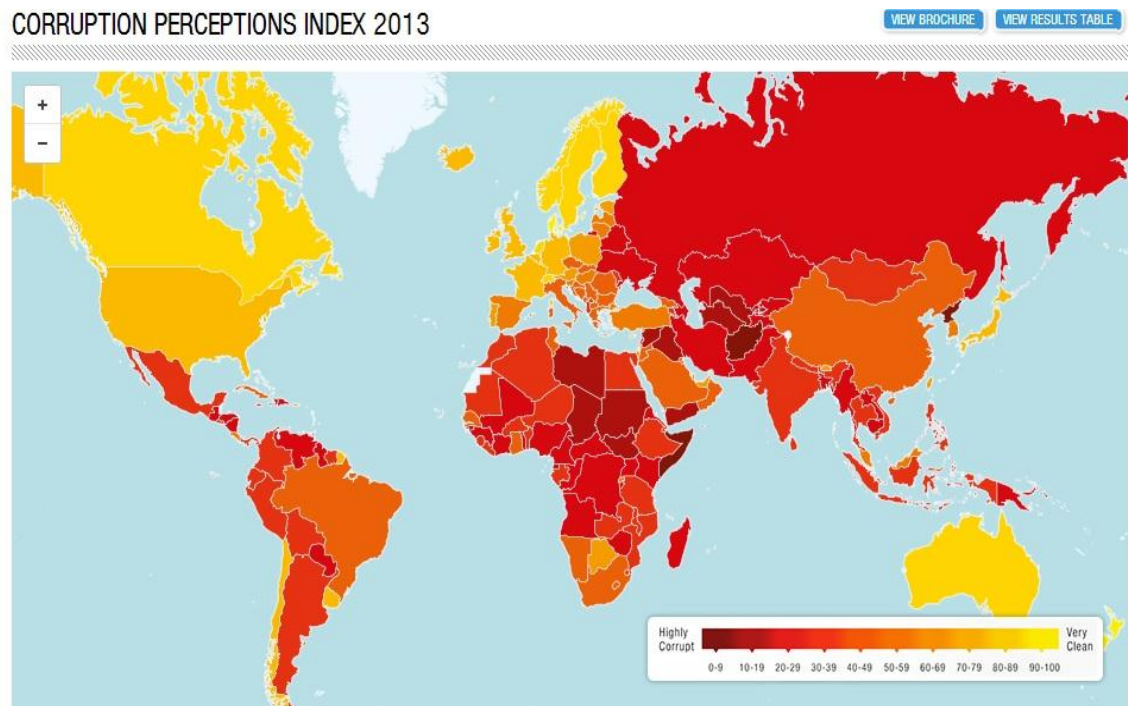
The Public Procurement Monitoring Office (PPMO) is a guiding body for procurement policy formulation, implementation, and monitoring procurement system in Nepal. The main mission of PPMO is to maintain transparency, accountability, effectiveness, efficiency, and as well as non-discrimination and equality in public procurement processes in Nepal. Currently, the PPMO installed (<http://gepson.gov.np>) as a single web portal system for all public entities of government procurement of Nepal. The GEPSON web portal is designed to facilitate the bidder to submit their bids through e-submission and it provides the easy access for all tender information, and contract awards.

The Department of Road (DOR) was the first organisation to introduce public e-procurement in Nepal. Similarly, other departments including Nepal Electric Authority, Department of Urban Development and Building construction, Department of Local Infrastructure Development of Agricultural Road, Roads Board Nepal, Public Procurement Monitoring office, and Ministry of Irrigation, Department of Water Induced Disaster Prevention, and Nepal Army are already implemented and practicing e-procurement system for procurement processes. The entire web portal is designed to facilitate the bidder's to submit their bids through e-submission.

In recent years, reducing corruption has been the main political agenda in Nepal. The level of the corruption is spreading at not only government level but also in each and every sector of Nepalese society. Subedi (2006) highlighted that Nepalese bureaucracy system, political parties, and their cadres, and the business sectors are seriously affected by corruption. Relevant factors pertaining to this situation include weak anti-corruption law, lack of leadership power in political parties, lack of

education, lack of rule of law, lack of monitoring by the civil societies, and economic status of the country.

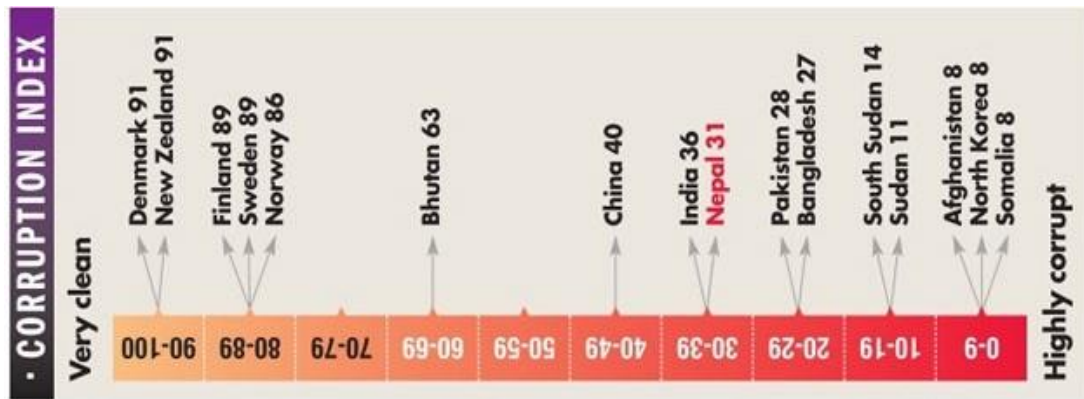
Transparency International (TI) Corruption Perception Index (CPI) ranks countries and territories according to their perceived levels of public sector corruption in a scale from 0 (highly corrupt) to 100 (highly clean). The corruption perception index (CPI) 2013 ranks the 177 countries and territories. Figure 2.4 shows corruption perceptions index 2013 and results indicate that no country has a perfect score and two-thirds of the countries score below 50 that indicate as most corrupt countries. This information indicates corruption is a serious problem around the world. According to CPI 2013, Denmark and New Zealand are very clean countries with both scoring 91 points each while Somalia, North Korea, and Afghanistan are listed as highly corrupted countries, each of them scoring 8.



(Source: Transparency International (2013))

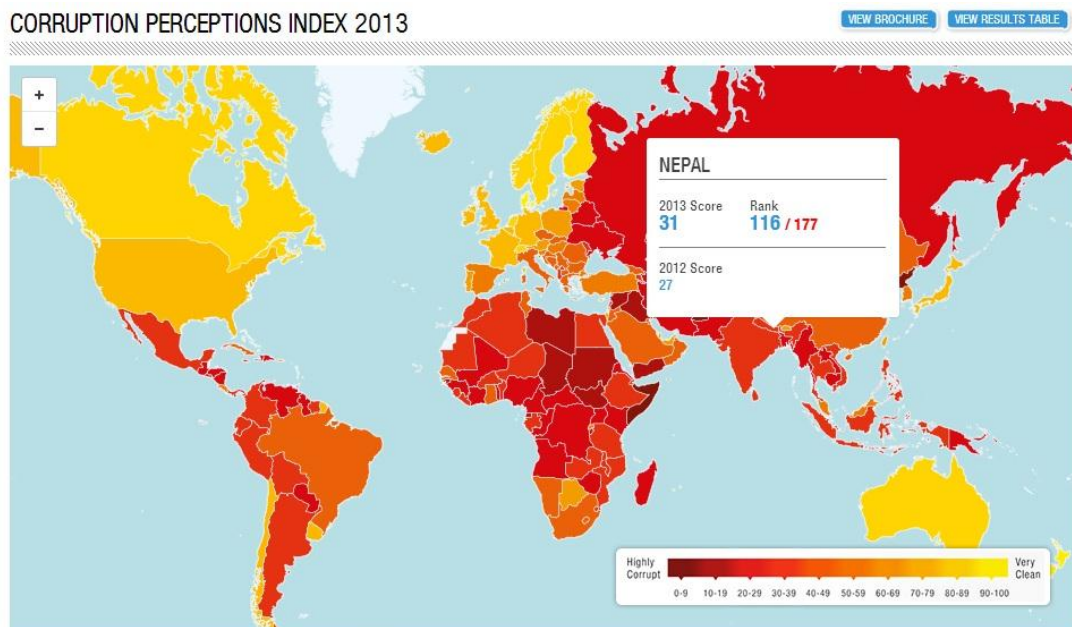
Figure 2.4 Corruption perceptions index 2013

In South Asia, Afghanistan is the top corrupted country followed by Bangladesh and Pakistan (CPI index 2013). In 2011, Nepal is the second most corrupted country in South Asia. Figure 2.6 shows the CPI 2013 score and rank of Nepal.



Source: Himalayan Times (2013)

Figure 2.5 Corruption index 2013 very clean to highly corrupt



(Source: Transparency International (2013))

Figure 2.6 Corruption perceptions index 2013 Nepal

Table 2.5 illustrates the CPI total score and rank of Nepal in the year 2004 to 2013. The CPI ratio 2011 ranked Nepal in position 154 out of 183 countries with a corruption score of 2.2. This is deterioration for the poor position in the history. In 2004, the ranking of country score was 2.8 and rank was 90. Similarly, in year 2005 to 2007 corruption ratio was constant 2.5 but in ranking was slightly changed from 117 to 131.

Table 2.4 Transparency international corruption perception index (CPI) Nepal 2004 to 2013

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Score / Total score	2.8/10	2.5 /10	2.5/10	2.5/10	2.7/10	2.3/10	2.2/10	2.2/10	27/100	31/100
Rank / total country	90/146	117/159	121/163	131/180	121/180	143/180	146/178	154/183	139/178	116/177

In comparison to 2010, Nepal experienced more corruption in 2011 and the CPI rank of the country is down by 8 points. In the year 2012 and 2013, the corruption ratio is slightly down compared to previous years. The CPI 2013 ranked Nepal at 116th position out of 177 countries with a total score of 31 (figure 2.6). In 2012, Nepal stood at 154th position with 27 points. In Nepal, there exists official corruption both with executive member of the government and the civil servant that work in bureaucratic positions (Subedi 2006). Some factors that create a favourable environment for corruption include weak professionalisation of the bureaucracy of the country, lack of accountability and transparency in the government work and services, weak separation between civil service and partisan politics, lack of political control and auditing, lack of political stability (Del Monte & Papagni 2007; Kolstad & Wiig 2009; Subedi 2006).

Corruption in public procurement is a serious problem in Nepal, and due to the use of traditional paper-based procurement systems, there is a potential to avoid rule of law for securing contracts (Bhattarai 2011). There are instances in Nepal where contracts and tenders are awarded because of an abuse of power and political interference. The tendency is that the potential contractors, who use their coercive power, get the contract. In some situations, other contractors are simply not able to submit tender document because of perceived coercive threatening from other influential contractors. In addition, government officers are also involved indirectly and use their official power for their own private benefit. Members of political parties are also involved and manipulated public procurement process for their own ends.

This eventually leads to institutional corruption in public procurement where parties with vested interest have opportunities to ‘play’ their roles in public procurement for their own benefits. For example, recent case that is an example of public procurement corruption is the Sudan Darfur Scam. In this case, the Special Court (SC) convicted three former police chief and two suppliers for millions of Nepalese Rupees that were embezzled during the purchase of an Armoured Personnel Carrier (APC) for the Nepalese peacekeeping mission in the Darfur region of Sudan (Sharma 2012). Therefore, ICT tools have the potential to assist countries like Nepal to combat the problem presented by systemic corruption.

To overcome this serious problem of corruption in Nepal and other countries, ICT tools have the potential to assist countries like Nepal to combat the problem presented by systemic corruption. Public e-procurement can be used as one of the anti-corruption strategies by promoting good governance, enhancing relationships

between government employee and citizens tracking of activities, monitoring and controlling the government employee and reducing potential aspects of corrupt behaviours.

2.10. Conclusions

This Chapter reviewed the previous literature of the public procurement. In particular, the review of public procurement, corruption in public procurement, public procurement processes, public e-procurement, different countries case example, and e-procurement in Nepalese public sector. Mainly, three key terms are used in this research includes public procurement, corruption, and public e-procurement. In regard, public procurement is the central instrument to assist the efficient management of the public resources in the country that covers all the acquisition of the goods and services of the government. Public procurement processes has a different stages and each stage has a risk of corruption. Corruption in public procurement has been prevalent throughout the world and is more serious and alarming stage in the developing countries that increase the government operation cost corrodes the social structure and trust in the government, distorts the composition of the government expenditure on the different services. For addressing these social-economic problems, the public e-procurement has been use of information and communication technology such as Internet/web based system by the public institution in conducting all the procurement activities that helps to automation of procurement process in order to improve efficiency, quality, transparency, and accountability in the government procurement. The next Chapter addresses the relevant information system literature and theories.

CHAPTER THREE

REVIEW OF ANTI- CORRUPTION THEORIES

3.1. Chapter Overview

This chapter discusses the anti-corruption potential of public e-procurement technology. It reviews the principal-agent theory, and discusses relevant other theories including transaction cost theory, diffusion of innovation of theory, fraud triangle theory, and technology acceptance model. Finally demonstrate the layouts of the theoretical framework.

A brief graphical layout of the structure of chapter is shown in figure 3.1.

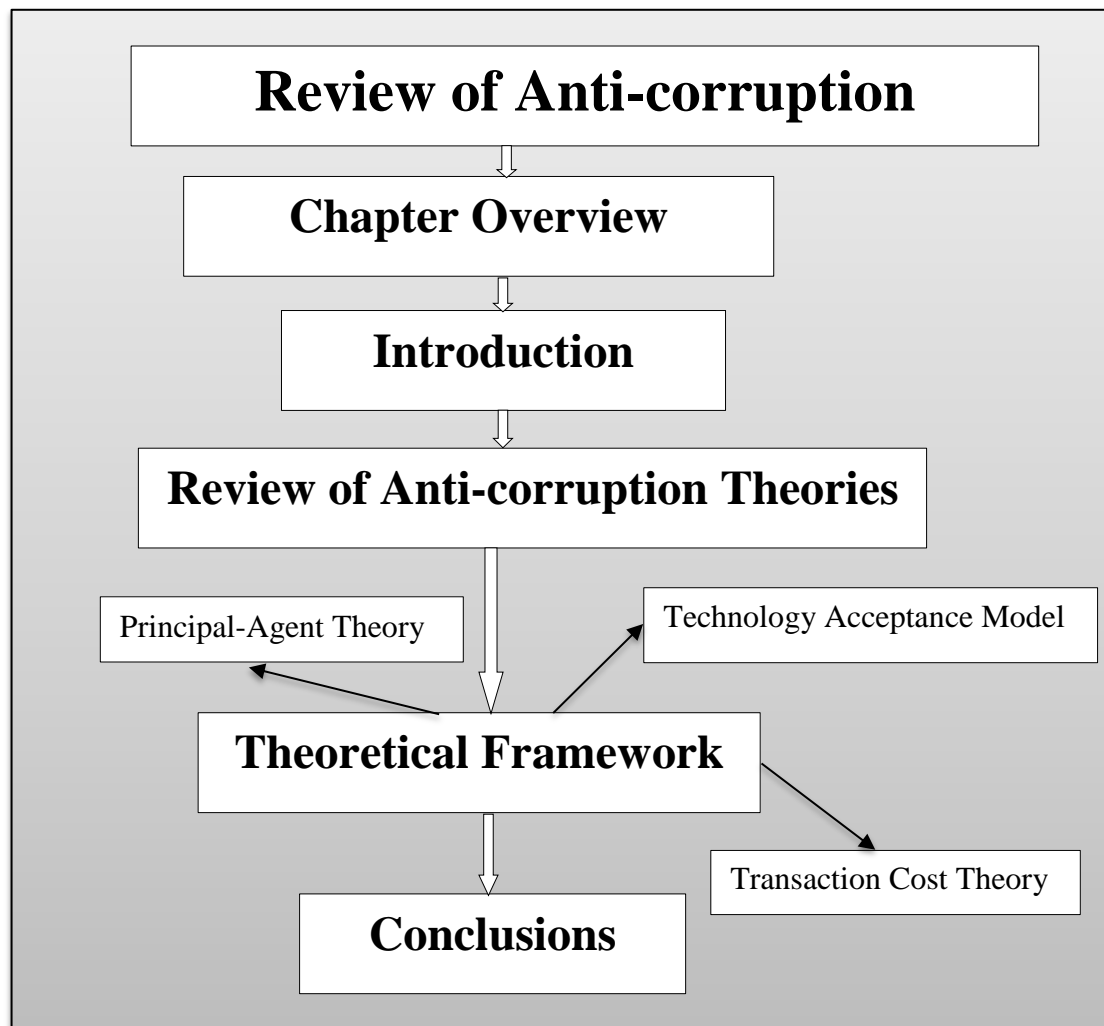


Figure 3.1 Chapter 3 overview

3.2. Introduction

Before discussion of the review of anti-corruption theories, it is important to review the ICT adoption and uses of literature that influence the better understanding of intent to adopt public e-procurement. ICT is one of the major driver and enabler of economic development of most countries (Braund et al. 2007) and is crucial for sustainable development in developing countries (Crede, Mansell & Mansell 1998). Governments across the globe have been increasing the adoption of ICT as a tool to enhance transparency and accountability in government (McCue & Roman 2012; Neupane, Soar, et al. 2012c). Use of ICT could yield significant benefits in improving the economic development and likely to sort out many problems and better governance in the public sector. In addition, ICT is widely viewed as enabling organisations to change business practices, improve organisational management, and improve performance (Basant et al. 2006). Public e-procurement is an government tool with the potential to help to reform government procurement systems (Filho & Mota 2012) and enhance efficiency, improve the speed and quality of procurement processes, and importantly, to enhance transparency and accountability in government work and services (Brun et al. 2010; Wen & Wei 2007).

3.3. Overview of Anti-corruption Theories

Bhattacharjee (2012) stated that theories are explanations of a natural or social behaviour, event, or phenomenon. More formally Bacharach (1989, p. 498) pointed out that “*scientific theory is a system of constructs and propositions that collectively presents a logical, systematic, and coherent explanation of a phenomenon of interest with in some assumptions and boundary conditions*”. Similarly, Leedy & Ormrod (2005, p. 4) indicate “*a theory is an organised body of concepts and principles intended to explain a particular phenomenon*”. Therefore, theory provides the systematically formulating and organising the ideas to the particular phenomenon so it interconnects the ideas which emerge the process (Tavallaei & Abu Talib 2010). Theory has been used as a variety of purpose depending on the field of research. In the scientific research, theory can develop a scientific knowledge and it followed three criteria including simple explanation of observed relation regarding their relation to a phenomenon, consistent with a found knowledge and the observed relations, device for verification and revision, and future research for further investigation (McMillan & Schumacher 2000).

Theories provide guidelines that govern research and provide a structure to the concepts and relationships between constructs that collectively present logical, systematic, and coherent explanation of phenomenon of the interest with some assumption (Bacharach 1989). No single theory provides the explanation for all social or natural phenomena. There is research about the attributes or qualities of a good theory including logical consistency and technological artefacts, meaningful explanations and exploratory powers, open to scientific evaluation, and simulate new thinking and research (Bacharach 1989; Bhattacharjee 2012; Gregor 2006). Different theories can explain the different types of behaviours, using a set of construct, propositions, boundary conditions, assumptions, and underlying logic.

David (1989, p. 490) pointed that there are four important elements of building blocks of theory: constructs (variables), propositions, logic, and boundary condition/assumptions. The basic building blocks of theories are concepts and it is a verbal abstraction drawn from observation of a number of specific cases. Constructs are taken from the theory, which explain the important concept of phenomenon. Many researchers proposed the attributes of good theories logical consistency, explanatory power, falsifiability, and parsimony (Bhattacharjee 2012; Markus & Robey 1988).

This study has discussed the different IS theories and their exploratory powers in the anti-corruption role of public e-procurement. Diffusion of Innovation Theory discusses technological innovation including technology's potential benefits such as relative advantages and the compatibility of information technology (Rogers 1995). Technology Acceptance Model (TAM) is based on two beliefs of technology used perceived usefulness, and perceived ease of use (Davis 1989). Fraud triangle theory describes the three factors, namely: perceived pressure, perceived opportunity, and rationalisation, that are present in every situation of fraud (Cressey 1953).

3.3.1. Principal-Agent Theory

Agency Theory can be considered as one of the most significant theoretical foundations because it constructs relationships in terms of principal and agent problems (Singh & Sirdeshmukh 2000) and it has been used in different areas of research including business management and information systems, organisational economics, and public procurement (Basu & Lederer 2011; Gefen & Carmel 2008; Oh, Gallivan & Kim 2006). It is also known as Principal-Agent Theory, and is concerned with resolving two problems that can occur in agency relationships between two parties: the Principal and Agent. The Agent is the one who makes the decision or takes any action on behalf of the Principal (Eisenhardt 1989; Jensen & Meckling 1976). This theory was applied in different agency relationships including buyers and sellers (Waterman & Meier 1998), government and citizens (Singh et al. 2010), public institutions and bureaucracy (Lambsdorff 2001). The main contribution of this theory in this study is to evaluate the risk of corruption in the government procurement process between government (principal) and bidders (agent). To use this concept, it is assumed that the Government is the principal body that provides public services to the people, and the agents are the bidders (Contractor, supplier) who work for the government and are providers of goods and services. The main role of principal or government authority is to formulate policy options to help in the regulation and development of public procurement, to monitor various procurement activities, regulate and maintain standards of procurement, capacity-building and professional development, information management and dissemination. Similarly, agents' roles are to bid for the government work and services, comply with all statutory, legal and award requirements relative to the work and services, complete all tasks within agreed cost structures, maintain quality and also complete all the tasks within the designated time frame. In this regard, the main contribution of principal-agent Theory is to explain the risk of corruption in public procurement processes between two parties - Principal and Agent - and also examine contractual problems to determine the most efficient contract type that will satisfactorily govern the agency relationship (Whipple & Roh 2010).

3.3.2. Transaction Cost Theory

The concept of transaction cost was mentioned by Commons (1931, p. 6) research: *“...Transactions are, not the “exchange of commodities,” but the alienation and acquisition, between individuals, of the rights of property and liberty created by society, which must therefore be negotiated between the parties concerned before labor can produce, or consumers can consume, or commodities be physically exchanged. Transactions, as derived from a study of economic theories and of the decisions of courts, may be reduced to three economic activities, distinguishable as bargaining transactions, managerial transactions and rationing transactions”*.

The Transaction Cost Theory supposes that the organisation tries to minimise transaction costs including information costs, negotiation costs, and monitoring costs (Williamson 1981). In economics and other disciplines, transaction cost is a cost of incurred in making an economic exchange. In broad terms, the Transaction Cost Theory identifies the services specific characteristics that affect the effectiveness in contracting or procurement processes and these costs are playing significant role in stages of public procurement processes like project planning, project design and documentation, tender processes, contract award, and accounting and auditing.

Hobbs (1996) illustrates an example of such costs in the context of supply chain management: search and information costs are costs that arise in search of information about products and services, prices and inputs. Similarly, negotiation or bargaining is a cost that results from the physical act of the transaction, such as negotiating and writing, or paying the services of an intermediary of transaction (such as an auctioneer, or a broker). Monitoring or the enforcement costs arise after an exchange is negotiated. This may involve monitoring the quality of goods and services from the suppliers or monitoring the behaviour of the supplier to ensure that all the pre-agreed terms of the transactions are met.

Previous scholars have conducted studies in the area of e-commerce and public e-procurement research using transaction cost theory to explain organisational and individual issues. For example, Vaidya et al. (2008) used transaction cost theory in assimilation of public procurement innovation and study discovered that the association between transaction cost uncertainties and e-procurement assimilation. Similarly, Parker and Hartley's (2003) study developed a framework for assessing public private partnership based on Transaction Cost Theory and an understanding of the roles of reputation and trust in contracting in the UK defence sector. In addition, the case study has highlighted the potential of transaction costs to defence procurement and illustrated reduced costs, contractor to generate profits, and building partnerships and trusts. Kauffman and Mohtadi (2004) focussed on the information technology adoption behaviour of organisation in the presence of transaction costs, agency costs and information uncertainty. Kauffman and Mohtadi study suggested two guidelines emerged for practitioners: adoption of standard e-procurement platforms that must be understood in terms of controllable trade-offs and gauging the business value impacts of exogenous shocks is critical to decision-making. In this regards, the main contribution of transaction cost theory is to reduce the transaction cost in the principal-agent relationship through the potential benefits

of public e-procurement. Hence, reducing transaction cost is an important contributing factor for reducing corruption in public procurement.

3.3.3. Technology Acceptance Model

Technology Acceptance Model (TAM) is widely accepted model in electronic commerce research (Li & Huang 2009). The TAM model specified two main important key beliefs, namely: perceived usefulness, and perceived ease of use (Davis 1989). It is considered as a robust model in predicting determinants of users adopting or using new technology. Many researchers have tested this model in the context of the intention to use technology and have found there to be a positive and significant relationship between perceived usefulness, and perceived ease of use. Aboelmaged (2010) applied TAM and Theory of Planned Behaviour in predicting the e-procurement adoption in the United Arab Emirates. His study revealed the practical implications to the procurement professional and system developers for the useful adoption model that demonstrates the significance of the perceived usefulness of e-procurement systems in influencing adoption decisions. Similarly, Chu et al. (2004) study explored the key success factors of the electronic tendering system in Taiwan through the behavioural perspective of the end users. Rahim (2008) applied TAM model and identified factors affecting acceptance of e-procurement systems in an Australian City Council. This study is concerned with how to relate the public e-procurement technology benefits with anti-corruption factors when used as strategy to combat corruption. TAM supports the theoretical foundation for constructing our research model.

3.3.4. Fraud Triangle Theory

Fraud Triangle Theory describes the three important factors present in every situation of fraud, namely perceived pressure, perceived opportunities, and rationalisation (Cressey 1953). In an organisation, employees face many kinds of perceived pressure. Most of the pressures involve financial need, also non-financial pressures, such as the need to report results that paint a better picture than actual performance, frustration of work, or even a challenge to beat the system, and this can also motivate fraud (Albrecht, Albrecht & Albrecht 2004). Likewise, perceived opportunities to commit management fraud include weak Boards of Directors, inadequate internal controls, and separation of duties. Rationalisation is a crucial component of most fraud because most of the people need to reconcile their behaviour with the commonly accepted notions of decency and trust. Matthew, Patrick and Denise (2013) pointed two factors that influence fraud and corruption in public procurement, namely: motivational factors, and organisational or environmental factors and perceived factors. Hence, Fraud Triangle Theory represents a ground-breaking model to explain the necessary conditions within which fraud occurs.

3.3.5. Diffusion of Innovation Theory

The Diffusion of Innovation Theory (DOI) has potential application to information technology ideas, artefacts, and technique, and plays a significant role as the theoretical foundation for much information systems research. Rogers (1995) draws upon comprehensive work in the field of information system research and he identified the five main characteristics of innovation that influence the potential

adopters' perception of accepting the innovation, including observability, relative advantage, compatibility, trial ability, and complexity. DOI theory is not suitable for this research because this research is not concerned with the effects of technology and is not able to extrapolate upon the relationship between two groups. The relative advantage of technology can be considered but all perceived advantages of technology are identified by another theory known as the Technology Acceptance Model.

3.3.6. Task-Technology Fit Theory

The Task Technology Fit (TTF) theory has also great application in IS research and has been used as the theoretical basis for number of business information research project. This theory was developed by Goodhue and Thompson (1995) as a multi-disciplinary field with contributions from prominent academics, researchers, sociologists, economists, information and communication researcher and many others. The TTF theory holds that *"IT is more likely to have a positive impact on individual performance and be used if the capabilities of IT match the tasks that the user must perform"* (Goodhue & Thompson 1995). The main strength of TTF theory is applied for evaluating how information technology leads to performance and usage impact (Lu & Yang 2014). The TTF theory is also explore the factors affecting the effective adoption of information technology such as mobile commerce (Lee, Cheng & Cheng 2007). The primary limitation of TTF model focuses on task fit alone do not pay enough attention to the fact that organizations must be utilized before they suffer any impact on functioning (Irick 2008).

3.3.7. DeLone and McLean IS Success Model

The DeLone and McLean Information Systems (IS) success model is one of the most cited and commonly used models in IS community over the past decade. DeLone and McLean (1992) comprehensively reviewed IS success measures in six different categories system quality, information quality, use, user satisfaction, individual impact, and organizational impact. The updated DeLone and McLean (2004) IS Success model consists of six interrelated dimensions of information success in e-commerce environment: system quality, information quality, service quality, use, user satisfaction, and net benefits. The main strong point of this theoretical explanation is that it focuses on an individual or organizational level when measuring and evaluating the various success constructs and relationships (Petter, DeLone & McLean 2008).

Table 3.1 shows some related theories and their own feature and explanation of predictive power frameworks for the study of intent to adopt anti-corruption technology e-procurement system. Furthermore, these theories constructs are very important and plays a significant role to understand the potential of technologies.

Table 3.1 Use of various theories by researchers

Theory / Model	Main constructs	Weakness	Strength	References
Technology Acceptance Model (TAM)	Perceived usefulness Ease of use	TAM only provides a limited guidance about how to influence usages design and implementation, Sun & Zhang (2006) two major shortcomings of TAM studies: the explanatory power of the model and the inconsistent relationship among construct.	Ability to explaining and predicting system use and to examine the variety of information technology uses behaviour Intention to use a technology	(Carter & Belanger 2005; Davis 1989; Gardner & Amoroso 2004; Sun & Zhang 2006; Venkatesh et al. 2003)
Principal-Agent Model (Agency Theory)	Information Asymmetry, Monopoly of power, Contract, Moral hazard, trust	Critiques of the agency theory have two issues: its ability to adequately portray real-world situations, and the completeness of the theory. It is not able to explain the complexities of real-world organisations	Agency theory has three important strengths: broad applicability, explanatory power, solution focus. It also attempts to identify the various contract alternatives. It focuses on improving the contracts between the parties.	(Boehm & Olaya 2006; Eisenhardt 1989; Jensen & Meckling 1976; Lambsdorff 2001; Yukins 2010; Zhang & Zhang 2009)
Fraud Triangle Theory	Perceived pressure, perceived opportunities, rationalisation	This theory only talks about the employment fraud related issues, does not cover other corruption related issues.	Ability to explain three elements of individual fraud include opportunity, motivation, rationalization.	(Albrecht et al. 2004; Turner,Mock & Srivastava 2003)
Transaction Cost Theory	Governance structure, degree of outsourcing success, coordination cost, transaction cost,	Little account of organisation strategic choices and their abilities to use IOIS, it neglects the political aspects of inter-organisational relationships (Vaidya 2012,	Transaction cost theory explains about the cost related issues such as information cost, negotiation cost, and monitoring cost. Describing the impact	(Choudhury 1997; Son & Benbasat 2004; Vaidya et al. 2008)

Theory / Model	Main constructs	Weakness	Strength	References
	operational, trust, frequency of transaction, monitoring cost, information cost	p. 17).	of inter-organisational information systems (IOIS) on transaction structure,	
Diffusion of Innovation Theory	Relative advantage, Compatibility, complexity	It does not talk about the technology perceived usefulness, and ease of use, Its only talk technology innovation relative advantages, and its compatibility.	It is well established theory, ability to talks about the technology innovation. The main attributes are relative advantage, compatibility, complexity, trialability, and observability.	(Rogers 1995; Vaidya & Hyde 2011)
Task-Technology-Fit Model	Individual performance, system utilization, task characteristics, technology characteristics	It ignores the dynamics between organisational factors and the technology. It only focuses on task not for technology assimilation process.	Positive influence on organisational performance, strong link between IS and performance impact	(Chwelos, Benbasat & Dexter 2001; Delone & Mclean 2004; Goodhue & Thompson 1995; Lu & Yang 2014)
DeLone & McLean IS Success Model	Information quality, system quality, service quality, user satisfaction, net benefits	This model only discuss about the evaluation of an IS on technical perspective after the technology is implemented. Therefore it does not consider the intent to adopt the information technology from organisation perspective.	Evaluating information system success with six dimension such as information quality, system quality, service quality, use, user satisfaction, and net benefits.	(Delone & Mclean 2004)

3.4. Theoretical Framework

The discussion in above section describes theory is a group of related concepts of phenomenon and it presents the logical, systematic, and coherent explanation phenomenon of interest. There are several theories related to corruption and employee fraud and public procurement efficiency. They include principal-agent theory (Boehm & Olaya 2006), fraud triangle theory (Hayne & Pollard 2000), transaction cost theory (Vaidya et al. 2008), technology acceptance model (Gonzalez, Gasco & Llopis 2010), diffusion of innovation of theory (Vaidya & Hyde 2011), Task-technology-fit model (Goodhue & Thompson 1995), and DeLone and McLean model (Delone & Mclean 2004).

The comprehensive review of anti-corruption theories (section 3.3) and use of various theories by the researcher (table 3.1), this study have been proposed three anti-corruption theories to investigate the intent to adopt public e-procurement technology to reduce corruption in public procurement. The figure 3.2 below presents a theoretical model of this study.

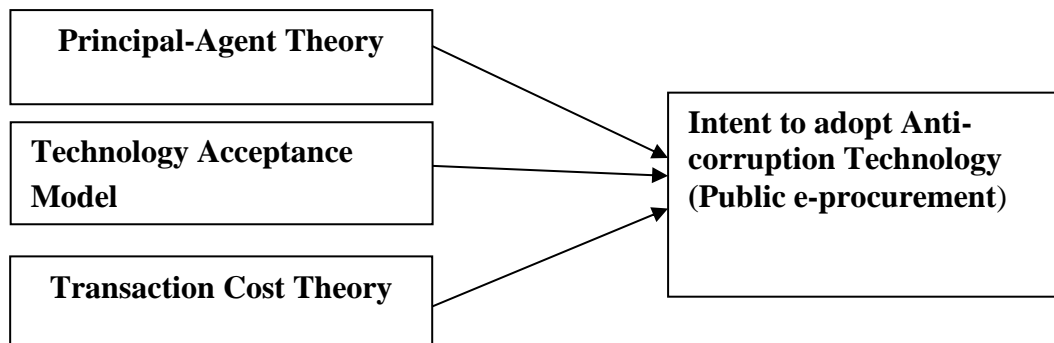


Figure 3.2 Theoretical Model

3.5. Conclusions

This Chapter has details of theoretical model and review of relevant theories used in this study. Principal-Agent Theory, Technology Acceptance Model, and Transaction Cost theory are found useful to investigate the intent to adopt e-procurement research. In the next Chapter, there is a discussion of the development of the research model and hypothesis for this study. Different anti-corruption factors were discussed based on the theories and hypothesised relationship between independent constructs and dependent construct in the next Chapter.

CHAPTER FOUR

DEVELOPMENT OF RESEARCH MODEL AND HYPOTHESIS

4.1. Chapter Overview

As discussed in Chapter Three, there is no single theory that provides an explanation for all social or natural phenomena. Different theories can explain and predict different types of behaviours, using a set of constructs, propositions, body conditions, assumptions, and underlying logic. This Chapter discusses the public e-procurement anti-corruption factors based on the Chapter Three reviews of anti-corruption theories. During the discussion of the theory construct, the study has developed a research hypothesis and research model for this study.

A brief graphical layout of the structure of chapter is shown in figure 4.1.

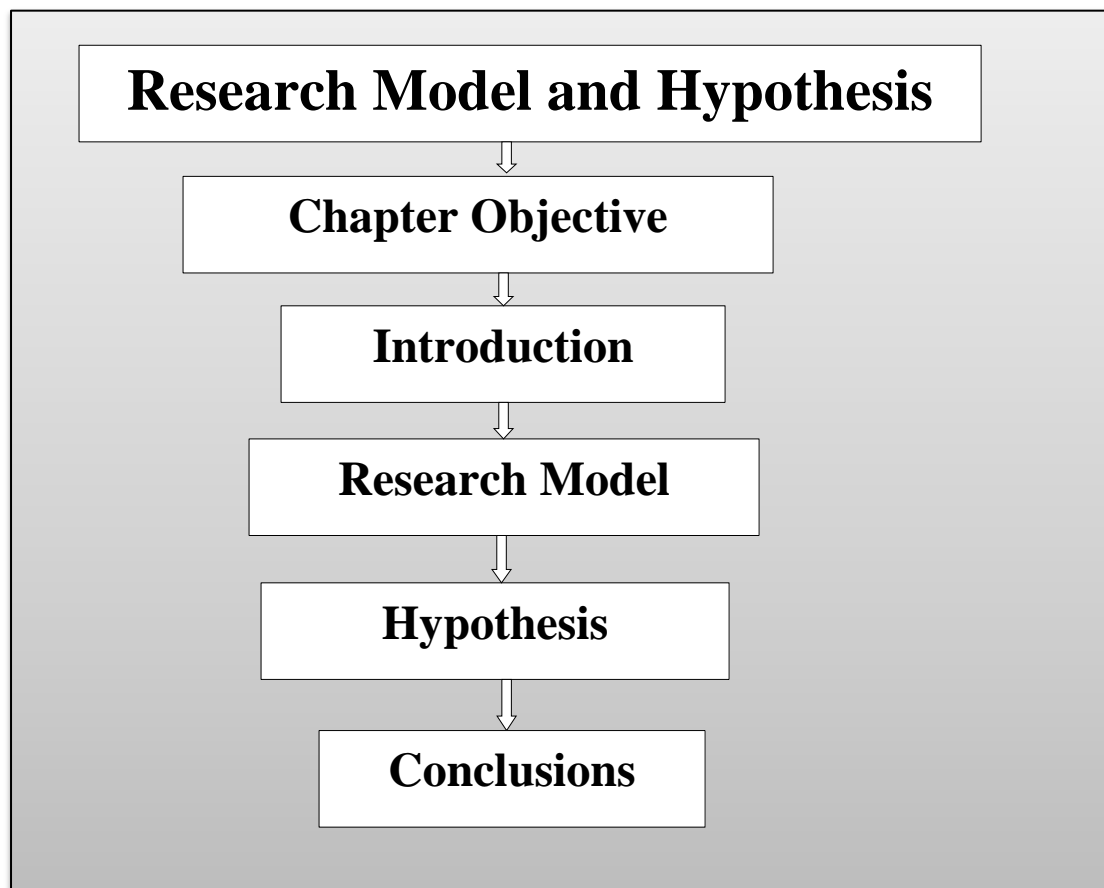


Figure 4.1 Chapter 4 overview

4.2. Introduction

Before discussing the anti-corruption factors of theory, it is necessary to demonstrate the relationship between the theories' construct and hypothesis. A research hypothesis is a prediction of the outcome of the study and the prediction is based on a formal theory. The hypothesis is a statement of the (asserted) relationship between facts, whereas the outcome of the theory come prediction about how certain phenomena will appear and behave. It is noted that the strong theory has reliably explained the past experiments and observations. The basic components of theories are concepts, variables, and hypothesis. As a result, hypotheses bear a close relationship to the theory in that the statements of the fact are derived from the

theory. Based on these facts, Chapter 3 discusses the different anti-corruption theories and demonstrate the theoretical model. The section 4.3 discusses the theories factors and formulates the research hypothesis and research model.

4.3. Factors of Anti-corruption Capability of Public e- Procurement

4.3.1. Information Asymmetry

Amagoh (2009, p. 6) proposed that information asymmetry is a core component of Principal-Agent Theory. In Agency relationships information asymmetry occurs due to information gaps such as incomplete information, incompleteness of contract, problems with monitoring mechanisms, the cost of configuration of the project in the contracting process between Principal and Agent when the Agent has more information than the Principal does or vice versa (Amagoh 2009; Finkle 2005; Gauld 2007; Taylor 2005). Singh and Sirdeshmukh (2000, p. 152) discussed different examples that demonstrated how the existence of asymmetrical information increases the probability of opportunistic behaviour. Hao and Qi (2011, p. 39) showed that asymmetrical information leads to collusive behaviour, and incomplete supervision in procurement activity. These arguments have support the concept that information asymmetry is the main cause of problems of corruption in Principal-Agent Relationships.

ICT tools such as public e-procurement can help to avoid an information asymmetry problem in public procurement processes. Xinzhang and Yonggang (2011) claim that electronic government enhanced transparency, accountability, economic performance, efficiency and mitigate the asymmetric information. Teo, Lin and Lai (2009) demonstrated that sharing more information helped to reduce information asymmetry thereby also to reduce corruption. As a result, this current study has proposed that reducing information asymmetry through the use of public e-procurement is an important contribution to the reduction corruption in Principal-Agent relationships.

This study has pointed out that the perceived benefits of public e-procurement help to reduce information asymmetry, as e-procurement contributes to greater competition and openness and fairness in contracting processes, up-to-date information, consistency in procurement processes, and is more transparent than paper-based systems. In summary, the above factors have helped to reduce the information gap between Principals and Agents as well as in reducing the chances of corruption in public procurement.

The following hypothesis summarises this relationship.

H1: Higher level of perception of the potential of public e-procurement technology to reduce information asymmetry is positively related to the willingness to adopt.

4.3.2. Monopoly Power

In the context of the public procurement processes, government officials play an important role in the goods and services and are the key people to provide a goods and services to the public in a transparent way. Government officers' roles include

identifying the need to purchase, selecting suppliers or bidders, contracting, and placing orders for goods and services. In some situations, corruption occurs where the public officials use public power for private benefits, for example, by assigning public contracts and/or tenders to favoured contractors or bidders, or accepting a bribe in exchange for granting a tender (OECD 2010). In some instances, government officials create shortages of goods and services in the market in order to create opportunities for bribery. Sometime public officials may have decide which bidders or suppliers companies to invite a public tender, limit calls for tender, create a different areas of specialisation, and try to make a real competition (Soreide 2002).

Klitgaard (1988) emphasised that the three most critical factors bearing upon opportunities for corruption including the monopoly upon power of officials, the degree of discretion that officials are permitted to exercise, and the degree to which there are systems of accountability, and transparency within an institution. This study emphasised that monopoly of power of government officials (Principal) is a critical factor of corruption in Principal Agent relationships and that public e-procurement is the best option to reduce the monopoly of power provision on goods and services of government officers in procurement processes. The significant key elements of public e-procurement that help to reduce the monopoly of power of government officers in Principal and Agent relationships include: (a) auditing capabilities with real-time procurement information of public e-procurement, (b) automation processes of procurement management, efficiency and quality, (c) facilitate accounting controls thereby reducing likelihood of fraud or accounting errors by enabling the electronic machine of requisition, purchase orders, invoice and receipts, (d) fixed price contracts for all buyers and sellers. These factors mentioned above are linked to a reduction the chances of corruption in public procurement.

The following hypothesis summarises this relationship.

H2: Higher level of perception of the potential of public e-procurement to reduce monopoly power is positively related to the willingness to adopt.

4.3.3. Trust

The concept of trust has garnered great attention in the existing pool of scholarly research. Many researchers have proposed that it is the most fundamental elements for e-commerce and information security. Trust has been identified as an important factor that determines the intention, behaviour, attitude, belief of user to adopt any inter-organisational information systems (Bachmann & Inkpen 2011; Dubelaar, Sohal & Savic 2005; Ngai, Lai & Cheng 2008) including e-procurement. Lack of trust has been touted as one of the main reasons for consumers not engaging in e-commerce (Keen 1999). Security of e-commerce transactions is also an important concern of users or consumers when making online financial transactions (Pi, Liao & Chen 2012). Maintaining trust in Principal-Agent relationships ensures beneficial outcomes for both exchange partners such as Government and bidders (Singh & Sirdeshmukh 2000).

Study proposition is that the potential of public e-procurement benefits increases the trust in Principal-Agent relationships that minimises the risk of corruption. In this regard, increasing the trust between Government and bidders is one of the most important anti-corruption factors (Neupane, Soar, et al. 2012c). Neupane et al's.

(2012c) study indicated that trust factors are highly significant and are correlated with the intent to adopt e-procurement. Another study Tran (2009) pointed that trust factors can minimise the risk of corruption. Consequently, several studies pointed out that trust played a prominent role in helping the public to overcome the perception of risk and uncertainty (McKnight, Choudhury & Kacmar 2002). As a result, information and communication technology tools are the important bridge to established a trust in governance towards effectiveness and positive results (Cordella 2005).

This study reveals how trust is an important anti-corruption factor that contributes to both Government and bidders to increase their mutual levels of trust. Most importantly, public e-procurement benefits comprise security of transaction, fair competition among bidders, user-friendly environment among buyers and/or suppliers in public tendering processes, anywhere anytime bidding e-procurement platform services, and monitoring and tracking of documents these factors played a significant role in reducing the chances of corruption in public procurement.

The following hypothesis summarises this relationship.

H3: Higher level of perception of the potential of e-procurement to increase trust is positively related to the willingness to adopt.

4.3.4. Perceived Usefulness and Perceived Ease of Use

The main purpose of these two variables, namely perceived usefulness and perceived ease of use, helps to explain the perception of users affects their tendencies either to use or not to use an application such as technology, and the extent of use of such tools to the extent they believe it will help them perform their job satisfactorily or if they believe it is useful (Davis 1989). Theoretically, the importance of perceived usefulness and perceived ease of use is to determine the user behaviour, attitudes, and intentions as it relates to the adoption of any applications or technology. These two constructs reveal the perceived benefits technology-based tools can have on user perceptions.

The main reason for selecting these constructs in this study is to identify the potential for perceived benefits of public e-procurement such as the reduction of paper work, user-friendliness, ease of access of public information (e.g. tender documents), reduction of administration cost, increase in buyer and seller productivity, shorter order cycle, clearer and more transparent communication between Government and citizens, minimisation of human errors as well as more efficiency and transparency (Brun et al. 2010; Gunasekaran et al. 2009; Panayiotou et al. 2004; Ronchi et al. 2010; Teo et al. 2009). Other studies (Croom & Brandon-Jones 2007) have found that based on an eighteen month examination of e-procurement deployment within a UK public sector organisation, “*the reputation of public procurement function and the general disposition of an organisation towards e-procurement is strongly influenced by users’ perceptions of internal service*”. The main practical implication is that the manager can force individuals to use e-procurement. Another study conducted by Neupane et al. (2012c) identified that perceived usefulness and perceived ease of use are useful anti-corruption factors within public e-procurement for reduced corruption. This study also revealed that the benefits of technology are driving the economic growth of the country as well as enhancing good governance.

The following hypothesis summarises this relationship.

H4: Higher levels of perceived ease of use will be positively related to the willingness to adopt anti-corruption technology (e-procurement)

H5: Higher levels of perceived usefulness will be positively related to the willingness to adopt anti-corruption technology (e-procurement)

4.3.5. Transaction Cost

The benefits of online or web-based technology for the effectiveness and efficiency of the day-to-day operations of government reflect the impact of electronic government procurement on the cost of transaction and value for money (Leipold 2007). The potential impact of implementing or adopting ICT tools like e-procurement systems in an organisation are to reduce the cost of transaction and produce significant time savings including information cost, monitoring cost, and coordination cost (Kachwamba 2011; Ojha, Palvia & Gupta 2008; Tai, Ho & Wu 2010).

The automation of procurement processes helps the bidders who no longer have to travel in order to submit the bids or tender documents, and this helps to avoid potential for physical threats from other potential bidders. This situation most commonly happens in developing countries due to the corruption. Bidders can save huge amounts of time and money in each step of procurement processes such as bid preparation or bid submission. Buyers and/or suppliers can easily search the information about goods and services prices and inputs. There are some examples of studied impacts of transaction costs to reduce corruption in procurement, such as reducing exchange costs in, reducing the total number of transactions (Shah 2006), best price and open auctions (Tran 2009).

This study is concerned with the potential benefits of public e-procurement and its potential to reduce transaction costs and eliminate corruption in procurement. In this regard, there are valid arguments that public e-procurement has played a positive role in Principal-Agent relationships that can help to reduce transaction costs, including shorter procurement cycles, increased availability of information, common management framework, centralisation and consistency of procurement processes, more competition and pricing in auction or bidding processes, and improved capacity within an organisation to monitor their partner's behaviour. By way of conclusion, reducing transaction costs is an important anti-corruption factor to reduce the potential for corruption in procurement processes.

The following hypothesis summarises this relationship.

H6: Higher level of perception of the potential of public e-procurement to reduce transaction cost is positively related to the willingness to adopt.

4.3.6. Transparency and Accountability

Public e-procurement has a range of potential benefits for both process and transparency in public procurement, Schapper (2008, p.115) stated that

“Procurement of goods, works, and services through Internet-based information technologies (e-procurement) is emerging worldwide with the potential to reform processes, improve market access, and promote integrity in public procurement”. Transparency is an important element that the governments have employed to promote openness information and reduce the chance of corruption in procuring goods and services. Thus, transparency and openness are core principles of public procurement and transparency is widely recognised as a foundation of good governance (Parigi et al. 2004; UNOPS 2012). Lack of transparency creates opportunities for the public officials such as government officers and politicians to abuse their positions of authority for private gain. This indicates a weak accountability mechanism that tends to facilitate corruption. Corruption flourishes due to a lack of transparency and accountability in public goods and services. As a result, corrupt bureaucrats realise that they can take advantage of regulation, so they generate further layers of government regulation governing which in turn then runs the risk of making processes over-complex and vague and avoid detection. Accountability refers to the “service guarantee” of a government; the extent to which its actions are accounted for and corrected if not carried out correctly in the first instance. Technically, accountability can be improved fairly and easily. Information can be published online, processes and decisions can be traced for audit and analysis, and there can be rules for compensation where accountability is not delivered.

The following hypothesis summarises this relationship.

H7: Higher level of perception of the potential of public e-procurement technology to increase transparency and accountability is positively related to the willingness to adopt.

Figure 4.2 presents the conceptual model of this study consisting of the hypothesis defined above. This model shows seven independent variables and relation with intent to adopt e-procurement technology dependent variable. Each variable has different items that are shown in Appendix. The model focuses on the Principal Agent-based approach in public procurement processes as a relationship between Government and bidders. Intent to adopt public e-procurement technology is a dependent construct of this study that demonstrates adoption and use of ICT tools as way to transform or reform the government system. Government institutions can do their all procurement activities through their e-procurement web portal, such as procurement planning, tendering, and the awarding of contracts that help to make these processes more transparent and accountable, as well as reducing opportunities and incentives for fraud. Bidders can easily access all of the procurement information online, and submit their bids online anytime and anywhere. This helps to avoid physical threats to other potential bidders, and has many other benefits.

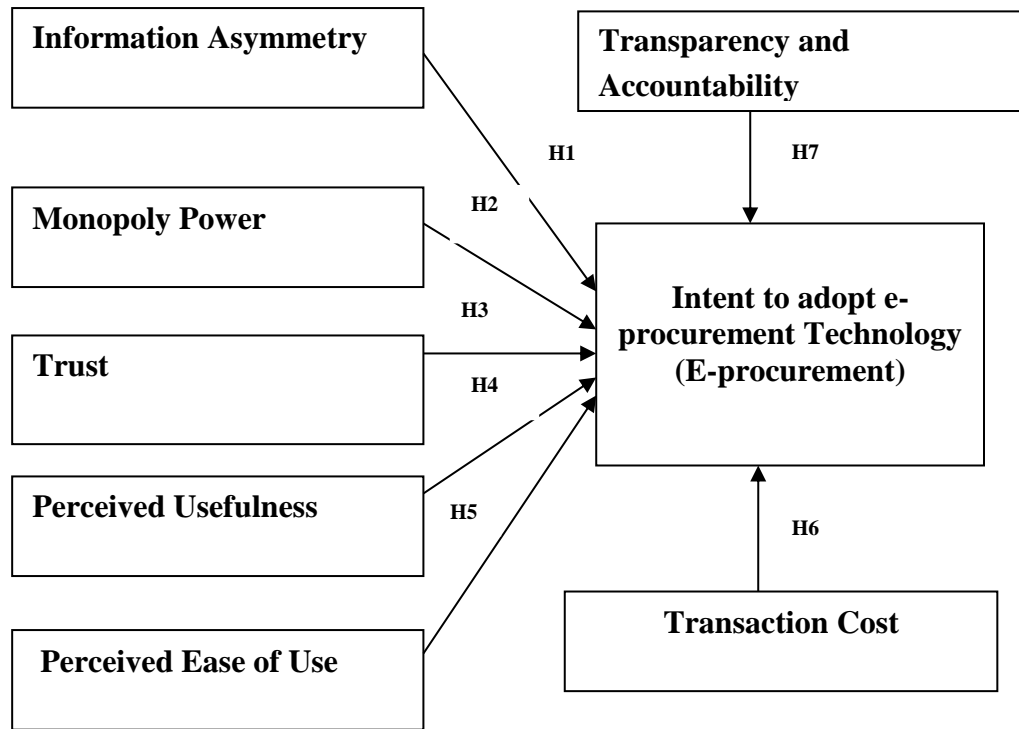


Figure 4.2 Research model of this study

The research model (figure 4.2) is developed based on the comprehensive review of anti-corruption factors. These all factors are associated with anti-corruption theories that are discussed in chapter 3. All seven independent anti-corruption variables (factors) are the main independent construct of three theories: principal agent theory, technology acceptance model, and transaction cost theory.

This research model has been tested by using the following regression equations:

$$A = \beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7 + \varepsilon$$

Where:

A= Intent to adopt public e-procurement technology

β_1 = Information asymmetry

β_2 = Monopoly power

β_3 = Trust

β_4 = Perceived usefulness

β_5 = Perceived ease of use

β_6 = Transaction cost

β_7 = Transparency and accountability

4.4. Conclusions

This Chapter has laid the development of research model and hypothesis. The figure 4.1 research model provides a better understanding of the relationship between principal and agent of the perception of the potential of public e-procurement

technology to reduce corruption in public procurement. The next chapter will explore the research methodology and data collection used to answer the research questions.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1. Chapter Overview

In this chapter, the overall procedure of research design and the research methods adopted to address the research question of the study is discussed in detail. Briefly, chapter five is divided into four major sections: research philosophy, research method, survey method, and data analysis approach. Survey method is divided into five-sub section including field survey questionnaire, research sampling, pilot study, final survey instrument, and operationalisation of construct. Some other relevant issues such as ethical clearance are also discussed.

A brief structure of the outline of this Chapter is shown in figure 5.1.

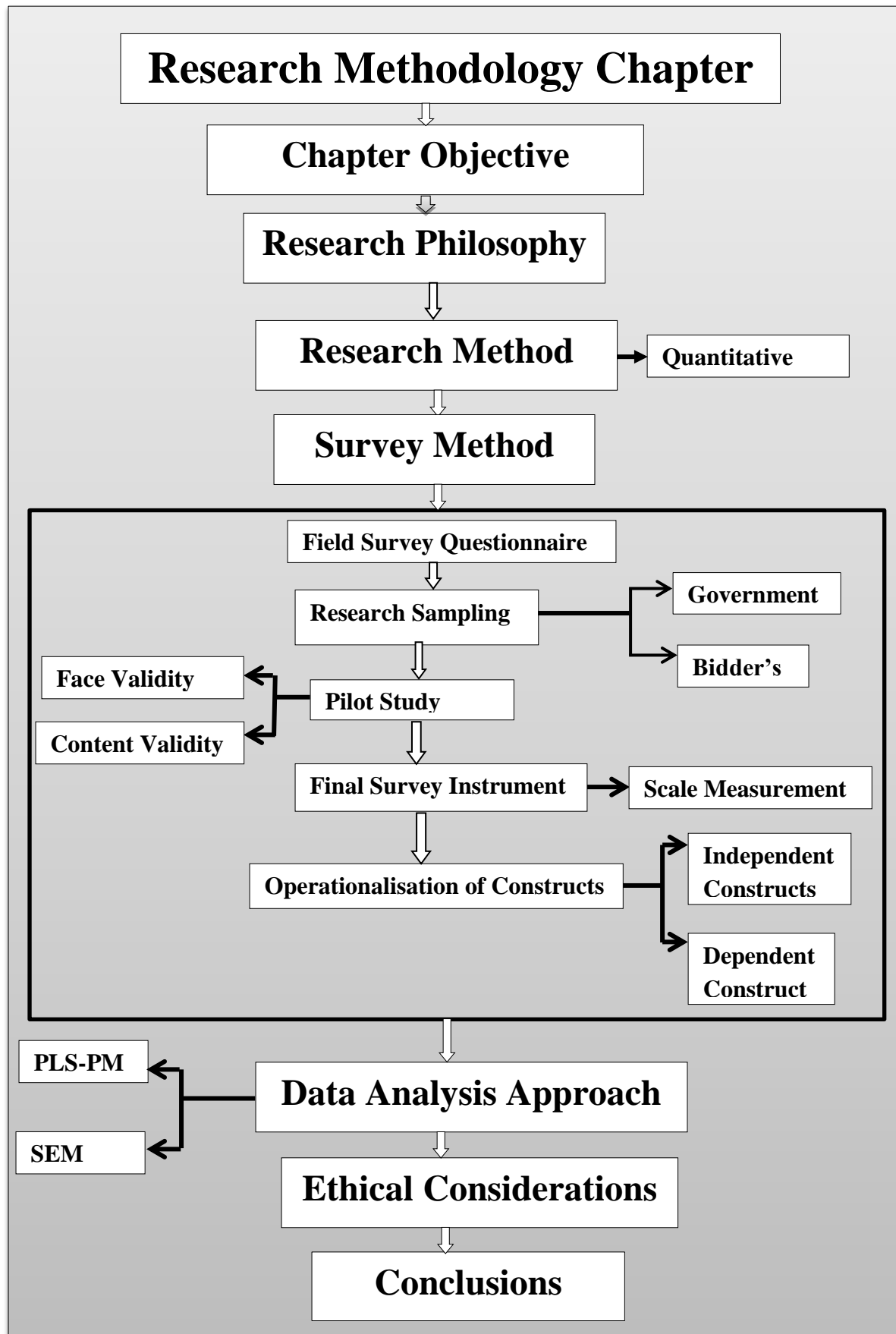


Figure 5.1 Chapter 5 overview

5.2. Introduction

In Chapter One, the research problems and research questions were identified. Chapter Three discussed the study's research model and hypothesis based on the review of theories linking anti-corruption to technologies. In this Chapter, the research methods used to answer the research question, by testing study model, and hypothesis.

The aim of this Chapter is to describe the research philosophy, research method, and data analysis strategy. The survey method is used to collect quantitative data. Two stakeholder perceptions (government and bidders) are the main source of quantitative data.

5.3. Research Philosophy

Research philosophy is a belief about how the data about a phenomenon should be collected, analysed, and interpreted (Levin 1988). There are various reasons why an understanding of research philosophy issues is an important research method. Easterby-Smith, Thorpe and Lowe (1997) identified three important reasons: firstly, philosophy can help the researcher to refine and specify the research method that is to be used in a study and also it can clarify the overall research strategy to be used to answer the research questions. Secondly, knowledge of research philosophy can assist the researcher to evaluate the different research methodologies and methods and it can also avoid unnecessary work by identifying the unnecessary limitations of particular approaches at initial stage. Finally, it can help the researcher to be creative and innovative for selection or adoption of appropriate research methods.

Research philosophy is an important term in research methodology in order to collect data in effective and appropriate manner (Williams 2011). Research paradigm is another important term in a research that defines paradigm as a set of assumptions about how the things work. Rossman and Rallis (2003) express paradigm as "shared understanding of reality." The two paradigms are popular among social science researchers: positivist, and post-positivist (Bhattacharjee 2012).

This study employed the positivist paradigm to examine the intent to adopt public e-procurement technology in government, and to explore the potential of public e-procurement technology to reduce corruption in government procurement. In the context of this research, positivist philosophy involves the hypotheses testing to obtain the objective truth and predict what may happen in future as well (Greener 2008). Table 5.1 demonstrates a number of implications of positivist philosophy in social research including methodological, value-freedom, causality, operationalisation, independence, and reductionism (Bond 1993; Easterby-Smith et al. 1997; Hughes 1994).

Table 5.1 Implication of positivist philosophy

Implication	Description	References
Methodological	All research should be quantitative, and that only research which is quantitative can be the basis for valid generalizations and laws	(Bond 1993; Easterby-Smith et al. 1997; Hughes 1994)
Value-freedom	The choice of what to study, and how to study, it should be determined by objective criteria rather than by human beliefs and interests	
Causality	The aim should be to identify causal explanations and fundamental laws that explain human behaviour.	
Operationalisation	Concepts need to be operationalised in a way that enables facts to be measured quantitatively	
Independence	The role of the researcher is independent of the subject under examination	
Reductionism	Problems are better understood if they are reduced to the simplest possible elements.	

Source Crossan (2003)

Another paradigm term is post-positivist approach that emphasise the meaning and creation of new knowledge. Ryan (2006) pointed out the different characteristics of post-positivist research: his/her research is broad rather than specialised, theory and practice cannot be kept separate, the researcher's motivations for and commitment to research are central and crucial to the enterprise, the idea that research is concerned only with correct techniques for collecting and categorising information. Ponterotto (2005) stated that post-positivist is strand of positivism, which deals with two concepts of paradigms identifying constructivism/interpretivism, and critical/ideological. This approach was not employed in this research.

Researchers have used scientific methods to design the research project including survey instruments, focusing on facts and objective of the assessment of attributes that is supported by the concept of positivism research approach. Bhattacharjee (2012, p. 35) stated that positivist methods employ a deductive approach to research, starting with the theory and testing the theoretical postulates using empirical data. This study employed positivist methods, and testing hypotheses theoretical constructs by using empirical survey data.

5.4. Research Method

The research method refers to selection of the most appropriate process to solve the problem in the study. There are two most common research methods used quantitative and qualitative (Myers 1997). A qualitative research is about exploring issues, understanding phenomena, and answering questions. This study employed a quantitative research technique i.e. collecting a numerical data to explain a particular phenomenon through structured data collection procedure from a large representative sample (Davis 2000; Saleh 2006). The table 5.2 shows the main elements of quantitative research and meaning of these elements used in the quantitative research.

Table 5.2 Elements of quantitative research

Elements	Quantitative research
Nature of reality	Objective, simple, single tangible sense impressions
Hypothesis	Formulated before the study
Purpose	To test hypothesis that the research begin with
Approach	Objective
The role of values	Value neutral, value free inquiry
Contexts	Independent of context
Study orientation	Is particularistic, studies elements variables
Focus	On variables
Researcher role	Rather passive, separation from object, detached
Emphasis	Places priority on studying differences
Design	Well planned and prescriptive
Key to research	Reliability
Research basis	Based upon facts
Measurement	Objective facts
Sampling	Is representative
Replications	Procedures are standards, and replication is assumed
Data collection	In the form of the numbers from precise measurement
Data analysis	Quantitative and mathematical, extensive use of statistics, reductive
Interpretation	All quantitative results interpreted by using statistics, tables, charts, show the relation with testing the hypothesis, conclusion drawn based upon a data, clarity based on the numerical data
Reporting	It can provide a highly integrated results

Source: Ashley & Boyd (2006, p. 73)

This study used a quantitative research approach for collecting numerical data. It is generally associated with the positivist / post positivist paradigm to explore the scientific inquiry of the phenomena (Crossan 2003). It involves collecting and

converting data into numerical form so that the statistical analysis can be made and conclusions drawn.

Myers (1997) classified research methods in various ways and most common quantitative and qualitative. Some of the qualitative methods are action research, case study research, and ethnography. In qualitative methods data can be obtain from the different sources such as participant observation, interviews and questionnaire, documents and text, and the researcher's impression and reactions (Myers 1997). In this study qualitative research method is used in pilot study only for pre-testing purpose. The quantitative methods are well accepted in the information system or any social or natural science research and different methods are used to collect a data: survey methods, laboratory experiments, and numerical methods. This study adopted the survey method which is discussed in details in section 5.5.

5.5. Survey Method

A survey is one of the most widely used methods for collecting data in a consistent way. Tanur (1982) has defined survey as a “*gathering information about the characteristics, actions, or opinions of a large group of people, referred to as a population*”. Mainly, survey has three distinct characteristics in research (Pinsonneault & Kraemer 1993). Firstly, it produces a quantitative description of some aspect of studied population, relationship between variables, and quantitative method for requiring standardised information. Secondly, it is a main method of collecting information based on people's perceptions using a structured and pre-defined questionnaire. Finally, it collects about a fraction of the study population sample.

Two types of survey are used in research: cross-sectional surveys, and longitudinal surveys (Babbie 1973). Cross-sectional survey is a common type of survey approach that collects data from people at one point in a time (Punch 2003). In this method, data is collected from the entire population and data analyses from tabulation for answering single questions or in more complex situation analysis exploring the relationships between variables. Likewise, longitudinal surveys are other type of survey in which the data are at different points in a time and this can be accomplished by each sampling from a population at different points in a time. The main problem of this approach is that it is hard to follow-up in a group of individuals, and sometimes it can lose the participants. Survey research has several inherent strengths compared to other research methods because it measures the wide range of unobservable data such as peoples' attitudes, beliefs, factual information and behaviours (Bhattacharjee 2012, p. 73).

This study used field survey questionnaire for collecting data. The field surveys capture the snapshots of practices, beliefs, situations from the random sample of subject of the field setting through a survey questionnaire (Bhattacharjee 2012). The following section discusses the field questionnaire survey.

5.5.1. Field Survey Questionnaire

The main purpose of the survey is to collect primary data based on the objective of the research. It is a common tool for asking the questions to the respondents. A survey can be conducted by an email, telephone, personal interview (Face-to-face), or Internet. This study employed the face-to-face questionnaire survey that provides significant advantages in terms of the amount and complexity of the data that can be collected. It has the highest response rate as well as it tries to cover all the issues directly from the respondents (Fricker & Schonlau 2002). The participants of the survey were recruited from government departments and its registered bidders. Firstly, the researcher discussed and asked the questions to the participant about public e-procurement. Secondly, a survey was conducted to collect the data related to measures of the perceived benefits of public e-procurement in the context of reducing corruption.

5.5.2. Research Sampling

As already mentioned in section 5.5 this study adopts a survey methods. Research sampling is another process of section of the sample population. The main goal of survey research is to collect data representative of a population (Kotlik & Higgins 2001). The population for this study was selected from the government departments and it's registered bidders in Nepal.

5.5.2.1. Government Departments

The participants for this study were invited from seven Nepalese government departments including the Department of Road (DOR), Nepal Electric Authority, Department of Urban Development and Building construction, Department of Local Infrastructure Development of Agricultural Road, Roads Board Nepal, Public Procurement Monitoring Office, and Ministry of Irrigation, Department of Water Induced Disaster Prevention. The main reason for selecting these organisations for the study was that they have already implemented and are currently using public e-procurement systems. The departments' name and address were gathered from the Government of Nepal directory (<http://nepal.gov.gov.np>). Then the researcher took further steps to confirm that the participants were implementing and using public e-procurement systems. It quickly turned out that the above-mentioned organisations were using a separate web portal for their procurement.

The Public Procurement Monitoring Office (PPMO) is a guiding body for procurement policy formulation, implementation, and monitoring procurement system in Nepal. The main mission of PPMO is to maintain transparency, accountability, effectiveness, efficiency, and as well as non-discrimination and equality in public procurement processes in Nepal. The PPMO has installed <http://gepson.gov.np> a single web portal system for all public entities of government procurement of Nepal. The PPMO has begun the process of creating a centralised web portal. Some of the government departments are also using the DOR web portal (<http://eproc.dor.gov.np/>) for procurement. DOR was the first organisation to

introduce public e-procurement for submission and opening of bids in Nepal since 2008. It was designed to facilitate the bidder to submit their bids through e-submission.

Research participants included government officers who were involved in procurement and administration sections including Joint Secretary, Director, Senior Divisional Engineer, Computer Officer, IT Manager, and Training Officer. The study used a convenience sampling approach as determined by the level of interest shown by the participants to respond to the survey and finally, 46 government officers from seven government departments were selected to complete a field questionnaire survey. More than Twenty-Five respondents had more than Seven years of experience in the field of public e-procurement.

5.5.2.2. Government Registered Bidders

The second population of the study were the bidders in Nepal and all the bidders were officially registered. These are private companies working for the government purpose and serve as a contractor, supplier, or vendors that respond to an invitation to bid. The Federation of Contractors Association of Nepal (FCAN) is an umbrella organisation of five regional and seventy-five district contractors association, associate, and commodity association member. Currently, 255 companies are associate member of FCAN. All member companies are classified into Class A, Class B, Class C, and Class D based on their equipment possession, work-specialty, and financial aspect. According to FCAN Nepalese Construction Souvenir (2011), one hundred and thirty two companies are in Class A, fifty companies are in Class B and Class C, and thirteen companies are in Class D. Major companies' head offices are located in Kathmandu, Nepal.

This study used a convenience sampling approach as determined by the level of interest shown by the participants to respond to the survey and finally, 220 bidders were responded to complete a questionnaire survey. A face-to-face questionnaire survey was conducted. The researcher discussed and asked questions to the participants about the public e-procurement perceived benefits of public e-procurement. The entire questionnaires were designed to reflect seven latent variables and one dependent variable of the study that determinants of organisation's willingness to participate in government e-procurement system. In addition, how this system helps to reduce the information gap between government and bidders, increase transparency and accountability in procurement system, reduce transaction cost, increase trust among bidders to adopt e-procurement, and reduction of monopoly power of the individual in contracting processes. Previous literature was the main source for developing a survey instruments for the bidders as well. All the respondents were asked to rate the extent to which each of the variables is the area of concern that could influence willingness to participate public e-procurement technology to reduce corruption.

5.5.3. Pilot Study

A pilot study is a mini version of full-scale study and it can be specific pre-testing of research instruments, including research questionnaire or interviews schedule (Polit, Beck & Hungler 2001; van Teijlingen & Hundley 2001). In this study, the preliminary version of the questionnaire was pre-tested through interview. A pre-test was conducted with the group of six senior government officers in Nepal, two procurement officers in Australia, and three academics in an Australian university with the knowledge of perceived benefits of e-procurement in public level. Three steps were followed to conduct pre-testing of the questionnaire. The questionnaire was designed to reflect seven latent variables including perceived usefulness, perceived ease of use, monopoly of power, information asymmetry, trust, transparency and accountability, transaction cost, and one dependent variable intent to adopt e-procurement of the study to determine the organisation to participate or practise public e-procurement system. First, the initial draft of the questionnaire was circulated to the experts. Second, semi-structured interviews were conducted and the results were then discussed with an experts. Third, the contents of the questionnaire were modified, deleted, and added whenever necessary following the feedbacks of the experts.

In research, validity can be established using a panel of experts or a field test. There are different types of validity (content, construct, face, and internal) used based on the objective of the study. In the context of the preparing the final survey instruments, content and face validity were employed in this pilot study for getting a generic feedback and suggestions of the survey instruments from the expert in the field. Face and content validity are the very important key entities of instrument development in the survey research to obtain the confidence results from the survey (Burton & Mazerolle 2011a).

5.5.3.1. Content Validity

Content validity refers to the representativeness or sampling adequacy of the content (Ives, Olson & Baroudi 1983). There are no tests to determine whether a measure adequately covers the content area or adequately represents a construct (Cooper & Schindler 2003). Content validity is to use a panel of expert to judge how well the instrument meets the standard and the expert panel judge all the items independently based on the content, scope, and propose. As mentioned in section 5.5.3 the pilot study involved academic experts, procurement professionals, and senior government officers with extensive knowledge of information systems, electronic government, e-commerce, and public e-procurement. Perceived benefits in reducing corruption were explored many times at various stages of finalizing the final survey instruments. Finally, the questionnaires were refined based on the feedback and suggestions of the expert group.

5.5.3.2.Face Validity

Face validity is defined as to whether an indicator seems to be a reasonable measure of its underlying construct “on its face” (Bhattacharjee 2012, p. 58). The main purpose of face validity is establishing an instruments ease of use, clarity and readability (Burton & Mazerolle 2011b). The process of pre-testing the questionnaire was supported by the face validity. The expert panel was involved in conducting the pilot study. The pilot helped explore if questions were relevant and appropriate for perceived benefits of e-procurement research. All the issues of survey items raised by the expert panel were included and modified for improvement for the final survey questionnaire.

5.5.4. Final Survey Instrument

Following the suggestions from and feedbacks of the expert panel, the final survey instrument was developed. Two sets of questionnaire were developed for this study: one for: government officers, the other for government registered bidders. Both final survey instruments, cover page provides survey titles “Survey of the potential of public e-procurement technology in practice – To reduce corruption in public procurement” for government officers or register bidders. In addition, cover page provides contact details of researcher as well. Second page title “survey instruments for government officers or government register bidders” provides a project details. Third page is a consent form and every participant is to sign that form after completing a survey questionnaire. There are two sections in the survey questionnaire (Part 1) general information (Part 2) impact of e-procurement in government and bidders relations. The table 5.3 shows the overview of total questionnaires and its items and all final questionnaire items are in Appendix B and C.

Table 5.3 Summary of total questionnaire and items

Government officers perspective	Bidders perspective
Q1 to Q4: General information	Q1 to Q5: General information
Q5 to Q12: Impact of e-procurement in government and bidders relations	Q6 to Q13: Impact of e-procurement in government and bidders relations
Q5: 5 items	Q6: 4 items
Q6: 6 items	Q7: 6 items
Q7: 6 items	Q8: 6 items
Q8: 7 items	Q9: 6 items
Q9: 6 items	Q10: 4 items
Q10: 5 items	Q11: 4 items
Q11: 10 items	Q12: 6 items
Q12: 6 items	Q13: 10 items

5.5.4.1. Scale of Measurement

The Likert scale, which is developed by Renis Likert (1932), is the most commonly used approach to scaling the responses of people's perceptions on the particular issues in survey research and is very popular for measuring ordinal data in social science, marketing and management, information systems and others research (Alexandrov 2010; Bhattacharjee 2012). Therefore, this study also adopted this Likert scale to evaluate the perceptions of the government and bidders on the potential of e-procurement in reducing corruption. The five-point scale was used to measure the perceptions: '1' represents 'Strongly disagree' while '5' represents 'Strongly agree'. The rest '2', '3' and '4' are for 'Disagree', 'Neutral' and 'Agree' respectively.

5.5.5. Operationalisation of Constructs

Operationalisation is the process developing an indicator or items for measuring a construct or variables. As discussed in Chapter Three, study has identified seven independent constructs (variables) and one dependent construct. Each construct contains several items and their attributes. As mentioned in section 5.8.1, five-point scale was used to measure each construct items. Sections below 5.9.1 and 5.9.2 discuss both depended and independent constructs with supporting literature used a construct.

5.5.5.1. Dependent Variable

The intent to adopt e-procurement technology is the dependent variable in this study that demonstrates adoption and use of public e-procurement as a way to transform or reform the government system. Government institutions can do their all procurement activities through their e-procurement web portal, such as procurement planning, tendering, and the awarding of contracts that help to make these processes more transparent and accountable, as well as reducing opportunities and incentives for fraud. Bidders can easily access all of the procurement information online, and submit their bids online anytime and anywhere.

Some studies have used ICT adoption as a dependent variable. Alam, Noor & Kamal (2009) conducted a study of ICT adoption in SMEs in Malaysia in order to examine the relationship between ICT adoption and five factors including perceived benefits, perceived cost, ICT knowledge, external pressure and government support. Lai & Li (2005) examined the relationships between TAM constructs in the context of Internet banking acceptance. Further, Al-Moalla & Li (2010) conducted their study into electronic procurement adoption in the United Arab Emirates, and examined the organisational issues within electronic procurement. The main contribution made through the study of the intent to adopt e-procurement is in to determine the relationship between seven independent variables; namely information asymmetry, monopoly of power, trust, perceived usefulness, perceived ease of use, transparency and accountability, and transaction cost. Appendices B and C provide data of the measurement items of the dependent variables on the perception of government and

its bidders. All the measurement items were adopted from the previous literature and modified to fit into the context of this study. Table 5.4 depicts the support in the literature for various studies to include intent to adopt e-procurement as dependent variables.

Table 5.4 Support in the literature for measuring intent to adopt e-procurement construct

Construct (Dependent)	Study context	References
E-procurement adoption	Electronic government procurement adoption behaviour on Malaysian SMEs	(Yusoff & Islam 2011)
Behavioural Intention to use e-procurement system	Employees adoption of e-procurement system: An empirical study	(Singh & Punia 2011)
Acceptance of e-procurement systems	Identifying factors affecting acceptance of e-procurement systems: an initial qualitative study at an Australian city council	(Rahim 2008)
Intention to use e-procurement	Predicting e-procurement adoption in a developing country An empirical integration of technology acceptance model and theory of planned behaviour	(Aboelmaged 2010)
Intent to adopt public e-procurement technology	Evaluating the anti-corruption capability of public e-procurement in a developing country	(Neupane, Soar, et al. 2012c)
Intended use	Trust and Tam in online shopping: an integrated model	(Gefen, Karahanna & Straub 2003)

5.5.5.2. Independent Variables

As discussed in Chapter Four, this study has selected seven independent constructs for research model and data analysis purpose. Each construct has different items and the items and each item was measured by respondent's perceptions on e-procurement and its uses as corruption reduction strategy. Appendices B and C show all measurement items of the independent variables and they were based on the previous literature support and were modified in the context of this study. Table 5.5 depicts the literature support of various studies that have identified various drivers of corruption and some of them were used as independent variables.

Table 5.5 Key literature supports for independent variables

Construct (Independent)	Study context	Research methods / data collection	Main measurement items	References
Information asymmetry	Information transfer in B2B procurement: an empirical analysis and measurement	Questionnaire survey	Information sharing Monitoring and control	(Kim & Umanath 2005)
Monopoly power	An empirical analysis of the relationship between e-government and corruption.	Comprehensive survey based on independent and reputable institutions	Corruption perception index (CPI) Global e-government readiness index (e-government development index)	(Mistry & Jalal 2012)
Increasing trust	Conceptualizing citizen's trust in e-government: application of Q methodology	Q-methodology used for validate the measurement items	Q-sorting-validate the measurement items Institutions based trust Website quality Deposition to trust	(Alsaghier et al. 2009)
	Measuring the public value of e-government	National survey data	Development of trust: security and privacy, transparency, trust, and participation	(Karunasena,Deng & Singh 2011)
	Adoption of e-procurement and participation of e-marketplace on firm performance: Trust as a moderator	Questionnaire	Ability Friendliness Safety Predictability	(Chang & Wong 2010)
	Trust and risk in e-government adoption	Paper based survey	Trust of the Internet Trust of the government Disposition to trust	(Belanger & Carter 2008)
Perceived usefulness and perceived ease of use	Conceptualizing citizen's trust in e-government: application of Q methodology	Applied Q-methodology for validation of questionnaire	Perceived usefulness Perceived ease of use	(Alsaghier et al. 2009)
	Trust and Tam in online shopping: an integrated model	Field study- Asking questions	Perceived usefulness Perceived ease of use	(Gefen et al. 2003)

Construct (Independent)	Study context	Research methods / data collection	Main measurement items	References
	An extension of trust and TAM model with TPB in the initial adoption of on-online tax: an empirical study	Online-questionnaire survey	Perceived usefulness Perceived ease of use	(Wu & Chen 2005)
	Perceived usefulness, perceived ease of use, and user acceptance of information technology	Field study questionnaire – Study 1 and study 2 (Lab study)	Perceived usefulness Perceived ease of use	(Davis 1989)
	Evaluating the anti-corruption capabilities of public e-procurement in a developing country	Field questionnaire survey	Perceived usefulness Perceived ease of use	(Neupane, Soar, et al. 2012c)
	Adoption of Internet banking; an empirical study in Hong Kong	Questionnaire survey	Perceived usefulness, perceived ease of use	(Cheng, Lam & Yeung 2006)
	Examining role of usefulness, ease of use and social influence on Jordanian Citizen's intention to adopt e-government	Survey	Perceived Ease of Use, perceived usefulness Social Influence	(Alryalat et al. 2013)
Transaction cost	Investigating the role of information technology in building buyer-supplier relationships	Survey	Effort and cost, monitoring, addressing the problem, advantage	(Grover, Teng & Fiedler 2003)
	What is the value of an It e-procurement system?	Panel expert	Order cost, administrative cost, opportunity cost of capital, lead time opportunity cost	(Ronchi et al. 2010)
	The performance impact of implementing Web-based e-procurement systems	Questionnaire survey	Process operation, collaboration operation, transaction cycle time error rate, information sharing, technology dependence, supplier performance Buyer integrated process Buyer organisational performance	(Tai et al. 2010)

Construct (Independent)	Study context	Research methods / data collection	Main measurement items	References
Transparency and accountability	The Role of Technology in enhancing Transparency and accountability in public sector organisations of Pakistan	Survey	Information access, empowerment of employee	(Haque & Pathrannarakul 2013)
	Role of public e-procurement technology to reduce corruption in government procurement	Literature survey (50 countries case example)	Transparency and accountability	(Neupane, Soar, et al. 2012)
	Does E-government promote Accountability? A comparative Analysis of website openness and Government Accountability	14 Countries case example	Transparency change openness change	(Wong & Welch 2004)
	An institutional analysis of an e-government system for anti-corruption: The case of OPEN	Single case study First round Interviews Semi-structured interviews Secondary data	Case analysis focus on strategies to fight corruption (Access to information and empowerment, prevention, enforcement, and capacity building)	(Kim et al. 2009)

5.6. Data Analysis Strategy

Different statistical techniques were employed to analyse the quantitative data of this study. Partial Least Squares (PLS) and Structural Equation Modeling (SEM) approaches were used to test the study research model and hypothesis. SmartPLS 2.0 and AMOS 21.0 software has been used for data analysis.

5.6.1. Partial Least Squares Path Modeling (PLS-PM)

The PLS (Partial Least Squares) approach to structural equation models also known as a PLS Path Modelling (PLS-PM) or Partial Least Squares Structural Equation Modelling (PLS-SEM) has been proposed for the component-based estimation method (Hair Jr et al. 2013; Vinzi, Trinchera & Amato 2010). Fornell and Bookstein (1982) demonstrated that PLS-PM explains at best residual variance of the latent variables and manifest variables in any regression run in the model. The number of respondents of government sample is very small. Thus, this study is employed using PLS-SEM approach for data analysis.

There are different valid explanations as to why PLS is an important technique for data analysis, and has been used in various field of computer science, marketing, management and psychology (Ismail, Hamid & Idris 2012). Literature suggests that generally PLS is used when the sample size is relatively small (Chin 1998a; Henseler, Ringle & Sinkovics 2009; Lehner & Haas 2010; Wetzels, Odekerken-Schroder & Van Oppen 2009). It also predicts complex relationships in a large model with multiple independent variables and multiple dependent variables (Abdi 2003). Likewise, PLS is the prediction of dependent endogenous variables as PLS generates latent variable scores that can be used to predict models (Chin 1998a; Henseler et al. 2009), and supports continuous moderation without losing information (Chin 1998a). The Table 5.6 shows the summary of previous literature as it relates the perceived benefits of the use of the PLS approach.

Table 5.6 Perceived benefits of PLS-SEM

Importance of PLS	References
Predict complex relationships within large models with multiple independent and dependent variables	(Abdi 2003)
Special features for multi-group comparison	(Chin & Dibbern 2010)
Prediction of dependent endogenous variables as PLS generates latent variables scores that can be used to predict model	(Chin 1998a; Henseler et al. 2009)
It is used when the sample size is comparatively small	(Chin 1998a; Henseler et al. 2009; Lehner & Haas 2010; Wetzels et al. 2009)
PLS uses a combination of principal component analysis, path analysis, and regression to simultaneously evaluate theory and data	(Pedhazur 1982)
PLS takes each latent variables as an estimate of its respective blocks of measurement items	(Aibinu & Al-Lawati 2010)
PLS-PM is that is suitable for prediction-oriented research.	(Henseler et al. 2009)
PLS-SEM is regarded as a variance-based approach to SEM	(Hair Jr et al. 2013)

PLS Path Modelling (PLS-PM) has been considered a very flexible and soft modelling approach to multi block analysis by the means of both hierarchical PLS path model and more as exploratory approach than a confirmatory one (Vinzi et al. 2010). Hanafi (2007) pointed out PLS-PM a statistically different approach from covariance structure analysis for path analysis with latent variables, interpretation of the basic entities of model, type, and parameters.

Two steps process is used to evaluate the PLS-PM assessment (a) outer model assessment for checking reliability and validity of reflective constructs, and validity of formative constructs (b) inner model assessment for checking the variance explanation of endogenous constructs, effects sizes and reductive relevance. Cronbach's α and Composite reliability (CR) is used to examined internal reliability of latent variables in PLS path models. Threshold value of the Cronbach's α and Composite reliability (CR) is greater than 0.70. Two validity subtypes are used to examine the validity: convergent validity and the discriminant validity. Average Variance Extracted (AVE) value examined the convergent validity that is greater than 0.50 indicates the sufficient level of convergent validity (Henseler et al. 2009), meaning that a latent variable is able to explain more than half of the variance of its indicators on average (Gotz, Liehr-Gobbers & Krafft 2010).

For assessing the PLS-PM structural model estimation, two indicators are used to valid a PLS-PM model: R^2 (Coefficient of determination) and standardized path coefficient. The exploratory power of the PLS-PM model can be evaluated by examining the amount of variation dependent variable. Chin (1998a, p. 323) rank the R^2 of endogenous latent variables in the path model values of 0.67 (Substantial), 0.33 (Moderate), or 0.19 (weak). The standardised path coefficient value represents the estimated values of the path relationship in structural model. The strength of the path coefficient value is suggested by Urbach and Ahlemann (2010), Chin (1998a): 0.2 weak, value between 0.2 to 0.5 is moderate, and more than 0.5 is strong.

5.6.2. Structural Equations Modeling (SEM)

SEM is one of the popular and mature research tools that is used to investigate theory-driven structural or causal hypotheses (Mueller & Hancock 2008). SEM is based on modelling the relationship among multiple independent constructs and dependent constructs simultaneously (Gefen, Straub & Boudreau 2000; Saghaei & Ghasemi 2009). SEM is very useful for this study to answer research questions a set of interrelated research questions in a single, systematic, and comprehensive analysis (Gefen et al. 2000).

Byrne (2010, p. 3) stated four aspects of SEM apart from the older generation of multivariate procedures: (a) it is confirmatory data analysis rather than an exploratory approach (b) SEM provides explicit estimates of errors variance parameters (c) SEM techniques can incorporate both unobserved (Latent) and observed variables (d) there are no widely applied alternative methods for modelling multivariate relations, or estimating point and interval indirect effects. These important features of SEM methodology can be used to test the proposed research model and examines the relationship between independent and dependent construct. Prior research applied SEM techniques very effectively to address the numerous

research problems in different disciplines such as computer science, marketing, social science (Hair, Ringle & Sarstedt 2011; Hooper, Coughlan & Mullen 2008).

This study examine the relationships among information asymmetry, monopoly power, trust, perceived ease of use, perceived usefulness, transaction cost, transparency and accountability, and intent to adopt e-procurement. The main objective of SEM is used to test the theoretical model and compared the modelled relationships with the observed scores. There is some justification why SEM is the best tools to analyse the bidders sample data.

- ❖ In general, SEM estimates the relationship between latent variables, allow for explicit tests of competing models, explore direct, indirect and total effects, and explore multivariate relationships in an integrated manner (Schreiber et al. 2006; Ullman 2006).
- ❖ In specific, scale development CFA analysis, mediation test plausibility of simple and complex mediational models, between group model stability, graphical representation of the patterns of correlates between a set of variable (Byrne 2010; Noar 2003; Qureshi & Compeau 2009).
- ❖ It is most widely recognised data analysis technique across various disciplines such as computer science marketing, management, social science and most importantly in social science research (Hair et al. 2011; Hooper et al. 2008).
- ❖ The main feature of SEM is to compare the model to empirical data and comparison is based on the assessment of fit-statistics of model and data (Nachtigall et al. 2003).
- ❖ SEM is the most powerful multivariate techniques to examine the casual modelling or path analysis (Ullman 2006).

SEM provides two sub models: measurement model and the structural model (path model) (Hair et al. 2010). Measurement model explains the relations between the observed and unobserved variables. It also provides the link between scores on a measuring instruments and the underlying construct (Byrne 2010). The measurement model constitutes the entire structural equation modelling that is referring to as Confirmatory Factor Analysis (CFA). CFA is used to validate the items explicitly measuring individual latent construct. Before testing the measurement model, the first-order latent construct was undertaken by using CFA that help to examine the individual reliability, international consistency reliability, and convergent and discriminant validity of the items (Hung et al. 2013). On the other hand, structural model represents the interrelationship of variables between constructs and it is also known as “*set of one or more dependence relationships linking the hypothesised model’s construct*” (Hair et al. 2010, p. 634). This study research model has examined in both measurement model and structural model. Different fit indicators are used to evaluate both measurement model and structural model. The table 5.7 illustrates the goodness to fit indicators, their explanation, threshold value, and supporting references of overall SEM.

Table 5.7 Fit indices for measurement model and structural model

Goodness-of-fit indices	Description	Threshold	Source
p-value	P-value (probability value) is a numerical measure of the statistical significance of a hypothesis test. If the p-value is less than 0.05, the results are statistically significant.	$P < 0.05$	(Byrne 2010)
X^2/df (Chi-square / degree of freedom)	Chi-square (χ^2) measure the difference used to compare the observed and estimated covariance matrices and degrees of freedom (df) are the number of non-redundant covariances/correlations in the input matrix minus the number of estimated coefficient. $X^2/df \leq 2.0$ (or 3.0 or even 5.0) considered as acceptable value.	< 3.00	(Hair et al. 2010)
GFI (Goodness of fit index)	Tabachnick & Fidell (2007) stated that goodness of fit index (GFI) calculates the proportion of variance that is accounted for by the estimated population covariance. The values ranges between 0 and 1, with higher value indicating better model fit. Most of the authors stated that GFI values should be 0.90, on the other hand Byrne (1998) and Greenspoon and Saklofske (1998) work suggest that GFI index must be exceed 0.80 indication of good fit.	> 0.90	(Byrne 1998; Greenspoon & Saklofske 1998; Tabachnick & Fidell 2007)
AGFI (Adjusted Goodness of fit index)	AGFI is used to measure adjusted by the ratio of degree of freedom for a proposed model to the total degree of freedom available (Hair et al. 2010). Liu et al.(2004) research pointed that the recommended value of AGFI is ≥ 0.80 .	> 0.80	(Hair et al. 2010; Liu et al. 2004)
NFI (Normed Fit Index)	The norm fit index (NFI) is one of the original incremental fit indices. According to Hair et al (2010, p. 668) “ <i>NFI is a ratio of the differences χ^2 value for the fitted model and a null model divided by the χ^2 value for the null model</i> ”. NFI values ranges between 0 and 1, higher value preferred as good model fit. Tasmin and Woods (2008) research highlighted NFI values ≥ 0.9 means satisfactory fit, $NFI \geq 0.80$ means acceptable fit.	> 0.90	(Hair et al. 2010)
CFI (Comparative fit Index)	The comparative fit index is an improved version of the Normed Fit Index (NFI), value ranges between 0 and 1, higher value indicates a good fit. Hair et al (2010, p. 669) stated that CFI values above 0.90 are usually associated with a model fits well.	> 0.90	(Hair et al. 2010)
RMSEA (Root Mean Square Error of Approximation)	Hair et al. (2010, p. 667) stated that “ <i>RSMEA is one of the most widely used measures that attempts to correct the tendency of the χ^2 GOF test statistic to reject the models with a large sample size</i> ”. Different authors stated different cut of level value of RMSEA for example Parent, Vandebek & Gemino (2005) and Chang & Wong (2010) suggested RMSEA value is < 0.08 , Hu and Bentler (1999) suggested that the cutoff value of RMSEA is 0.06 and $N \leq 250$.	< 0.08	(Chang & Wong 2010; Hair et al. 2010; Hu & Bentler 1999; Parent et al. 2005)
PCLOSE (P of Close Fit)	PCLOSE is used to test of closeness fit in AMOS. It tests the hypothesis that the RMSEA is good in the population (no greater than 0.05)	< 0.05	(Byrne 2010)

5.7. Ethical Considerations

Ethical clearance is compulsory for all research work especially where the human contribution is the main source for the data collection. This study has directly involved people through the process of pilot study and questionnaire survey. Therefore, this study followed all the ethical procedure to obtain the ethical clearance from the USQ ethics committee. On the other hand, all the participants in the questionnaire survey were notified as voluntary participants and it was clearly stated that if participant had any problems in filling the questionnaire survey, they had a choice to withdraw at any stage of the project. Incomplete survey questionnaire were destroyed. Most importantly, all the participants were signed a consent form. Furthermore, all the written documents and filled questionnaires were stored safe in a filing cabinet and all the documents will be stored for five years and then will be destroyed according to USQ policy.

5.8. Conclusions

In this Chapter, the research methodology and data analysis strategy were described. This study employed the positivist paradigm to intent to adopt public e-procurement technology in government, and to explore the potential of public e-procurement technology to reduce corruption in government procurement. Before the final field survey, study conducted the pilot study that helped to refine the questionnaire. Finally, field survey questionnaires were selected as the best approach to explore the research problems and answer the research questions. In the next Chapter, the data analysis and instrument validation will be conducted using statistical software SPSS 21.0 and AMOS 21.0, Partial Least Squares (PLS), Structural Equation Modelling (SEM) and the results are presented.

CHAPTER SIX

DATA ANALYSIS FOR GOVERNMENT OFFICER

6.1. Chapter Overview

The previous Chapter explored the research methodology and data collection used to answer the main research questions. This Chapter covers the various statistical techniques and tools used to analyse the government officer's sample collected data using partial Least Square (PLS) SmartPLS 2.0 and SPSS version 21.0. The main content of this chapter includes introduction, questionnaire validity, reliability, and content validity of data used in this research, and followed by different stages of measurement (PLS-PM) structural model, hypothesis testing, and finally conclusion of the chapter.

A brief structure of the outline of this Chapter is shown in figure 6.1.

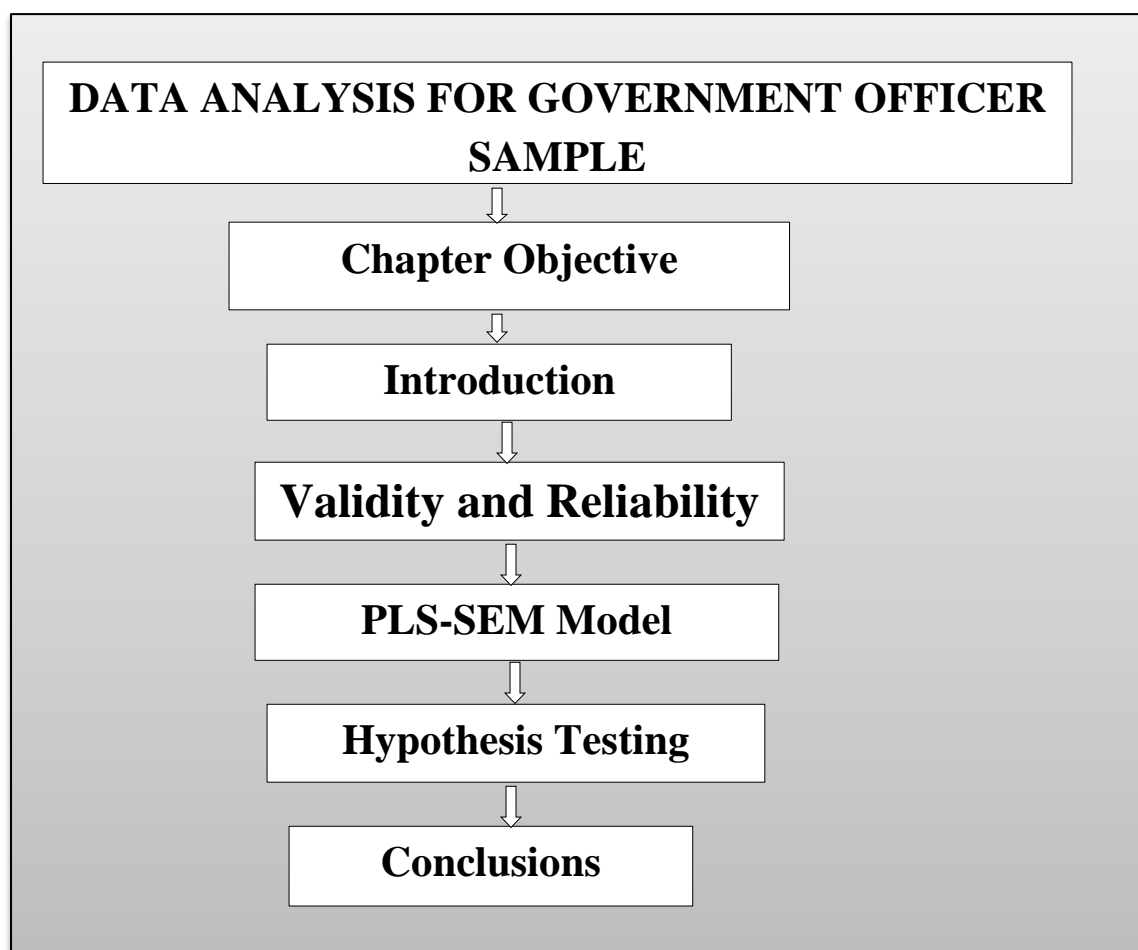


Figure 6.1 Chapter 6 overview

6.2. Introduction

Government officers are the main key stakeholders implementing and practising public e-procurement in public level and government departments are the guiding body for procurement policy formulation, implementation, and monitoring a system. Accordingly, their perception can played a significant role to an effective assessment

of reducing corruption in public level through the technology. Seven independent constructs and one dependent construct was employed in this study to evaluate the potential of public e-procurement technology to reducing corruption, namely: information asymmetry, monopoly of power, perceived usefulness, ease of use, increasing trust, reducing transaction cost, increasing transparency and accountability, intent to adopt e-procurement system.

The questionnaire survey was used to collect quantitative data on the perceptions of government officers. After collecting the data, another important processes are required before a final analysis of the data; this is known as the process of data and instrument validation. Instrument validation is an important component to the survey research method (Burton & Mazerolle 2011b) which identify the reliability and validity of the data used in the research. Before undertaking a detailed analysis of data, all the participant responses should be vetted for consistency and completeness of the entire questionnaire. In addition to that, all the respondents were answered the entire complete questionnaire or not if they were not answered the entire questionnaire, all the missing value were not included in the statistical analysis. Descriptive statistics, Cronbach's alpha value, Average of Variance Extracted (AVE), Cross loading analysis, Pearson's correlation were applied the validity and reliability of questionnaire data government officer sample. PLS Path Modelling (PLS-PM) techniques are considered to be a very flexible and soft modelling approach to multi block analysis of data (Vinzi et al. 2010) and PLS-PM approach was applied to test the research model on the government officer sample data. The SPSS is used for initial analysis and checking the validity of data such as descriptive statistical analysis.

6.3. Descriptive Statistics

Descriptive statistics is an initial step in statistical analysis procedure (Cooper & Schindler 2003). It gives numerical and graphical procedures to summarise a collection of data in a simple and understandable manner and give the audience an overall sense of the data being analysed. For The typical examples of descriptive measures are the mean, median, the standard deviations and the classical measures of skewness, kurtosis and correlation (Bickel & Lehmann 2012). In this regards, the sample responses of the government sample data was only 46 responses. As we already mention in chapter 5, all the variables were coded on a five point Likert scale with ranging from "Strongly Disagree" to "Strongly Agree".

Figure 6.2 demonstrates the demographic information on the respondents from the government and Figure 6.2 clearly demonstrates that more than twenty-five respondents had more than seven years of experience in procurement and administration sections including positions joint secretary, director, senior divisional engineer, computer officer, and IT manager.

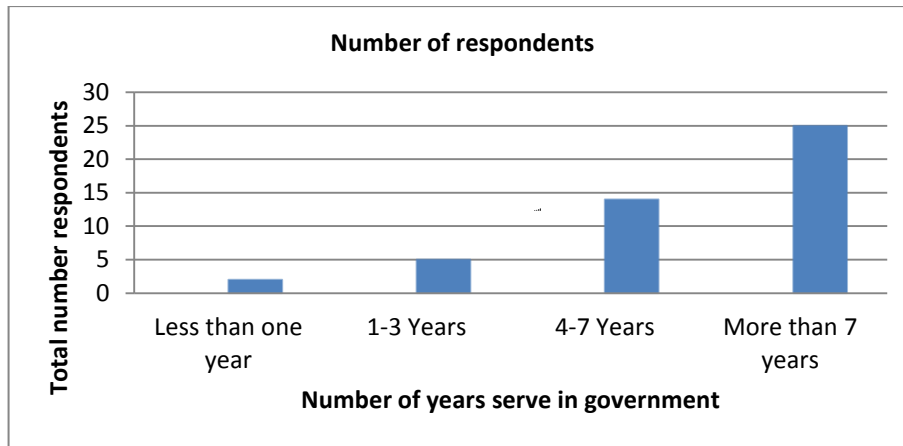


Figure 6.2 Total years served by government officers in an organisation

6.3.1. Information Asymmetry

Appendix D represents the descriptive statistics of information asymmetry construct and six items were used to measure the items. The mean of the information asymmetry items ranges from 3.26 for IA5 to 4.43 for IA4. Similarly, the standard deviation of information asymmetry variables data items ranges from 0.655 for IA4 and 0.963 for IA3.

6.3.2. Monopoly Power

Appendix D shows the descriptive statistics of monopoly of power. The seven items were employed to measure the monopoly of power. The mean of the monopoly of power items ranges from 2.96 for MP6 to 4.20 for MP7. Similarly, the standard deviation of monopoly of power variables data items ranges from 0.619 for MP7 and 1.09 for MP5.

6.3.3. Increasing Trust

Increasing trust between government officers and its register bidders were measured by six times as shown in Appendix D. The mean of the increasing trust items ranges from 4.28 for IT5 to 4.33 for IT4. Similarly, the standard deviation of increasing trust variables data items ranges from 0.621 for IT3 and 0.98 for IT6.

6.3.4. Perceived Usefulness

The perceived usefulness of public e-procurement technology construct was measured by five times as shown in Appendix D. The ranges of mean of perceived usefulness items were from 3.91 for PU4 to 4.59 for PU5. Similarly, the standard deviation ranges from 4.98 for PU5 to 0.812 for PU4.

6.3.5. Perceived Ease of Use

The six items as shown in Appendix D measured perceived ease of use of the public e-procurement technology. The mean ratio of all the items was from 4.02 for PEU1

to 4.83 for PEU2. Likewise, the standard deviation ranges from 5.29 for PEU6 to 0.882 for PEU1.

6.3.6. Transaction Cost

The five items as shown in Appendix D measured transaction cost of the public e-procurement technology. The mean ratio of all the items was from 3.33 for TC3 to 3.98 for TC5. Likewise, the standard deviation ranges from 0.967 for TC3 to 1.33 for TC2.

6.3.7. Transparency and Accountability

The ten items as shown in Appendix D measured transparency and accountability. The mean ratio of all the items was from 2.91 for TA6 to 4.17 for TA1. Likewise, the standard deviation ranges from 0.590 for TA3 to 0.953 for TA10.

6.3.8. Intent to Adopt E-procurement

The ten items as shown in Appendix D measured intent to adopt public e-procurement. The mean ratio of all the items was from 3.50 for ITA2 to 4.83 for ITA6. Likewise, the standard deviation ranges from 0.383 for ITA3 to 1.218 for ITA3.

6.4. Initial Stage Measurement Model

The Smart PLS 2.0 is used to run the measurement model for government officer sample data. Figure 6.3 demonstrated the initial stage of measurement model that shows how the observed variables relates to their constructs (Guo et al. 2011). Testing of validity and reliability of the model data is another import process. In this regards, Average Variance Extracted (AVE), composite reliability (CR), and Cronbach's alpha were used to test the reliability and validity of the measurement model. Various scholars have already pointed that threshold value of AVE, CR, and Cronbach's alpha $>.50$, >0.70 , and >0.7 respectively. Further, factor loading of items should be consider and acceptable greater than 0.5 (Lew & Sinkovics 2012, p. 23) and some instance 0.40 can be acceptable level (Chin 1998a). The entire factor loading value less than 0.5 should be eliminated from the model. In initial stage, figure 6.3 shows the results of measurement model with seven latent variables information asymmetry (IA), monopoly of power (MP), perceived usefulness (PU), perceived ease of use (PEU), increasing trust (IT), transaction cost (TC) and transparency and accountability (TA). Similarly, reliability of cross loading value result is illustrated in Table 6.1 in order to judge internal consistency of each item. According to the Table 6.1 some of the cross loading value is less than thresholds values 0.40 so study eliminate those items form the model. For example, information asymmetry construct item IA6 0.310, monopoly of power construct items MP3 0.369, and MP7 -0.025, perceived usefulness construct items PU3 0.023, PU4 -0.054, transparency and accountability construct item TA6 0.313 were deleted from the measurement model.

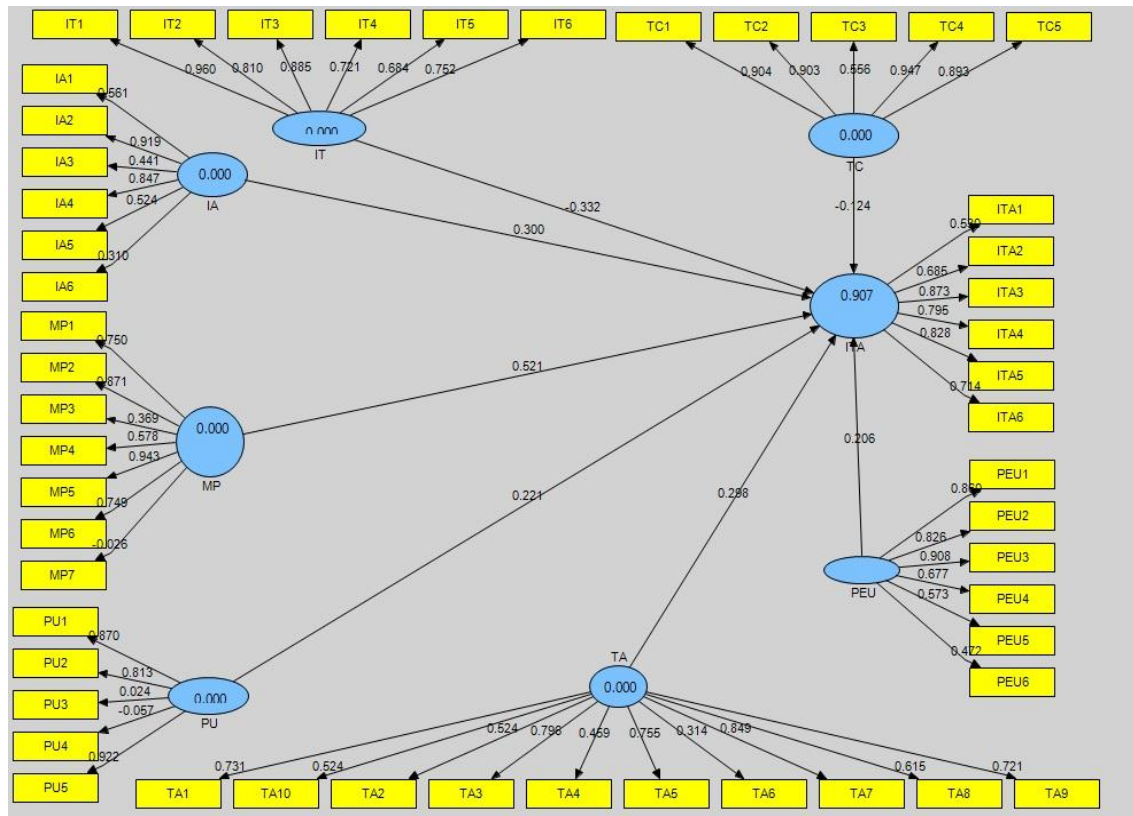


Figure 6.3 Initial stage measurement model of government officer sample

Table 6.1 Cross loading value of the construct of the government officer sample

Items code	IA	IT	ITA	MP	PEU	PU	TA	TC
IA1	0.561	0.050	0.559	0.559	0.544	0.236	0.271	0.708
IA2	0.918	0.428	0.868	0.856	0.564	0.285	0.720	0.918
IA3	0.441	0.059	0.306	0.346	-0.105	-0.058	0.199	0.201
IA4	0.847	0.391	0.691	0.480	0.552	0.448	0.641	0.520
IA5	0.523	0.057	0.365	0.398	-0.172	-0.080	0.253	0.143
IA6	0.310	0.687	0.259	-0.015	0.446	0.346	0.589	0.101
IT1	0.415	0.959	0.339	0.267	0.693	0.252	0.780	0.465
IT2	0.293	0.809	0.199	0.246	0.626	0.266	0.614	0.538
IT3	0.523	0.884	0.315	0.399	0.468	0.102	0.696	0.368
IT4	0.128	0.721	0.047	0.130	0.362	0.011	0.437	0.123
IT5	0.077	0.683	0.098	-0.066	0.274	0.108	0.528	0.037
IT6	0.162	0.751	0.075	-0.105	0.293	0.177	0.569	0.002
ITA1	0.403	-0.007	0.529	0.316	0.598	0.563	0.286	0.582
ITA2	0.494	-0.088	0.684	0.724	0.069	-0.104	0.211	0.482
ITA3	0.831	0.518	0.872	0.604	0.583	0.395	0.771	0.653
ITA4	0.680	0.578	0.795	0.649	0.643	0.334	0.721	0.768
ITA5	0.769	0.140	0.828	0.565	0.433	0.569	0.464	0.535
ITA6	0.643	0.072	0.713	0.674	0.442	0.133	0.494	0.528

Items code	IA	IT	ITA	MP	PEU	PU	TA	TC
MP1	0.719	0.062	0.758	0.750	0.497	0.216	0.374	0.799
MP2	0.682	0.482	0.594	0.870	0.442	-0.083	0.525	0.705
MP3	0.133	0.292	0.013	0.369	0.132	-0.137	0.078	0.248
MP4	0.173	0.383	0.280	0.578	0.238	-0.227	0.319	0.481
MP5	0.757	0.209	0.771	0.942	0.343	-0.057	0.487	0.656
MP6	0.463	0.123	0.524	0.748	0.008	-0.207	0.309	0.389
MP7	-0.283	0.157	-0.060	-0.025	0.023	-0.194	-0.042	-0.217
PEU1	0.553	0.726	0.501	0.193	0.859	0.613	0.747	0.545
PEU2	0.566	0.527	0.626	0.370	0.825	0.598	0.610	0.685
PEU3	0.355	0.475	0.453	0.249	0.907	0.492	0.568	0.558
PEU4	0.464	0.297	0.533	0.618	0.677	0.045	0.451	0.510
PEU5	0.112	0.421	0.209	0.016	0.573	0.098	0.422	0.112
PEU6	0.115	0.170	0.113	0.039	0.471	0.039	0.223	0.028
PU1	0.220	0.080	0.335	-0.049	0.345	0.870	0.328	0.212
PU2	0.380	0.250	0.342	-0.010	0.398	0.812	0.357	0.259
PU3	-0.050	0.161	-0.063	0.052	0.040	0.023	0.140	-0.013
PU4	-0.230	-0.136	0.021	0.012	-0.050	-0.057	-0.187	-0.128
PU5	0.309	0.242	0.428	-0.032	0.552	0.921	0.456	0.224
TA1	0.684	0.480	0.534	0.622	0.422	-0.054	0.731	0.637
TA10	0.343	0.437	0.211	0.307	0.167	0.024	0.524	0.185
TA2	0.343	0.437	0.211	0.307	0.167	0.024	0.524	0.185
TA3	0.737	0.446	0.744	0.429	0.735	0.623	0.796	0.711
TA4	-0.013	0.461	0.140	-0.187	0.243	0.333	0.458	-0.061
TA5	0.409	0.767	0.450	0.247	0.546	0.301	0.755	0.374
TA6	0.205	0.244	0.315	0.098	0.228	0.396	0.313	0.210
TA7	0.546	0.782	0.550	0.440	0.763	0.391	0.848	0.745
TA8	0.205	0.771	0.096	-0.023	0.685	0.407	0.614	0.237
TA9	0.509	0.516	0.394	0.414	0.351	0.202	0.721	0.378
TC1	0.658	0.460	0.642	0.589	0.715	0.347	0.634	0.903
TC2	0.600	0.190	0.601	0.681	0.520	0.190	0.478	0.902
TC3	0.465	-0.095	0.434	0.609	0.041	-0.223	0.158	0.556
TC4	0.779	0.420	0.753	0.746	0.675	0.360	0.675	0.946
TC5	0.837	0.607	0.845	0.754	0.683	0.279	0.830	0.893

Note: IA=Information Asymmetry; IT=Increasing Trust; ITA=Intent to adopt e-procurement; MP=Monopoly of Power; PEU=Perceived Ease of Use; PU= Perceived Usefulness; TA=Transaction Cost; TA= Transparency and Accountability.

Table 6.2 shows the initial stage of the reliability and validity of the constructs. According to table 6.2 of the overall construct AVE, Cronbach's alpha value is less than thresholds value.

Table 6.2 Initial stage measuring reliability of constructs

Constructs	AVE	Composite Reliability	Cronbach's Alpha
Information Asymmetry (IA)	0.406957	0.784803	0.671249
Increasing Trust (IT)	0.652186	0.917309	0.903882
Intent to adopt e-procurement (ITA)	0.556533	0.880349	0.833061
Monopoly of Power (MP)	0.463022	0.826661	0.795225
Perceived Ease of Use (PEU)	0.542497	0.871547	0.837600
Perceived Usefulness (PU)	0.454313	0.707912	0.566083
Transparency and Accountability (TA)	0.421774	0.872481	0.845957
Transaction Cost (TC)	0.726916	0.928229	0.898687

6.5. Final Stage Measurement Model

Figure 6.4 demonstrated the final stage of the measurement model that was run after the removal of all the items loading value less than 0.50, which have below thresholds value. Table 6.3 presents the results of reliability of the construct including Average Variance Extracted (AVE), composite reliability (CR), and Cronbach's alpha. Internal reliability was examined via Cronbach's alpha and composite reliability (CR) (Lew & Sinkovics 2012). All the constructs demonstrate the composite reliability (CR) and Cronbach's alpha value is higher than 0.70 that is greater than the threshold value 0.7, except information asymmetry 0.699, i.e. also close to 0.70. George & Mallery (2003, p. 231) providing the range of Cronbach's alpha value ">.9-Excellent, >.8-Good, >.7-Acceptable, >.6-Questionable, >.5-Poor". The CR values of construct ranged from 0.820 to 0.928, all the greater than the threshold of 0.7 (Bagozzi & Yi 1988). The absolute standardised outer loading range from 0.459 to 0.959, all the loading value is greater than the threshold value 0.40 (Chin 1998a; Henseler et al. 2009) (see Table 6.5). Lew and Sinkovics (2012, p. 23) and stated that a score of outer loading over 0.5 can be acceptable and Chin (1998a) stated 0.40 can be acceptable. Henseler et al. (2009) suggested that the AVE value of above 0.50 indicates the sufficient level of convergent validity. The Table 6.3 results reveal all AVE value is greater than 0.5.

Table 6.3 Measuring reliability of constructs

Constructs	AVE	Composite Reliability	Cronbach's Alpha
Information Asymmetry (IA)	0.547	0.820	0.699
Increasing Trust (IT)	0.650	0.916	0.903
Intent to adopt e-procurement (ITA)	0.555	0.880	0.833
Monopoly of Power (MP)	0.622	0.889	0.849
Perceived Ease of Use (PEU)	0.606	0.881	0.833

Constructs	AVE	Composite Reliability	Cronbach's Alpha
Perceived Usefulness (PU)	0.760	0.904	0.841
Transparency and Accountability (TA)	0.502	0.887	0.871
Transaction Cost (TC)	0.726	0.928	0.898

Discriminant validity was examined using the square root of average variance extracted (AVE) and cross loadings. The Table 6.4 shown the value of the square root of AVE for each construct were greater than the highest correlation between that the construct and the other constructs (Fornell & Larcker 1981; Gefen & Straub 2005).

Table 6.4 Latent construct correlation table with squared of AVE values

Items	IA	IT	ITA	MP	PEU	PU	TA	TC
IA	1.000							
IT	0.364	1.000						
ITA	0.877	0.294	1.000					
MP	0.795	0.285	0.792	1.000				
PEU	0.592	0.630	0.643	0.421	1.000			
PU	0.346	0.224	0.431	-0.038	0.516	1.000		
TA	0.709	0.768	0.671	0.542	0.727	0.394	1.000	
TC	0.840	0.428	0.795	0.790	0.679	0.265	0.713	1.000

Table 6.5 presents the factor loading of those indicator that have met the recommended threshold value 0.4 (Chin 1998a; Henseler et al. 2009).

Table 6.5 Factor loading of all the items

Items	IA	IT	ITA	MP	PEU	PU	TA	TC
IA1	0.666							
IA2	0.933							
IA4	0.814							
IA5	0.459							
IT1		0.959						
IT2		0.814						
IT3		0.885						
IT4		0.719						
IT5		0.676						
IT6		0.745						
ITA1			0.542					
ITA2			0.678					
ITA3			0.868					
ITA4			0.794					
ITA5			0.825					

Items	IA	IT	ITA	MP	PEU	PU	TA	TC
ITA6			0.717					
MP1				0.743				
MP2				0.868				
MP4				0.586				
MP5				0.944				
MP6				0.754				
PEU1					0.871			
PEU2					0.848			
PEU3					0.906			
PEU4					0.654			
PEU5					0.547			
PU1						0.884		
PU2						0.811		
PU5						0.917		
TA1							0.800	
TA10							0.555	
TA2							0.555	
TA3							0.789	
TA5							0.696	
TA7							0.846	
TA8							0.620	
TA9							0.743	
TC1								0.904
TC2								0.903
TC3								0.555
TC4								0.946
TC5								0.892

The PLS structural model is evaluated by the goodness-of-fit (GoF) using the Q-square test for predictive relevance through the blindfolding procedure (Chin 1998b; Geisser 1975; Stone 1974). The table 6.6 shows the PLS-PM structural model validation using Q-squared. The cross-validated communality H^2 measures the capacity of the model to predict the manifest variables directly from their latent variables (Tenenhaus et al. 2005). H^2 values should be greater than zero that indicate evidence of all the observed values are well constructed by the model and demonstrated its predictive relevance (Poujol et al. 2012). The Q^2 statistics measure the predictive relevance of the model and the value is greater than zero means the model has predictive relevance. The GoF value (0.625) represents overall fit of the model that is the geometric mean of the average communality and the average R-squared.

Table 6.6 PLS-PM model evaluation results

Constructs	Predicative relevance Q^2	Cross-validated communality (H^2)	GoF
Information Asymmetry (IA)	0.297	0.301	0.625
Increasing Trust (IT)	0.626	0.525	
Intent to adopt e-procurement (ITA)	0.565	0.379	
Monopoly of Power (MP)	0.608	0.442	
Perceived Ease of Use (PEU)	0.396	0.397	
Perceived Usefulness (PU)	0.780	0.491	
Transparency and Accountability (TA)	0.544	0.378	
Transaction Cost (TC)	0.782	0.598	
GOF= $\sqrt{\text{average } R^2 \times \text{average communality}}=0.625$ (Tenenhaus et al. 2005)			

6.6. Predictive Power of PLS-PM Model

A glance at Figure 6.4 reveals the PLS-PM structural model of factors influencing the intent to adopt public e-procurement reduce the chances of corruption in public procurement. The predictive power of model was analysed using R^2 as shown in figure 6.4 and the R^2 value of intent to adopt e-procurement is 0.892 that is interpreted as 89.20 percent of the variance of intent to adopt e-procurement explained by the PLS-PM model.

The path arrows represent the hypothesised relationship between independent constructs (IA, MP, PEU, PU, IT, TC, TA) and the dependent construct (ITA). The path coefficient values represent the beta value $\beta_1=0.263$, $\beta_2=0.554$, $\beta_3=0.210$, $\beta_4=0.259$, $\beta_5=-0.269$, $\beta_6=-0.116$, and $\beta_7=0.219$. The path coefficient value needs to be at least 0.20 and ideally above 0.30 in order to considered as a strong relationships and meaningful for further discussion (Chin 1998b). Further, the strength of the path coefficient value is suggested by Urbach and Ahlemann (2010), Chin (1998a) 0.20 is weak, value between 0.2 to 0.5 is moderate, and greater than 0.5 is strong. The rectangular boxes represent the observed variables, indicators, or measurement items of latent variables that were shown in operationalisation variables in Appendix B.

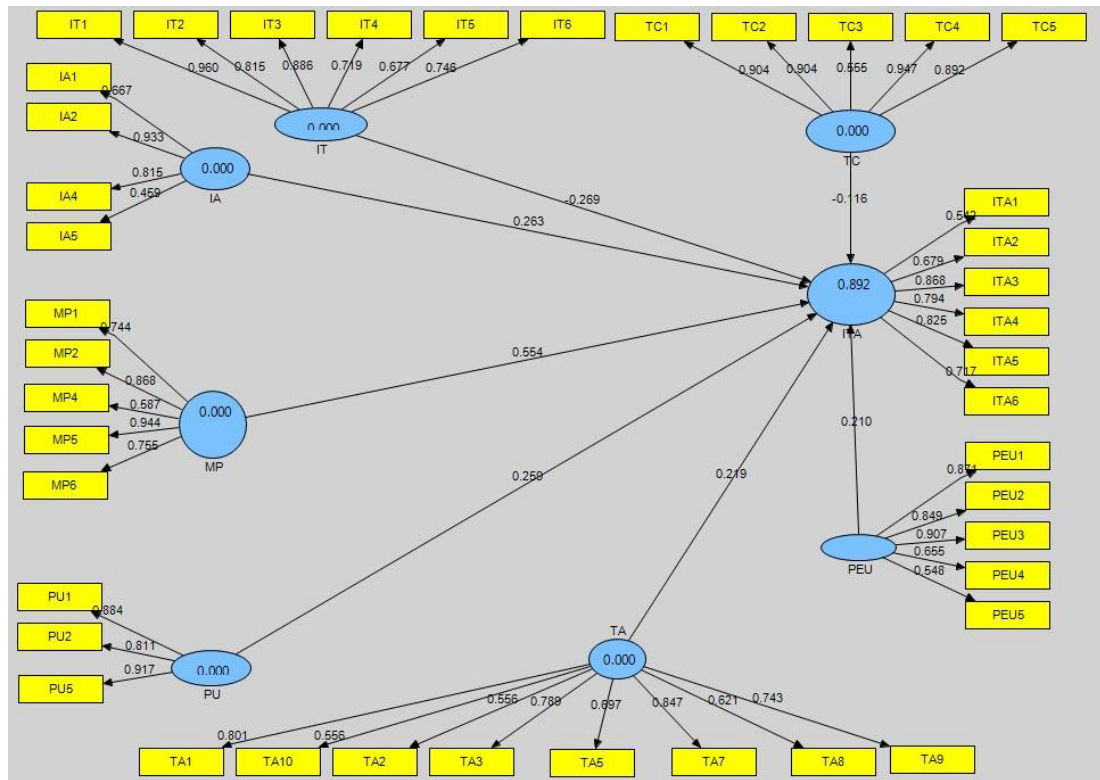


Figure 6.4 PLS-PM structural equation model

6.7. Hypothesis Testing

In PLS-PM structural equation modelling, bootstrapping method was used to test the significant of paths in the study measurement model. The bootstrap is an alternative way to produce better approximations for the true small sample properties (Schmidheiny & Basel 2012). Bootstrap techniques is used for testing hypothesis testing (Beaumont & Bocci 2009) and Chin (1998a) research suggested bootstrapping conducted with 500 samples. But another research conducted by Hair, Ringle & Sarstedt (2011) pointed out that:

- ❖ The minimum number of bootstrap samples is 5,000.
- ❖ The number of cases should be equal to the number of observations in the original sample.
- ❖ Critical t-values for two-tailed test are 1.65 (significance level =10 percent), 1.96 (significance level =5 percent), and 2.58 (significance level=1 Adverse selection per cent)(Hair Jr et al. 2013, p. 186).
- ❖ Multicollinearity: each indicator's variance inflation factor (VIF) value should be less than 5.

Figure 6.5 demonstrated the results of the testing the path between model and constructs and path arrows represent the t-statistics value.

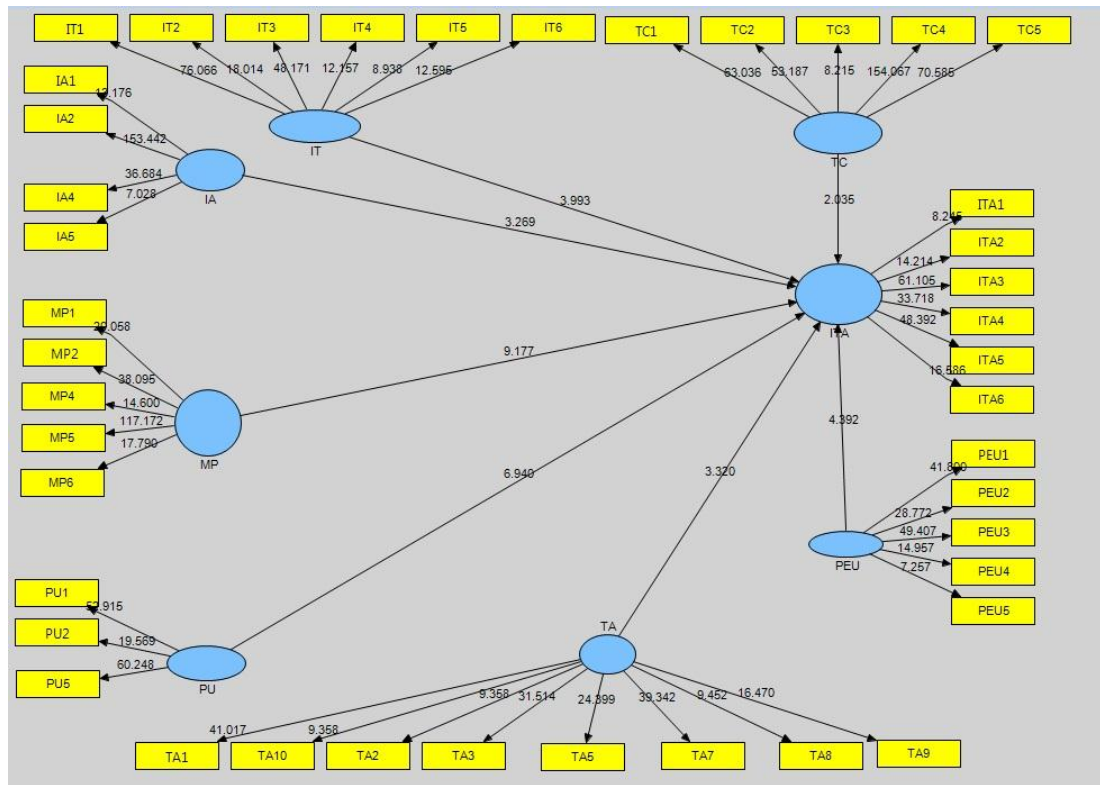


Figure 6.5 Test the study model of government officer sample

The table 6.7 presents the standardised path coefficient relationship regression analysis results and hypothesis test. The result found that all the independent variables were positively significant except increasing trust (-0.269), and transaction cost (-0.116) to the dependent variable intent to adopt e-procurement. The construct monopoly of power result found strong indicator to intent to adopt e-procurement.

Table 6.7 The results of regression analysis of testing of government officer samples

Relationships	Path Coefficient value	Strength	T Statistics	Hypothesis Supported?
Information Asymmetry (IA) -> ITA (Intent to adopt e-procurement)	0.263	Moderate	3.268**	Yes
Increasing Trust (IT) -> ITA (Intent to adopt e-procurement)	-0.269	Moderate	3.992**	Yes
Monopoly of Power (MP) -> ITA (Intent to adopt e-procurement)	0.554	Strong	9.176**	Yes
Perceived Ease of Use (PEU) -> ITA (Intent to adopt e-procurement)	0.210	Moderate	4.391**	Yes
Perceived Usefulness (PU) -> ITA (Intent to adopt e-procurement)	0.259	Moderate	6.940**	Yes
Transparency and Accountability (TA) -> ITA (Intent to adopt e-procurement)	0.219	Moderate	3.319**	Yes
Transaction Cost (TC) -> ITA (Intent to adopt e-procurement)	-0.116	weak	2.034*	Yes

Notes: Significant levels (all two-tailed) denoted by * (5 percent, t-value 1.96); ** (1 percent t-value >2.58); *** (10 percent t-value > 1.65)

Relationship between information asymmetry and intent to adopt e-procurement

The results from the PLS-PM structural model figure 6.4 shows that the positive relationship between the construct information asymmetry and intent to adopt e-procurement with standardised path coefficient $\beta=0.263$, t-value 3.268, at p-value 0.01. This significant value represents that reduction of information asymmetry problems through e-procurement has positive affects to reduce the asymmetry problems. Thus, hypothesis H1 is supported on the perception of the government officer.

Relationship between reduction of monopoly power and intent to adopt e-procurement

The PLS-PM structural model shows that there is a strong relationship between reduction of monopoly power and intent to adopt e-procurement with standardised path coefficient $\beta=0.554$, t-value 9.176, at p-value 0.01. These results indicate a strong evidence of reduction of monopoly power through the e-procurement in public procurement. Thus, hypothesis H2 is supported.

Relationship between increasing trust and intent to adopt e-procurement

The PLS-PM structural model shows that there is a negative relationship between increasing trust and intent to adopt e-procurement with standardised path coefficient $\beta=-0.269$, t-value 3.992, at p-value 0.01, which provides support for the hypothesis H3.

Relationship between perceived ease of use and intent to adopt e-procurement

The PLS-PM model results indicate that the perceived ease of use is positively significant to intent to adopt e-procurement with $\beta=0.210$, t-value 4.391, at p-value 0.01, which provides hypothesis H4 is supported.

Relationship between perceived usefulness and intent to adopt e-procurement

The PLS-PM model results indicate that the perceived usefulness is positively significant to intent to adopt e-procurement with $\beta=0.259$, t-value 6.940, at p-value 0.01, which provides hypothesis H5 is supported.

Relationship between transparency accountability, and intent to adopt e-procurement

The PLS-PM model results indicate that transparency and accountability is positively significant to intent to adopt e-procurement with $\beta=0.219$, t-value 3.319, at p-value 0.01, which provides hypothesis H6 is supported.

Relationship between reduction of transaction cost and intent to adopt e-procurement

The PLS-PM structural model shows that there is a negative relationship between transaction cost and intent to adopt e-procurement with standardised path coefficient $\beta=-0.116$, t-value 2.034, at p-value 0.05, which provides support for the hypothesis H7.

6.8. Conclusions

In this Chapter, government officer's sample data was analysed. The government officers' data sample was very small. Therefore, this study employed a PLS-PM approach to test the measurement model and research hypothesis. Different stages were employed to examine the reliability and validity of the items, constructs, and whole measurement model. Subsequently, PLS-PM structural model and hypothesis were tested. The results of the government officer's sample data suggests that the monopoly of power, information asymmetry, trust, perceived usefulness, perceived ease of use, transaction cost, and transparency and accountability constructs were antecedent's towards intent to adopt e-procurement. All the latent variables were positively significant to the intent to adopt public e-procurement. In the next chapter, the government's registers bidder's sample data was analysed.

CHAPTER SEVEN

DATA ANALYSIS FOR BIDDERS

7.1. Chapter Overview

The previous Chapter demonstrated the analysis of government sample data using PLS-PM structural model. The main purpose of this Chapter is to analyse the bidder's sample data that is cover the various statistical techniques and tools using SEM (Structural Equation Modelling) AMOS 21.0, and SPSS version 21.0. The Chapter presents the key results of the bidder's sample data includes questionnaire validity using Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM), hypothesis testing, and finally conclude the conclusion of the chapter.

A brief structure of the outline of this Chapter is shown in figure 7.1.

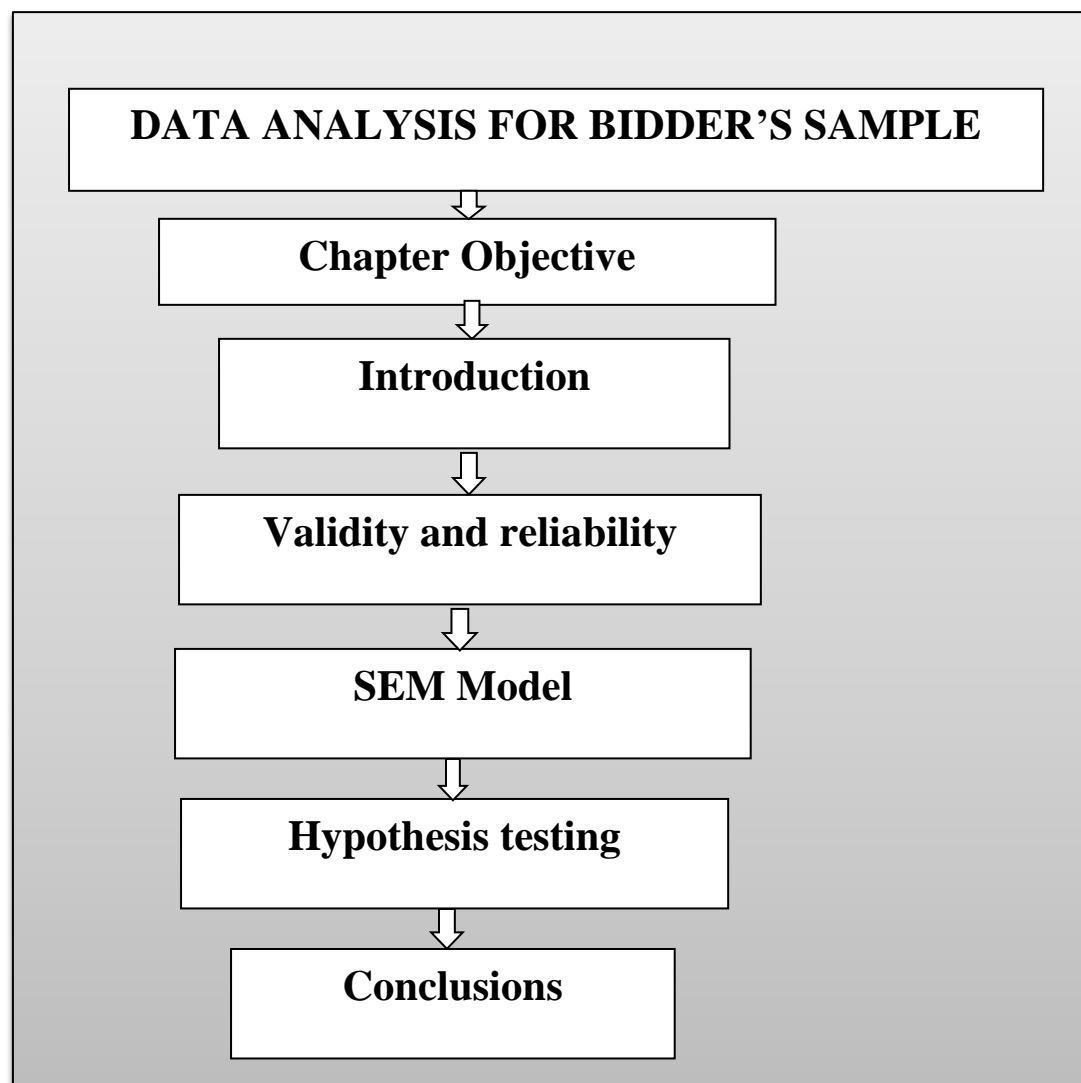


Figure 7.1 Chapter 7 overview

7.2. Introduction

The government register bidders are considered to the major stakeholders in practicing the public e-procurement system. They are working for the government's works and services as a contractor, suppliers, or vendors that respond to the bid of the government. Therefore, their perceptions on the potential of public e-procurement connecting to reduce the corruption in public procurement are very crucial for the government. One dependent and seven independent anti-corruption factors were employed to evaluate the research model including intent to adopt e-procurement, information asymmetry, reduction of monopoly power, perceived usefulness, perceived ease of use, increasing trust, reducing transaction cost, increasing transparency and accountability.

The field questionnaire survey was employed to collect the quantitative responses from the bidders. Based on the convenience sampling approach, finally 220 responses were approached to complete the entire questionnaire. In the data analysis process, different steps were taken to validate bidders sample data. Descriptive statistics, Cronbach's alpha value, Average of Variance Extracted (AVE), Cross Loading, Confirmatory Factor Analysis (CFA) were applied the validity and reliability of the data.

7.3. Descriptive Statistics

Descriptive statistics analysis refers to statistically describing the basic features of the data, aggregating, and presenting the construct of interest or associations between these constructs (Bhattacharjee 2012). For the initial analysis and determining the validity of collecting data, SPSS is used for descriptive statistics. As mention in Chapter 5, all the variables used in bidders sample data were coded on five point Likert scale with ranging from "strongly disagree" to "strongly agree".

Figure 7.2 demonstrates the information about the types of the Internet currently use in an organisation. In total, eighty-nine organisations currently used cable Internet, eighty-one organisations used leased line Internet, and fifty organisations used other types of Internet. Cable Internet is one of the fastest broadband services provided by different Internet service provider in Nepal. Leased line is referred to as private lines that provide a transmission medium as a permanent dedicated circuit between two points.

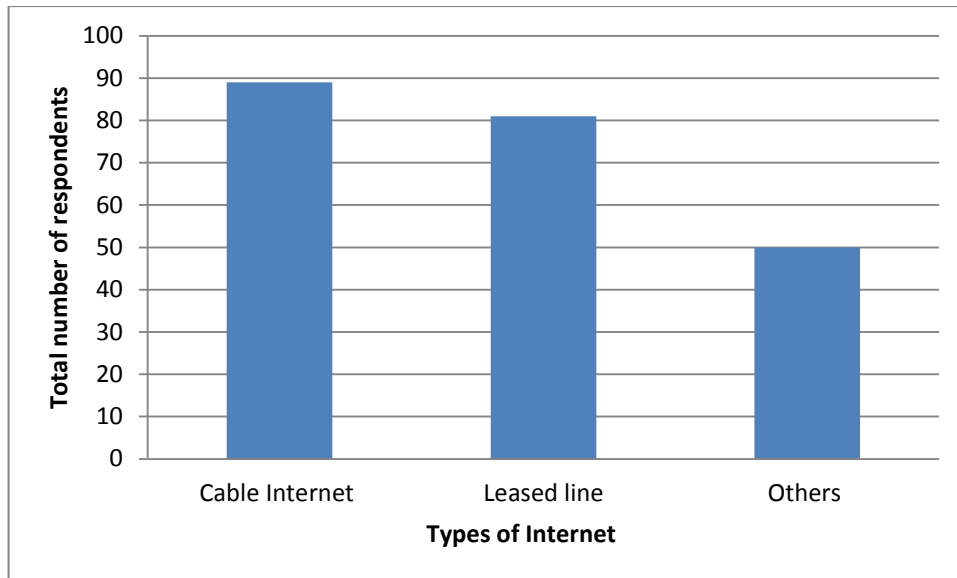


Figure 7.2 Types of internet services in an organisation

Figure 7.3 demonstrates the demographic information of the respondents serving in the organisation. Figure 7.3 clearly demonstrates that based on the respondents' information that more than one hundred and forty five respondents had seven and more years of experience in organisation supply chain management processes including procurement, and administration.

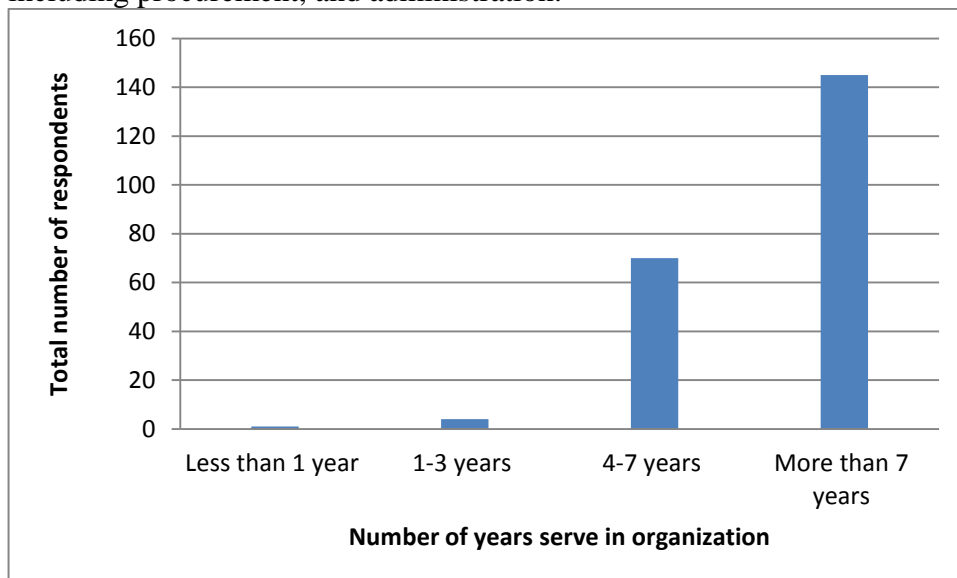


Figure 7.3 Total numbers of working experience in an organisation

7.3.1. Information Asymmetry

Reduction of the “information asymmetry” problem through the intent to adopt public e-procurement is one of the main constructs of this study. Six items were used to measure information asymmetry problems based on the perception of the bidders sample data. The means value of the information asymmetry ranges between the IA3 4.24 to IA5 4.50. Similarly, the standard deviation (S.D.) of information asymmetry construct data items ranges from 0.597 for IA5 and 0.776 for IA3. The entire mean and S.D. values were illustrated in Appendix E.

7.3.2. Monopoly Power

Reduction of monopoly power construct was measured with six items MP1, MP2, MP3, MP4, MP5, and MP6. The mean value of the construct ranges from 3.38 for MP5, and 4.05 for MP6. Likewise, the standard deviation (S.D.) reduction of monopoly power construct data items ranges from 0.636 for MP6 and 0.780 for MP1. The entire mean and S.D. values were illustrated in Appendix E.

7.3.3. Increasing Trust

Increasing trust construct was measured by four items IT1, IT2, IT3, and IT4. The mean values of the items were ranges from 4.02 for IT2, and 4.30 for IT4. Likewise, the standard deviation (S.D.) reduction of increasing trust construct data items ranges from 0.554 for IT3 and 0.688 for IT1. The entire mean and S.D. values were illustrated in Appendix E.

7.3.4. Perceived Usefulness

The perceived usefulness of the public e-procurement was measured by the four items PU1, PU2, PU3, and PU4. The ranges of mean value of perceived usefulness items were from 3.65 for PU2, and 4.46 for PU4. Likewise, the standard deviation (S.D.) reduction of perceived usefulness construct data items ranges from 0.725 for PU2 and 1.011 for PU1. The entire mean and S.D. values were illustrated in Appendix E.

7.3.5. Perceived Ease of Use

The perceived ease of use of the public e-procurement was measured by the six items PEU1, PEU2, PEU3, PEU4, PEU5, and PEU6. The ranges of mean value of perceived ease of use items were from 4.32 for PEU4, and 4.66 for PEU6. Likewise, the standard deviation (S.D.) reduction of perceived ease of use construct data items ranges from 0.552 for PEU3 and 0.800 for PEU4. The entire mean and S.D. values were illustrated in Appendix E.

7.3.6. Transaction Cost

Four items (TC1, TC2, TC3, and TC3) were used to measure the reduction of transaction cost through the public e-procurement technology measurement. The ranges of mean value of reduction of transaction cost items were from 4.23 for TC2, and 4.35 for TC4. Likewise, the standard deviation (S.D.) reduction of transaction cost construct data items ranges from 0.589 for PEU3 and 0.599 for TC2. The entire mean and S.D. values were illustrated in Appendix E.

7.3.7. Transparency and Accountability

Increasing transparency and accountability through the public e-procurement technology was measured by the ten items (TA1, TA2, TA3, TA4, TA5, TA6, TA7, TA8, TA9, and TA10). The ranges of mean value of transparency and accountability construct items were from 3.28 for ITA10, and 4.43 for TA1. Likewise, the standard

deviation (S.D.) reduction of transaction cost construct data items ranges from 0.508 for TA8 and 0.807 for TA10. The entire mean and S.D. values were illustrated in Appendix E.

7.3.8. Intent to Adopt E-procurement

The dependent construct intent to adopt public e-procurement was measured by the six items ITA1, ITA2, ITA3, ITA4, ITA5, and ITA6. The ranges of mean value of intent to adopt e-procurement measurement items were from 4.27 for ITA4, and 4.47 for ITA2 and ITA6. Likewise, the standard deviation (S.D.) intent to adopt e-procurement construct measurement items ranges from 0.601 for ITA3 and 0.643 for ITA1. The entire mean and S.D. values were illustrated in Appendix E.

7.4. First Order Latent Constructs Measurement Model

This study employed Structural Equation Modelling (SEM) for analysis of bidders sample data. It is a very powerful multivariate analysis technique to examine the casual modelling or path analysis, confirmatory factor analysis (CFA), regression models, covariance structure models, and correlation structure models (Byrne 2010; Ullman 2006). There are different steps to require for conducting a SEM analysis. As discussed in Chapter 5, SEM provides a two sub model measurement model (CFA Analysis) and structural model. A Confirmatory factor analysis (CFA) is used to validate the items explicitly measuring individual latent construct. Before testing the measurement model, the first-order latent construct was undertaken by using CFA that help to examine the individual reliability, international consistency reliability, and convergent and discriminant validity of the items (Hung et al. 2013). As discussed in chapter 5, the table 7.1 illustrate criteria to evaluate goodness of fit measures.

Table 7.1 Goodness of fit indicators

Goodness-of-fit indices	Threshold	Source
P-value	P<0.05	(Byrne 2010)
X ² /df	<3.00	(Hair et al. 2010)
Goodness of fit index (GFI)	>0.90, must be >0.80	(Byrne 1998; Tabachnick & Fidell 2007)
Adjusted goodness of fit index (AGFI)	>0.80	(Hair et al. 2010; Liu et al. 2004)
Normed fit index (NFI)	>0.90, >0.80 acceptable	(Hair et al. 2010; Tasmin & Woods 2008)
Comparative fit index (CFI)	>0.90	(Hair et al. 2010; Su & Yang 2010)
Root mean square error of approximation (RMSEA)	<0.08	(Chang & Wong 2010; Hair et al. 2010; Hu & Bentler 1999; Parent et al. 2005)
PCLOSE	>0.05	(Byrne 2010)

7.4.1. Information Asymmetry

The total six items were used to test the first order CFA analysis of information asymmetry (IA): IA1 more competition, IA2, up-to-date information, IA3 track and monitor, IA4 equal opportunities, IA5 more transparent, IA6 overall to reduce corruption. From CFA first order iteration results, the IA3 loading value is less than cut off (0.40) and deleted not used in final iteration. The study considers the fit indicators (CMIN/df, CFI, GFI, AGFI, NFI, RMR, RMSEA, and PCLOSE) were used to test the overall validity of the items. After deleting the item (IA3), the model achieved the good fit and the results were CMIN/df 1.20, GFI 0.990, AGFI 0.969, CFI 0.996, NFI 0.976, RMSEA 0.030, and PCLOSE 0.584. The figure 7.4 demonstrated the first order CFA measurement model of information asymmetry.

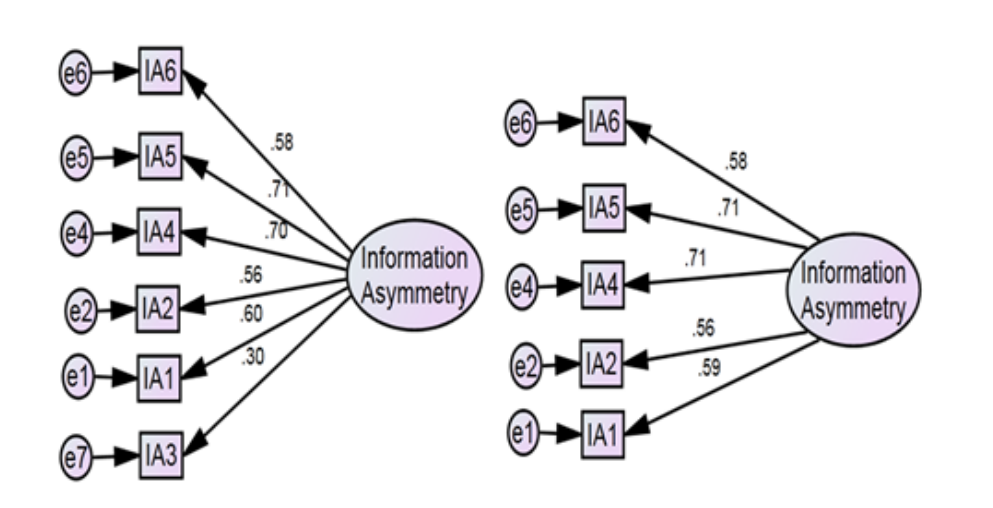


Figure 7.4 One-factor congeneric measurement model of Information asymmetry (IA) (First iteration, final iteration)

7.4.2. Monopoly Power

The six items measured the reduction of monopoly power: MP1 real time procurement information, MP2 automation of procurement process, MP3 improves the international efficiencies, MP4 facilitate accounting control, MP5 fix price contact, MP6 overall reduction of monopoly power (more details in appendix). For achieving the good model fit, the MP1 and MP3 items were deleted and run the final iteration. Overall, results were CMIN/df 5.55, GFI 0.974, AGFI 0.872, CFI 0.936, NFI 0.925, RMSEA 0.144, and PCLOSE 0.022. The figure 7.5 illustrated the first and final iteration results of the measurement model.

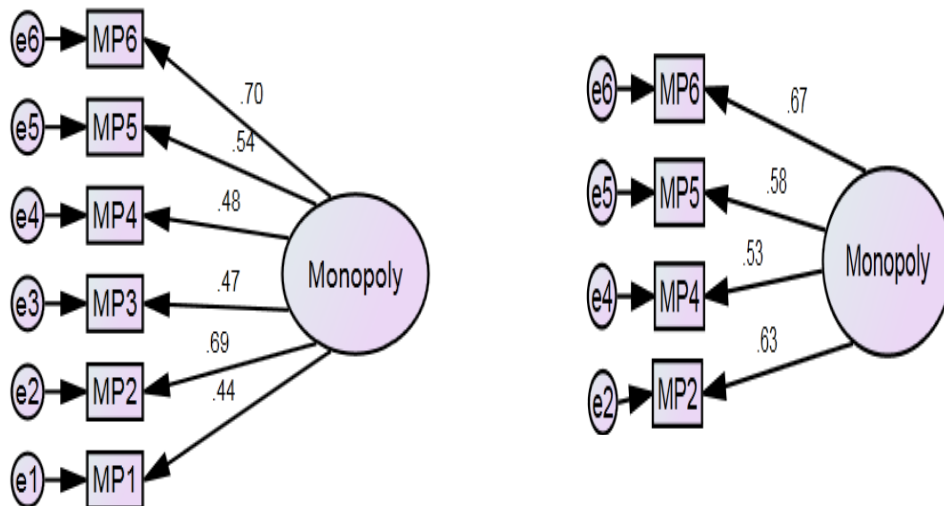


Figure 7.5 One-factor congeneric measurement model of monopoly power (MP) (First and final iteration)

7.4.3. Perceived Usefulness

Perceived usefulness (PU) of the public e-procurement helps to reduce corruption in public e-procurement was measured by the four items PU1 helps to tender preparation, PU2 improves quality of work, PU3 easier to do work, PU4 useful for whole procurement process (more details in appendix). All the items achieve good factor loading and reach an overall fit results CMIN/df 2.99, GFI 0.987, AGFI 0.936, CFI 0.985, NFI 0.944, RMSEA 0.095, and PCLOSE 0.141. The figure 7.6 illustrated the final iteration results of the measurement model.

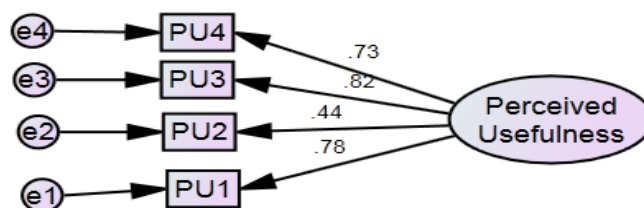


Figure 7.6 One-factor congeneric measurement model of perceived usefulness (PU) (Final iteration)

7.4.4. Perceived Ease of Use

Six items were used to measure the perceived ease of use of public e-procurement in procurement processes for bidder's perception PEU1 clear and user friendly environment, PEU2 easier to get tender or bid information, PUE3 easier to prepare tender document, PEU4 easier for modification or withdraw tender document, PEU5 easy to use system, PEU6 overall useful to do for work. For achieving the good model fit, PEU3 item was deleted and run the final iteration. Overall, results indicated a good model fit CMIN/df 4.21, GFI 0.962, AGFI 0.885, CFI 0.956, NFI

0.944, RMSEA 0.121, and PCLOSE 0.013. The figure 7.7 illustrated the first and final iteration results of the measurement model.

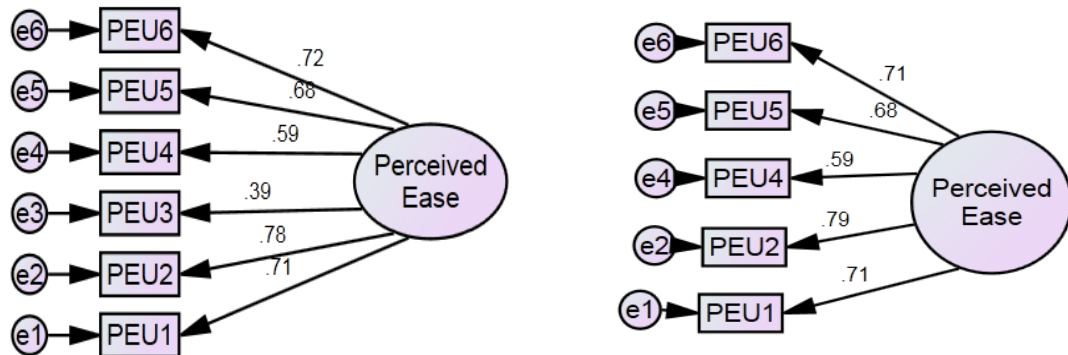


Figure 7.7 One-factor congeneric measurement model of perceived ease of use (PEU) (Final iteration)

7.4.5. Increasing Trust

Four items were used to measure the public e-procurement perceived benefits as increasing trust between government and bidder's relations IT1 track and monitor, IT2 security of transaction, IT3 anytime and anywhere bidding platform, IT4 increasing overall trust. All the items achieved a good factor loading and results indicate a good measurement model fit CMIN/df 17.66, GFI 0.925, AGFI 0.623, CFI 0.836, NFI 0.831, RMSEA 0.276, and PCLOSE 0.000. The figure 7.8 illustrated the final iteration results of the measurement model.

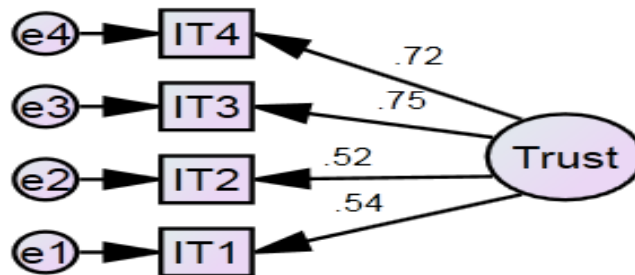


Figure 7.8 One-factor congeneric measurement model of increasing trust (IT) (Final iteration)

7.4.6. Transaction Cost

Four items were used to measure reduction of transaction cost through the public e-procurement: TC1 shorter purchasing and response time, TC2 reduce transaction cost, TC3 more competition among bidders in tendering processes, TC4 overall decrease transaction cost reduce chance of corruption (see more details in appendix). All the items achieved a good factor loading and results indicate a good measurement model fit CMIN/df 7.608, GFI 0.966, AGFI 0.829, CFI 0.937, NFI 0.930, RMSEA 0.174, and PCLOSE 0.004. The figure 7.9 illustrated the final iteration results of the measurement model.

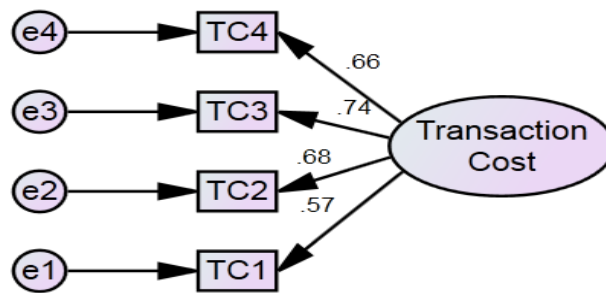


Figure 7.9 One-factor congeneric measurement model of transaction cost (TC) (Final iteration)

7.4.7. Transparency and Accountability

Main perceived benefits of intent to adopt public e-procurement is providing transparency and accountability in public procurement process. Ten items were used to measure transparency and accountability: TA1 contribute more transparent and accountable in procurement process, TA2 helps to reduce human errors, TA3 more convenient to acquire information, TA4 procurement related information available in government e-procurement web portal, TA5 better relationship between government and bidders, TA6 improve quality of services, TA7 increase transmission timely public information on procurement information, TA8 increases the availability of public information on bids, TA9 increase accuracy of orders, TA10 minimise the time for receiving payments. For achieving the good model fit, TA1, TA2, TA3, TA4 and TA5 items were deleted and run the final iteration. Overall, results indicated a good model fit CMIN/df 4.149, GFI 0.962, AGFI 0.887, CFI 0.961, NFI 0.949, RMSEA 0.120, and PCLOSE 0.014. The figure 7.10 illustrated the first and final iteration results of the measurement model.

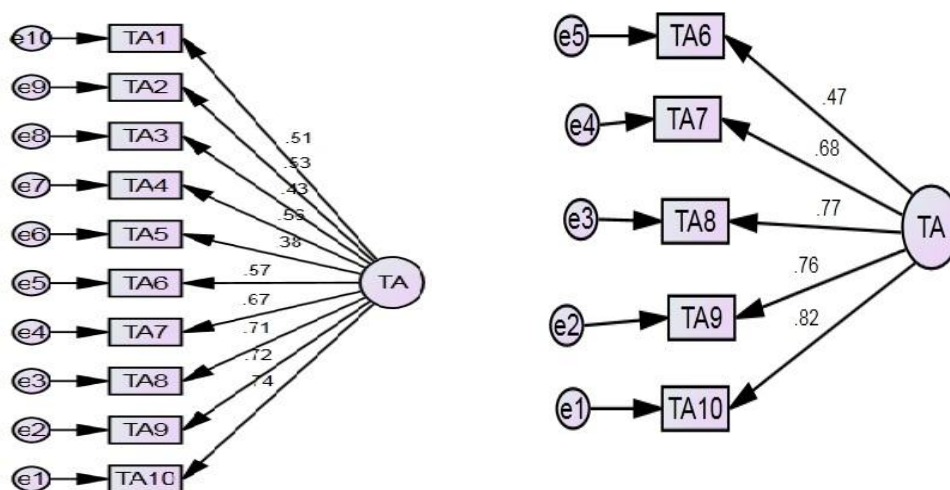


Figure 7.10 One-factor congeneric measurement model of transparency and accountability (TA) (First iteration and final iteration)

7.4.8. Intent to Adopt E-procurement

Intent to adopt public e-procurement construct was measured by six items ITA1 work and services via e-procurement portal, ITA2 continue visiting web portal, ITA3 always relay on tender information, ITA4 provide a personal and company information to an e-procurement portal, ITA5 organisation needs, and ITA6 implement e-procurement systems for handling my procurement task. For achieving the good model fit, ITA4 item was deleted and run the final iteration. Overall, results indicated a good model fit CMIN/df 5.85, GFI 0.944, AGFI 0.832, CFI 0.933, NFI 0.922, RMSEA 0.149, and PCLOSE 0.001. The figure 7.11 illustrated the first and final iteration results of the measurement model.

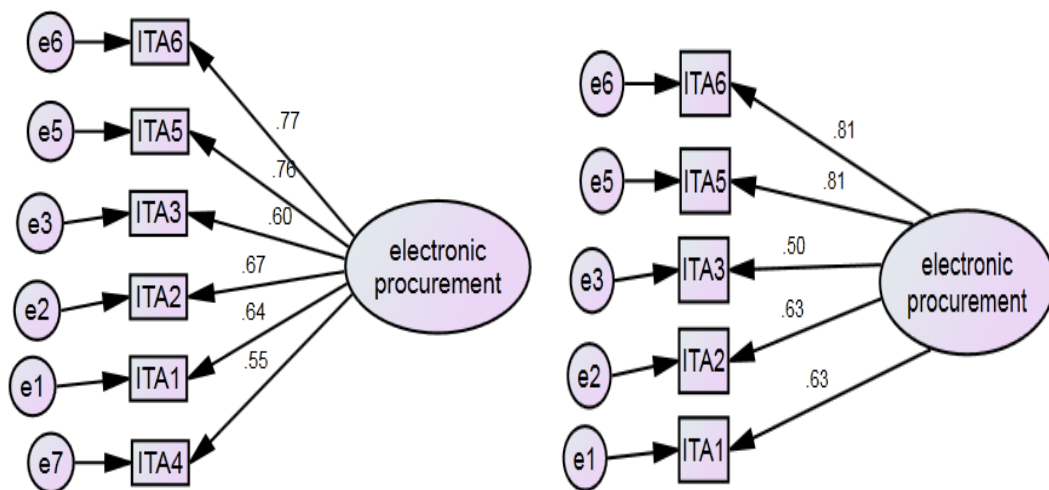


Figure 7.11 One-factor congenetic measurement model of Intent to adopt e-procurement (First and final iteration)

Table 7.2 shows the overall results of the CFA first order congenetic measurement model with final iteration of the all independent variables and dependent variable.

Table 7.2 Results of the on-factor congenetic measurement model (final iteration)

Constructs	Model fit indices						
	CMIN/DF	GFI	AGFI	CFI	NFI	RMSEA	PCLOSE
Information Asymmetry	1.20	.990	.969	.996	.976	.030	.584
Reduction of Monopoly of power	5.55	.974	.872	.936	.925	.144	.022
Perceived usefulness	2.99	.987	.936	.985	.978	.095	.141
Perceived ease of use	4.21	.962	.885	.956	.944	.121	.013
Increasing trust	17.66	.925	.623	.836	.831	.276	.000
Reduction of transaction cost	7.608	.966	.829	.937	.930	.174	.004
Transparency and accountability	4.149	.962	.887	.961	.949	0.120	.014
Intent to adopt e-procurement	5.85	.944	.832	.933	.922	.149	.001

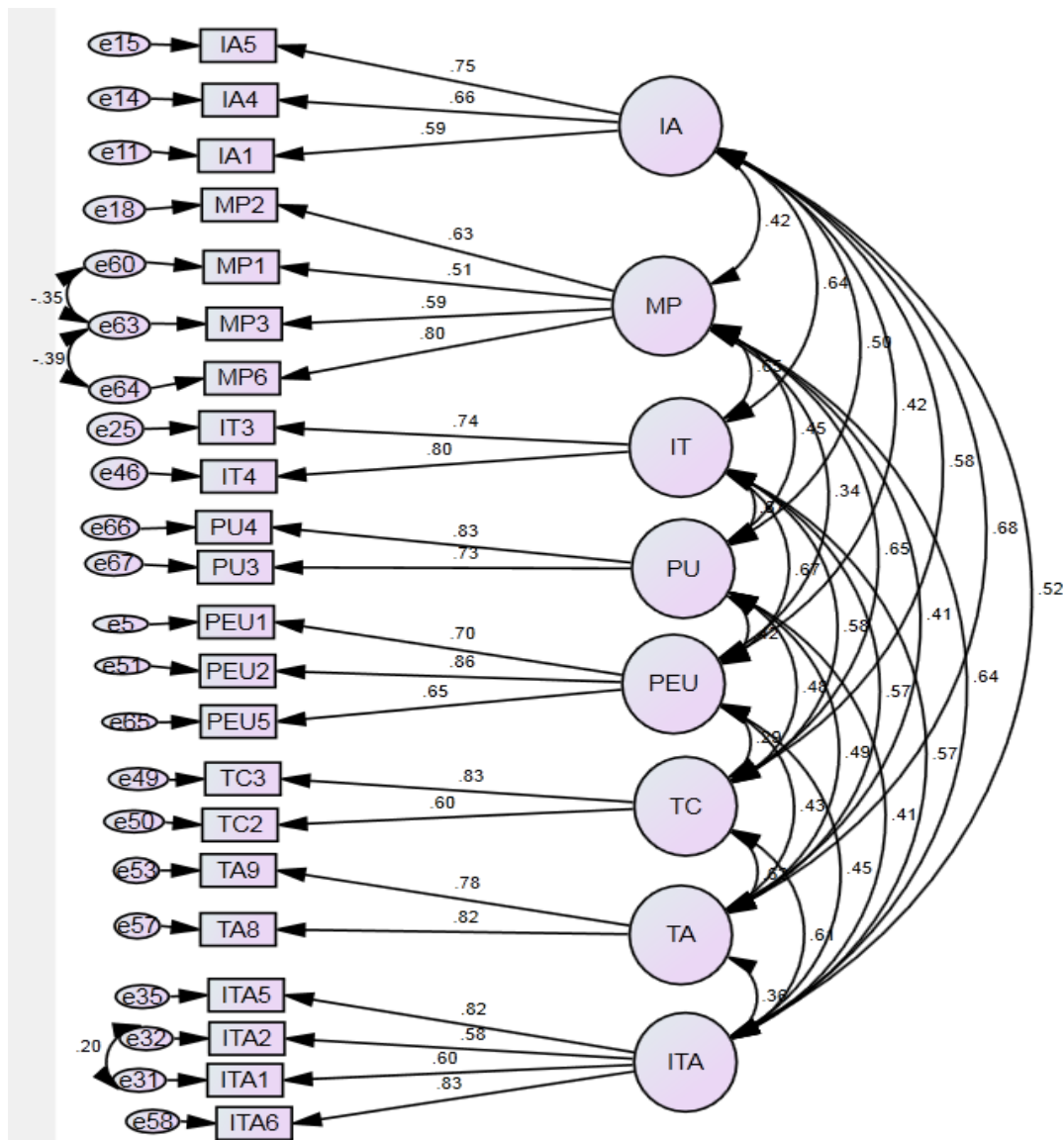
7.5. Measurement Model

Structural Equation Modelling (SEM) consists have two main models: path model (also known as structural model) and measurement model (Lei & Wu 2007). The measurement model in SEM is evaluated through the confirmatory factor analysis (CFA). The measurement model aims to examine two main indicators: (1) specifies the indicator for each construct, (2) assess the reliability of each construct for estimating the casual relationship (Hair et al. 1995, p. 620). The table 7.4 demonstrated the results of the measurement model goodness of fit indices were CIMN/DF 1.950, CFI 0.911, GFI 0.874, AGFI 0.824, NFI 0.834, RMR 0.026, RMSEA 0.066, and PCLOSE 0.007.

Table 7.3 Goodness of fit indices of the measurement model

Fit indexes	Recommended criteria	Results	Remarks
CMIN/DF	<3.0	1.943	Good fit
CFI	>0.90	0.909	Good fit
GFI	>0.90	0.872	Acceptable
AGFI	>0.80	0.818	Good fit
NFI	>0.90	0.833	Acceptable
RMR	<0.08	0.027	Good fit
RMSEA	<0.08	0.066	Good fit
PCLOSE	<0.05	0.008	Good fit

The overall result of CFA measurement model confirms that model has a good fit. Most of the indicator achieved a good fit such as CIMN/DF should be less than 3.00, CFI greater than 0.900, RSMEA less than 0.08; GFI is above 0.80 or close to 0.90, AGFI greater than 0.80, PCLOSE less than 0.05. Likewise, RMR value (RMR =0 exact fit) is close to fit (0.026). Fit indices are affected by sample size, larger sample have more chance of better fitting. Jackons (2003, p. 9) demonstrated that the sample size had a practically significant effect on RMSEA, NFI, and GFI value. In RSMEA smaller average values were associated with larger sample sizes and in the case of GFI, larger average values were associated with larger sample sizes. Thus, bidders sample size is considered as small size so that it significant on RMSEA and GFI value. NFI value is less than recommended value 0.90, but some author have argued NFI 0.80 is acceptable (Hair et al. 2006; Tasmin & Woods 2008). To achieve the maximum model fit of the measurement model, some of the items were deleted and run the model multiple times. Figure 7.12 demonstrates the result of measurement model by using confirmatory factor analysis (CFA).



Note: IA= Information Asymmetry; MP= Reduction of monopoly power; PU= Perceived usefulness; PEU= Perceived ease of use, IT= Increasing Trust; TC= Reduction of transaction cost; TA= Transparency and Accountability; ITA= Intent to adopt public e-procurement

Figure 7.12 Measurement model of bidder's sample

Measuring the reliability and validity of the construct is another step. Generally, Average Variance Extracted (AVE), Composite Reliability (CR), Cronbach's alpha, Maximum Shared Variance (MSV), and Average Shared Variance (ASV) were used to test the reliability and validity of the measurement model. Table 7.5 shows the overall reliability and validity of the CFA measurement model. Based on the results, most of the construct achieved threshold value for example the CR and Cronbach's alpha value should be greater than 0.70. The construct TC closed to acceptable value CR value. Henseler et al. (2009) research highlighted the AVE value indicate the sufficient level of convergent validity. The table 7.5 results reveal that all AVE value is greater than 0.50 except information asymmetry and reduction of monopoly power (MP). Likewise, MSV, and ASV has measured discriminant validity of the construct and MSV, and ASV value is less than AVE value. Results indicate that MSV and

ASV value is less than AVE value except IA and MP MSV value and ASV value respectively.

Table 7.4 Reliability and validity of the measurement model

Constructs	Cronbach's alpha	Construct Reliability	AVE	MSV	ASV
Information Asymmetry (IA)	0.701	0.709	0.451	0.461	0.297
Reduction of Monopoly of power (MP)	0.651	0.731	0.412	0.424	0.274
Perceived usefulness (PU)	0.752	0.758	0.611	0.445	0.245
Perceived ease of use (PEU)	0.769	0.783	0.549	0.449	0.199
Increasing trust (IT)	0.740	0.743	0.592	0.449	0.387
Reduction of transaction cost (TC)	0.665	0.683	0.526	0.419	0.307
Transparency and accountability (TA)	0.781	0.781	0.641	0.461	0.271
Intent to adopt e-procurement (ITA)	0.809	0.807	0.517	0.408	0.266

Table 7.6 demonstrates the discriminant validity that indicates the square root of AVE value being greater than any of the other inter-construct correlation. The diagonal elements represent the square root of AVE value. The values range from 0.662 (MP) to 0.801 (TA). The overall result indicates to achieve discriminant validity.

Table 7.5 Latent construct correlation table with squared of AVE values

Constructs	ITA	PEU	PU	IA	MP	IT	TC	TA
ITA	0.719							
PEU	0.448	0.741						
PU	0.407	0.423	0.782					
IA	0.520	0.424	0.500	0.682				
MP	0.639	0.336	0.455	0.422	0.662			
IT	0.566	0.670	0.667	0.640	0.651	0.769		
TC	0.606	0.292	0.478	0.576	0.647	0.580	0.725	
TA	0.362	0.434	0.488	0.679	0.409	0.571	0.620	0.801

Note: **IA**= Information Asymmetry; **MP**= Reduction of monopoly power; **PU**= Perceived usefulness; **PEU**= Perceived ease of use, **IT**= Increasing Trust; **TC**= Reduction of transaction cost; **TA**= Transparency and Accountability; **ITA**= Intent to adopt public e-procurement

7.6. Structural Model (Path Model)

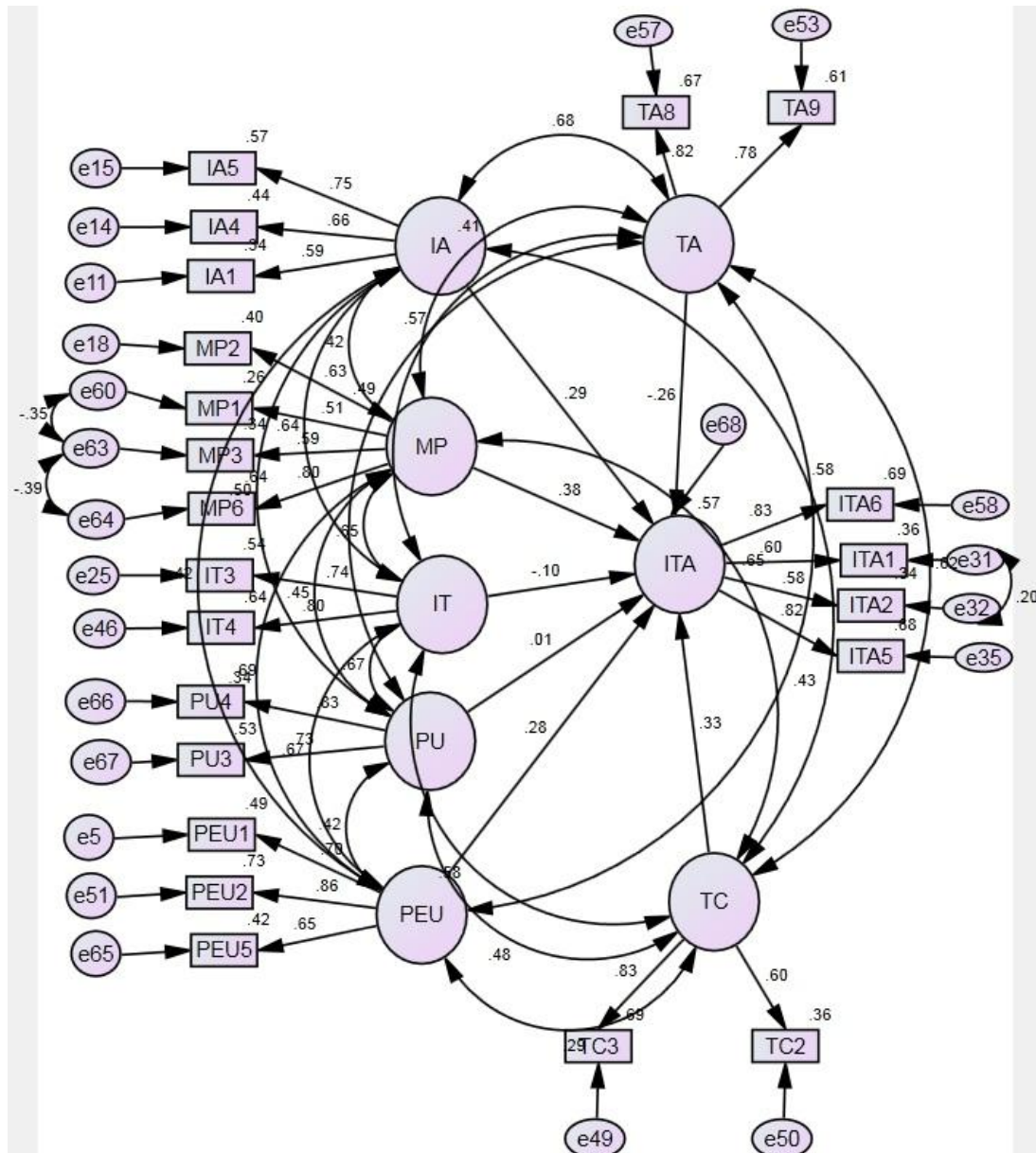
Structural model is the last step in the SEM approach (Tasmin & Woods 2008) that examines the relationship between the construct. Figure 7.13 demonstrates the structural model of bidder's sample data. This model integrates and correlates all the independent factors information asymmetry, reduction of monopoly power, perceived usefulness, perceived ease of use, increasing trust, reduction of transaction cost, and transparency and accountability to dependent factor intent to adopt e-procurement. Before evaluating the structural model, the overall model fit must be achieved to ensure the model adequately represents the overall set of casual relationship. The table 7.6 shows the summary results of structural model fit indices. The result shows that most of the indicator achieved overall model fit such as CIM/DF (1.943) is less than threshold value 3.00. Similarly, CFI analyse the model

fit by examining the comparison between the data and the hypothesised model, the CFI value >0.90 that is considered representative of well-fitting model (Hair et al. 2010, p. 669), the value closer to 1.0 indicating a better fit (Weston & Gore 2006, p. 24). AGFI values of structural model maintain a threshold value greater than 0.80 and GFI value is 0.87 that is closer to the good fit value 0.90 (Hair et al. 2010) but Byrne (2010, p. 78) research work suggests that GFI and AGFI values are affected by the sample size of the data. Other fit indices NFI, RMR, RMSEA, and PLOSE achieved an acceptable fit.

Table 7.6 Goodness of fit indices of the structural model

Fit indexes	Recommended criteria	Structural model	Remarks
CMIN/DF	<3.0	1.943	Good fit
CFI	>0.90	0.909	Good fit
GFI	>0.90	0.872	Acceptable
AGFI	>0.80	0.818	Good fit
NFI	>0.90	0.833	Acceptable
RMR	<0.08	0.027	Good fit
RMSEA	<0.08	0.066	Good fit
PCLOSE	>0.05	0.008	Good fit

Figure 7.13 demonstrates the estimated structural path model and the squared multiple correlations for the dependent construct that provide the overall variance of estimated model. The predictive power of model was analysed using R^2 as shown in figure 7.13 and the R^2 value of intent to adopt e-procurement is 0.57 that is interpreted as 57 percent of the variation of intent to adopt e-procurement explained by the structural model.



Note: IA= Information Asymmetry; MP= Reduction of monopoly power; PU= Perceived usefulness; PEU= Perceived ease of use, IT= Increasing Trust; TC= Reduction of transaction cost; TA= Transparency and Accountability; ITA= Intent to adopt public e-procurement

Figure 7.13 Structural model of bidder's sample

Table 7.7 demonstrates the results of testing the paths of the construct in the model. The results indicate that standardised coefficient and hypothesis test. The regression results found that the construct information asymmetry is an affected by the intent to adopt e-procurement and standardised coefficient (β) value is 0.289 at significance level 0.038 ($P < 0.05$). Similarly, other independent variables are: the reduction of monopoly power is affected by the intent to adopt e-procurement and standardised coefficient (β) is 0.346 at significance level 0.005 ($P < 0.05$); Increasing transparency and accountability is affected by the intent to adopt e-procurement and standardised coefficient (β) is -0.204 at significance level 0.047 ($P < 0.05$); perceived ease of use is affected by intent to adopt e-procurement and standardised coefficient (β) is 0.236 at significance level 0.019 ($P < 0.05$); reducing transaction cost is affected by intent to

adopt e-procurement and standardised coefficient (β) is 0.259 at significance level 0.032 ($P < 0.05$). On the other hand, perceived usefulness, and increasing trust standardised coefficient (β) are 0.006, -0.079 at significance level 0.933 ($P > 0.05$), 0.628 ($P > 0.05$) respectively. This p-values indicate that these two independent variables are not supported and significance level 0.05.

Table 7.7 The results of SEM of bidder's sample

Path	Estimate	S.E.	C.R.	P-values
ITA <--- IA	.298	.144	2.075	.038
ITA <--- MP	.346	.123	2.823	.005
ITA <--- PU	.006	.078	.084	.933
ITA <--- IT	-.079	.163	-.484	.628
ITA <--- TA	-.204	.103	-1.986	.047
ITA <--- PEU	.236	.101	2.341	.019
ITA <--- TC	.259	.121		.032

Note: **IA**= Information Asymmetry; **MP**= Reduction of monopoly power; **PU**= Perceived usefulness; **PEU**= Perceived ease of use, **IT**= Increasing Trust; **TC**= Reduction of transaction cost; **TA**= Transparency and Accountability; **ITA**= Intent to adopt public e-procurement

7.7. Hypothesis Testing

The figure 7.14 demonstrated the best obtained structural model of bidder's sample. This model shows the relationship of the constructs and path coefficient value. The result suggests that information asymmetry, monopoly power, perceived ease of use, transaction cost, and transparency and accountability were statistically significant to intent to adopt e-procurement. Perceived usefulness and increasing trust were not significant. The table 7.10 demonstrated the overall summary result of the hypothesis testing.

Relationship between information asymmetry and intent to adopt e-procurement

The result from the structural model demonstrates that positive relationship between information asymmetry and intent to adopt e-procurement with standardised coefficient $\beta = 0.289$ at p-value < 0.05 . This significant value represents that information asymmetry has a positive affects with intent to adopt e-procurement. Theoretically and statistically this results indicate that public e-procurement reduces the information gap between government and bidder's relationship. Therefore, hypothesis 1 is supported.

Relationship between reduction of monopoly power and intent to adopt e-procurement

The structure model shows that the path coefficient relationship between monopoly of power and intent to adopt e-procurement were found positive and significant $\beta = 0.346$ at p-value < 0.05 . This result indicates that reduction of monopoly power

through the intent to adopt e-procurement is one of the critical factors bearing upon opportunities for corruption. Hence, hypothesis 2 is supported.

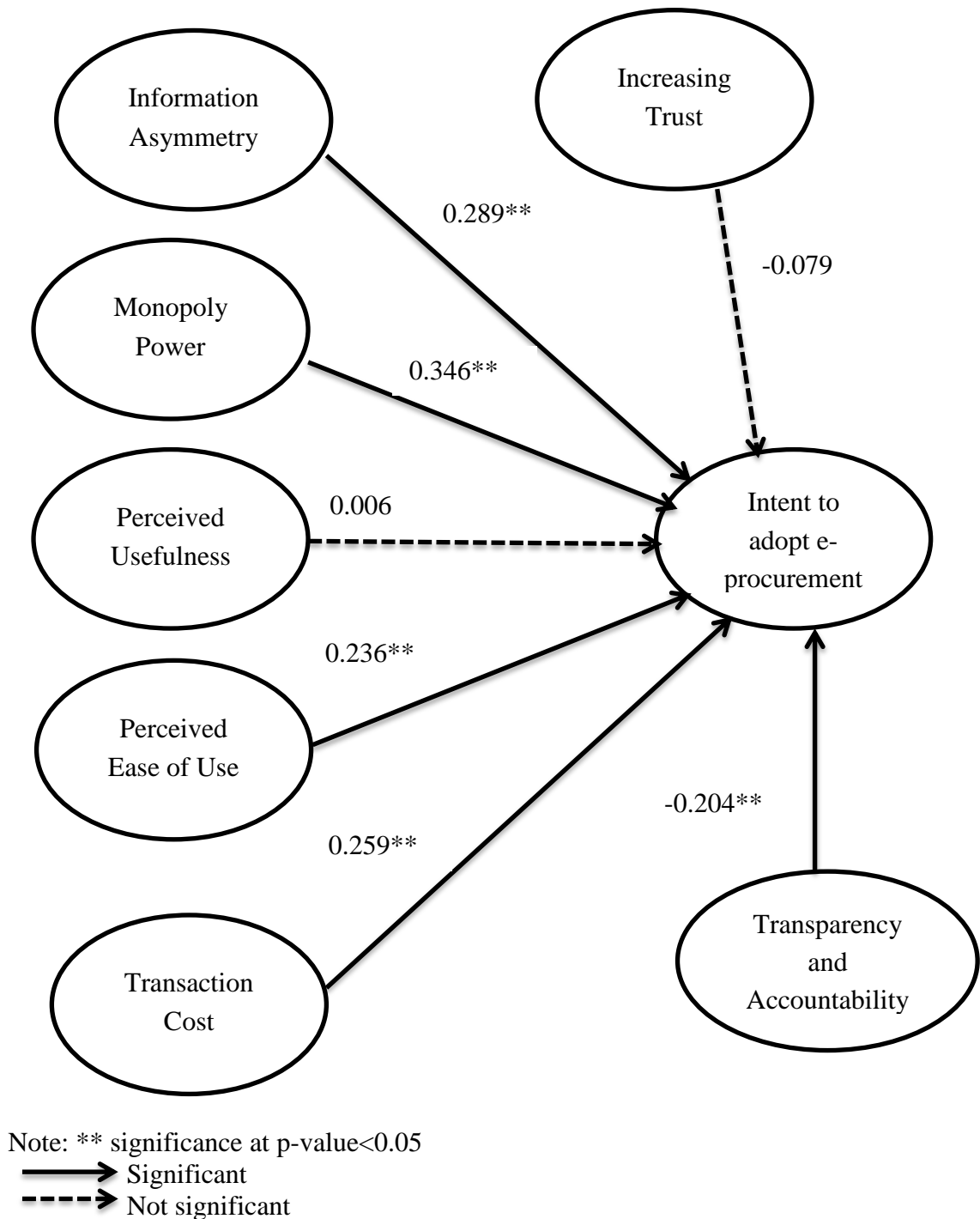


Figure 7.14 Final Structural model of bidder's sample

Relationship between perceived usefulness and intent to adopt e-procurement

The final structural model demonstrates that the path coefficient value of perceived usefulness of the public e-procurement is very low and negative ($\beta = 0.006$ at p-value

= 0.628) that relationship with intent to adopt is not significant. Thus, hypothesis 3 is not supported.

Relationship between perceived ease of use and intent to adopt e-procurement

The final structural model shows that the relationship between perceived ease of use and intent to adopt e-procurement is significantly correlated with $\beta = 0.236$ at p-value < 0.05 . This result indicates that perceived ease of use is one of the critical factors of intent to adopt e-procurement and supported hypothesis 4.

Relationship between transaction cost and intent to adopt e-procurement

The final structural model shows that the relationship between reduction of transaction cost and intent to adopt e-procurement is significantly correlated with $\beta = 0.259$ at p-value < 0.05 . This result indicates that reduction of transaction cost is one of the critical factors of intent to adopt e-procurement and hypothesis 5 is supported.

Relationship between increasing trust and intent to adopt e-procurement

The final structural model demonstrates that the path coefficient value of increasing trust of the public e-procurement is very low ($\beta = -0.079$ at p-value = 0.628) that relationship with intent to adopt is not significant. Thus, hypothesis 6 is not supported (P-value > 0.05).

Relationship between transparency and accountability, and intent to adopt e-procurement

The final structural model shows that the relationship between increasing transparency and accountability and intent to adopt e-procurement is significantly correlated with $\beta = -0.204$ at p-value < 0.05 . This result indicates that increasing transparency and accountability is one of the core and critical factors of intent to adopt e-procurement and hypothesis 7 is supported.

Overall, five hypothesis were supported and two hypothesis were not meet the criteria. The relationship between reduction of the monopoly power and intent to adopt e-procurement demonstrated strongly significant and correlated with β value is 0.346. If the path coefficient value is greater than 0.30 in order to considered as a strong relationships and meaningful for further discussion (Chin 1998b).

Table 7.8 Summary of the hypothesis testing (Bidders sample)

	Hypotheses	Coefficient value	P-values	Remarks
H1	<i>Higher level of perception of the potential of public e-procurement technology to reduce information asymmetry is positively related to the willingness to adopt.</i>	0.298	< 0.05	Supported
H2	<i>Higher level of perception of the potential of public e-procurement to reduce monopoly power is positively related to the willingness to adopt.</i>	0.346	< 0.05	Supported
H3	<i>Higher level of perception of the potential of e-procurement to increase trust is positively related to the willingness to adopt.</i>	-0.079	0.628	Rejected

Hypotheses		Coefficient value	P-values	Remarks
H4	<i>Higher levels of perceived ease of use will be positively related to the willingness to adopt anti-corruption technology (e-procurement).</i>	0.236	<0.05	Supported
H5	<i>Higher levels of perceived usefulness will be positively related to the willingness to adopt anti-corruption technology (e-procurement)</i>	-0.006	0.933	Rejected
H6	<i>Higher level of perception of the potential of public e-procurement to reduce transaction cost is positively related to the willingness to adopt.</i>	0.259	<0.05	Supported
H7	<i>Higher level of perception of the potential of public e-procurement technology to increase transparency and accountability is positively related to the willingness to adopt.</i>	-0.204	<0.05	Supported

7.8. Conclusions

This Chapter has discussed data analysis of bidder's sample data. The first part of the section highlighted some demographic information including respondent's work experience, and different types of Internet used by the organisation, and the mean and standard deviations of each construct items used in the questionnaire survey. The second part of the section focused on the measurement model by using Confirmatory Factor Analysis (CFA): first order latent construct and full measurement model. In first order latent construct analysis examine the individual reliability, internal consistency reliability, and convergent and discriminant validity of the item. Measurement models were evaluated through assessment of the reliability of each construct for estimating the casual relationship, and structural model (Path analysis). Reliability, validity, and goodness of fit indices were evaluated in CFA measurement model. In the final stage of measurement model, study has examined a structural model. The structural model integrates and correlates all independent factors to dependent factor of the study model. It also demonstrates the results of the hypotheses testing. The result demonstrates that five hypotheses were supported and two hypotheses were rejected. The next chapter covers the discussions of the both results: government sample data and bidder's sample data.

CHAPTER EIGHT

DISCUSSION OF FINDINGS

8.1. Chapter Overview

This Chapter covers the discussion of the results of two stakeholder groups: government officer and bidder's perception that the results were demonstrated in chapter six and chapter seven. The aim of this Chapter is to discuss the findings of the main research question and seven sub questions. The content of the Chapter includes an introduction, detail results of all research hypothesis and linking findings with reviewed literature, followed by the conclusion of the Chapter.

The brief structure of this chapter is shown in figure 8.1.

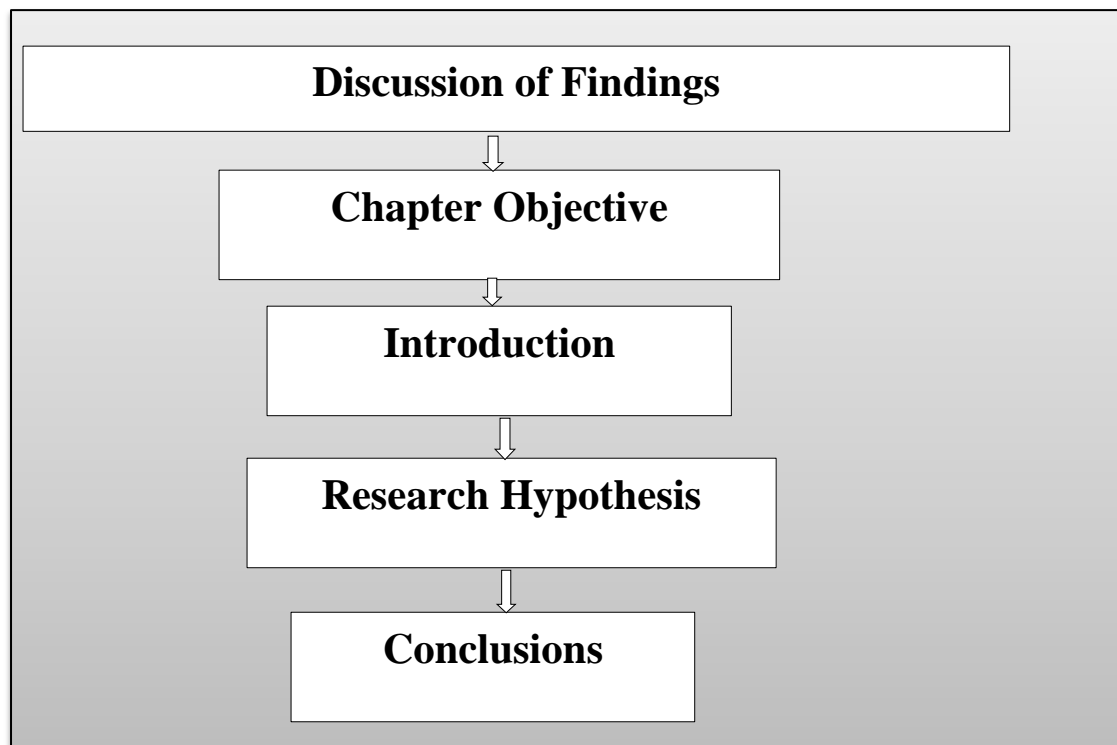


Figure 8.1 Chapter 8 overview

8.2. Introduction

This study set out to analyse the willingness to adopt e-procurement for reducing corruption on the perception of government officers, and the bidder's. This study contributes to the existing literature on the perceived benefits of public e-procurement by combining the different construct into a single research model and by direct link to intent to adopt e-procurement. The research model was tested with two main stakeholders: government officers and government register bidders as sources for the sample data. The results were presented in Chapter Six and Chapter Seven. The main section of this Chapter provides the context and justification of all research hypotheses of the study and comparing the findings with reviewed literature.

8.3. Research Hypothesis

The structural model examine the relationship between the construct and the research model that integrates and correlates seven independent constructs (information asymmetry, reduction of monopoly power, perceived usefulness, perceived ease of use, increasing trust, reduction of transaction cost, and transparency and accountability to one dependent construct (intent to adopt e-procurement). The seven-research hypotheses were formulated and tested based on the two sample data. The below section describes the individual relationship (research hypothesis) based on the results obtained from Chapter Six and Chapter Seven.

8.3.1. Information Asymmetry and Intent to Adopt E-procurement

H1: A higher level of perception of the potential for public e-procurement technology to reduce information asymmetry is positively related to the user's willingness to adopt.

The results of the both sample government and bidder's: hypothesis H1 is supported and strongly significant and correlated to intent to adopt e-procurement. This study reviews the existing body of research on how reducing an information asymmetry problem in principal-agent relationship through the implementation of public e-procurement affects the level of corruption. It is found that information asymmetry is a critical factor in principal-agent relationship that leads to create an information gap, incomplete of contract, and problem of monitoring between two parties (e.g. government and bidders). On this issue, the research conducted by Singh and Sirdeshmukh (2000) argued that asymmetrical information increases the probability of opportunistic behaviour. Similarly, Wathne and Heide (2000) research claimed that information asymmetry is facilitating conditions for opportunism.

From the government officer's perception, four items were found to be valid and significant to reducing information asymmetry problems. They are (a) e-procurement contributes to enhance competition in terms of quantity (participation) and quality (openness and fairness) among bidders in public procurement process (b) by providing real time procurement information (e.g. tender document) (c) e-procurement provides consistency for all potential bidders (d) e-procurement helps to reduce discretion (e.g. limit financial delegation). These all items help to reduce the information asymmetry problems in public contract. The results (Chapter Six) demonstrate that a positive and correlated relationship between information asymmetry and intent to adopt e-procurement ($\beta=0.236$, $t\text{-value}= 3.268$, significant at 0.01).

Results from the bidder's sample, three items were found to be valid and significant to reduce information asymmetry problem. They are (a) e-procurement contributes to enhance competition in terms of quantity (participation) and quality (openness and fairness) among bidders in public procurement process (b) e-procurement provide more transparency in bidding process than manual system (c) overall, e-procurement found a reduction in the information asymmetry that decrease chances of corruption in public procurement. The results of Chapter Seven demonstrate that a positive and correlated relationship between information asymmetry and intent to adopt e-procurement ($\beta=0.289$, $p\text{-value} < 0.05$).

Both results indicate that reducing information asymmetry through e-procurement is the key factor for reducing the probability of corruption in public contract. This finding is consistent with other previous research. Balsevich, Pivovarova and Podkolazina (2011) highlighted that electronic presentation of information reduce the information asymmetry problem in public procurement procedures. Xinzhang and Yonggang (2011) research focused the case example of South Korea government e-procurement system. Before the implementation of e-procurement system, Korean government have many problems including complicated procurement procedures, lack of sharing procurement information, time consuming, costly application processes, more chances of corruption, lack of transparency and efficiency and more other issues. After the implementation of the e-procurement system, the Korean government then enhanced its government procurement system by eliminating information asymmetry problems. Thus, this study believed and found that public e-procurement reduces the information gap (lowering information asymmetry problem) between government and bidders. Indeed, lower level of information asymmetry directly decreases opportunities of corruption in public procurement. Therefore, this study justifies that willingness to adopt e-procurement reduces the information asymmetry problems as well as mitigates corruption.

8.3.2. Reduction of Monopoly Power and Intent to Adopt e-Procurement

H2: Higher level of perception of the potential of public e-procurement to reduce monopoly power is positively related to the willingness to adopt.

The result of the both sample government and bidder's hypothesis H2 is supported and strongly correlated to the intent to adopt e-procurement. This result is supported to the existing body of research on how the reduction of monopoly power of public official over goods and services through the implementation of public e-procurement technology in principal-agent relationship affects the level of corruption. Specially, the government officer (procurement officer) is a key person who plays significant roles to supply goods and services in an efficient and transparent way. Corruption occurs where the public officials use a public monopoly power for private benefits e.g. he/she can assign a project to the favourite contractor or bidders or accepting a bribe in exchange for granting a tender document (OECD 2010). Thus, the monopoly power of government officials is a critical factor bearing upon opportunities for corruption (Klitgaard 1988). This study emphasises that monopoly power of government officer (principal) is a critical factor of corruption in principal-agent relationship and public e-procurement can be considered to be the best option to eliminate the power of government officers in procurement processes.

From the results of the government officer sample, the five items were found to be valid and represent to measure the reduction of monopoly power. They are (a) e-procurement provide real time information (b) e-procurement reduces monopolies or selection of favoured bidders in contracting process (c) e-procurement improves internal efficiency in procurement process (d) e-procurement facilitate accounting control (reduces a fraud) (e) e-procurement helps to provided fix price contract to all buyers and sellers. These factors played a significant role in reduction of monopoly power. The statistical results in Chapter Six demonstrated the positive and highly

correlated relationship between monopoly power and intent to adopt e-procurement ($\beta=0.554$, $t\text{-value}= 9.176$, significant at 0.01).

The results from the bidder's sample, four items were found to measure reduction of monopoly power. They are (a) e-procurement provide real time information, (b) e-procurement provides automation in procurement processes, (c) e-procurement improves the internal efficiency across procurement processes (d) overall, e-procurement was found to help reduce the monopoly of power. The result Chapter Seven demonstrated that monopoly power is positive and highly correlated to intent to adopt e-procurement ($\beta=0.346$, $P\text{-value}<0.05$).

Both results indicate that a reduction in the monopoly on power through implementation of public e-procurement is one of the key components for reducing corruption in procurement processes. In the principal agent-relationship framework, monopoly of power held by officials is one of the most critical factors that facilitate opportunities for corruption (Klitgaard 1988; Lambsdorff 2001; Mistry & Jalal 2012; Rose–Ackerman 2008). In this regards, public e-procurement provide automated real time procurement information and facilitate accounting control in a single click over whole procurement processes. As a result, it can reduce the potential monopoly power of officials. Garcia-Murillo's (2013) research highlighted a similar concept, that is if government services have automated systems and manages all processes online through electronic application, that this eliminates the monopoly power of government officials as well as reduces the involvement of government officials. Finally, Garcia-Murillo's research argued that reduction of monopoly power of government agents was a fact for reducing corruption. Mistry and Jalal's (2012) research concluded that the power of ICT enabled technology resulted in a mitigation of corruption as well as a reduction in the monopoly power of public officials. Further, other research finding also consistent with the result of the study by Ahmad, AL-Mutairi & Thuwaini (2013) who found that the impact of adoption of e-government was an effect on reduce corruption and monopoly power of government officials in Kuwait's public sector. So this study emphasises that monopoly of power of government officers (Principal) is a critical factor for corruption in principal-agent relationships, and that public e-procurement can be considered to be the best option to eliminate the power of government officers in procurement processes.

8.3.3. Increasing Trust and Intent to Adopt E-procurement

H3: Higher levels of perception of the potential of e-procurement to increase trust is positively related to the willingness to adopt.

The result of the government sample H3 is supported and strongly correlated to the intent to adopt e-procurement. Nevertheless, the bidder's sample data H3 is rejected. Trust is an important factor that helps to make a good environment between government and bidders. Public e-procurement is considered to create trustable environment in public procurement processes such from project identification to awarding contracts. This study theoretically and statistically emphasise that increasing trust helps to reduce corruption in public procurement. Previous scholars demonstrated that trust is a fundamental element of e-commerce or information system research that determines the intention, behaviour, attitude, or belief of user to

adopt any inter organisational information systems (Bachmann & Inkpen 2011; Dubelaar et al. 2005).

The result from the government officer sample, six items were found to measure trust. They are (a) e-procurement contributes track and monitor (b) help to build a trust between government and bidders relation (c) help to provide security of transaction (d) provides fair competition in all bidding processes (e) provides an user friendly environment (f) overall increasing trust between government and bidders. The result (chapter six) indicated that trust is negative and highly correlated to the intent to adopt e-procurement ($\beta = -0.269$, $t\text{-value} = 3.992$, significant at 0.01).

The result from the bidders sample data, two items were found to measure a final SEM structural model. They are (a) anywhere and anytime bidding platform of e-procurement may help to build level of trust, (b) overall increasing level of trust between government and bidders through e-procurement is related to reduce the chances of corruption. The result of Chapter Seven indicated that trust is not significant to intent to adopt e-procurement ($\beta = -0.079$, $P\text{-value} = 0.628$).

Both results indicated that increasing trust through the e-procurement is an important factor that affects the level of corruption in public procurement. Ndou (2004) and Karunasena et al. (2011) research pointed that electronic government services helps in building trust between government and citizens. Maintaining trust in government and bidders (Principal-agent) relationship is an important and beneficial for both stakeholders (Singh & Sirdeshmukh 2000). Tolbert and Mossberger (2006) research finding shows that the use of electronic government web site is statistically significant to the trust. Tolbert and Mossberger further explained e-government increases the process-based trust by improving relationship between citizens and perceptions of responsiveness. In other research, Tran (2009) highlighted that trust is an important factors that helps to reduce corruption. Kim, Kim and Lee (2009) research finding showed that impact of implementing OPEN system on corruption and there also helping to increase trust between civil officers and citizens. This study indicates that trust is an important anti-corruption factor with positive relationship to intent to adopt public e-procurement. The main contribution of e-procurement provided to numerous benefits to the bidders such as track and monitor, security of transaction, any time anywhere bidding, user friendly system, these features played a major role to reduce corruption as well as helped to make good relationship.

8.3.4. Perceived Ease of Use and Intent to Adopt E-procurement

H4: Higher levels of the perceived potential of e-procurement to increase trust is positively related to the willingness of users to adopt.

The result of both the sample government and bidder's hypothesis H4 is supported by positive and strongly significant results confirming its effect on the intent to adopt e-procurement. This study reviewed the existing body of research on how the perceived ease of use of public e-procurement affects the level of corruption in principal-agent (Government-Bidders) relationship. It found that perceived ease of use was an important determinant of user behaviour, attitudes, and intention to adopt or use any technological application. This study found that perceived ease of use of

e-procurement was a most important factor that helped to reduce corruption in procurement processes.

From the government officer's sample results, five items were valid to measure perceived ease of use of public e-procurement technology. These were (a) e-procurement provides a user friendly environment for publishing bid information (b) it is easy to use of public tendering and contract practices (c) a system that was easy to learn and use system (d) easy system for procurement task (e) provides any time anywhere platform for bidders to submit bids. The results (Chapter Six) found that the construct perceived ease of use was a positive significance to intent to adopt e-procurement ($\beta = -0.210$, $t\text{-value} = 4.391$, significant at 0.01).

Result from the bidders sample, three items were valid to measure perceived ease of use. They are (a) e-procurement provides a clear and user-friendly environment for accessing bid information (b) e-procurement is easier to get bid information (c) e-procurement services provide me perceive ease of use. The results revealed in Chapter Seven demonstrated that perceived ease of use had positive significance on the intent of users adopt e-procurement ($\beta = 0.236$, $P\text{-value} < 0.05$).

The construct 'perceived ease of use' played a significant role in the users' intention to adopt the technology. Both sample results indicated that the perceived ease of use of public e-procurement was a critical factor that helped to minimise the risk of corruption in public procurement processes. This research finding is consistent with other research conducted in different context such as adoption of Internet banking (Cheng et al. 2006), evaluating the anti-corruption capabilities of public e-procurement in developing country context (Neupane, Soar, et al. 2012c), adoption of online tax (Wu & Chen 2005), conceptualising citizen's trust in e-government applications (Alsaghier et al. 2009), and predicting e-procurement adoption in a developing country (Aboelmaged 2010). The main contribution of perceived ease of use construct is to determine perception of the government and bidders to intent to adopt e-procurement. This study has found that perceived ease of use of the public e-procurement is one of the anti-corruption factors that can help governments lower the public procurement corruption.

8.3.5. Perceived Usefulness and Intent to Adopt E-procurement

H5: Higher levels of perceived usefulness will be positively related to the willingness of users to adopt anti-corruption technology (e-procurement).

The result of the government sample H5 is supported with positive significance for the intent to adopt e-procurement, but in terms of the bidder's sample, H5 is rejected. Nevertheless, perceived usefulness of public e-procurement is one of the perceived anti-corruption factors in public procurement. This study reveals the prior research on how the perceived usefulness of e-procurement technology is an anti-corruption factor that has the effect of reducing levels of corruption in public procurement. It was found that perceived ease of use to determines the user behaviour, attitudes, and intention to adopt or use any technological application. This study argued that perceived usefulness of e-procurement is a most important factor that helps to reduce corruption in procurement processes.

From the government sample results, three items were valid to measure the perceived usefulness of e-procurement technology. They are (a) e-procurement technology would enable the department to accomplish procurement task easier and faster than a manual system (b) e-procurement service improves tendering process environment (d) overall it is useful for procurement related job. These three factors can be considered to make transparent and accountable public procurement processes. The statistical results (displayed in Chapter Six) showed that perceived ease of use is a positive significance to intent to adopt e-procurement ($\beta=0.259$, $t\text{-value}= 6.940$, significant at 0.01).

Result from the bidders sample, two items were valid to measure perceived ease of use. They are (a) e-procurement is easier to get bid information (e) overall, e-procurement technology is useful in all procurement related job. The results in Chapter Seven showed that usefulness is not significant to intent to adopt e-procurement ($\beta=0.006$, $P\text{-value}=0.933$).

The construct 'perceived usefulness through e-procurement technology' played a significant role for both parties' (government and bidders) intention to use e-procurement technology. This research argued that perceived usefulness through e-procurement is an important anti-corruption factor. In this regards, this research was consistent with prior research how technology's perceived benefits linked to minimised risks for corruption. Colesca and Dobrica's (2009) research on adoption and use of electronic government services case of Romania found that perceived usefulness of using e-government service has a positive effect on satisfaction. Further Colesca and Dobrica highlighted that the managerial reasons behind the adoption of e-government in public sector to reform public sector, leading efficient and accountable and transparent government that prevent level of corruption and human errors. Bwalya's (2009) research highlighted the perceived usefulness of e-government in Zambia and concluded that corruption is reduced, time is saved and enhanced transparency and accountability through e-government. The main contribution of perceived usefulness construct is to determine perception of the government and bidders to intent to adopt e-procurement. This study believes that perceived usefulness of e-procurement is one of the anti-corruption factors that can help government lower the public procurement corruption.

8.3.6. Reduction of Transaction Cost and Intent to Adopt e-Procurement

H6: Higher level of the perceived potential of public e-procurement to reduce transaction costs is positively related to the user's willingness to adopt.

The results of the both samples government and bidder's: H6 is supported and significant to intent to adopt e-procurement. This study supports the existing body of research on how reducing transaction cost through e-procurement effects the level of corruption in public procurement. One of the significant perceived benefits of implementing e-procurement or any other electronic government application is to reduce the transaction cost and time saving of the government. This study's assumption is not only that transaction cost are reduced through e-procurement, but

that it also reduces the chances of corruption and acts as an anti-corruption factor in public procurement.

From the government sample results, all five items were valid to measure the reduction of transaction cost through implementation of e-procurement technology. They are (a) e-procurement provides shorter order cycle (b) e-procurement reduces the tender cost (c) e-procurement provides a centralised tendering process that can reduce the transaction costs (d) e-procurement provides a common management framework that can reduce the transaction cost (e) overall reducing transaction cost is related to reduce the risk of corruption. These factors play an important role for the government to reduce the transaction cost as well as reduce corruption. The statistical results (Chapter Six) showed that transaction cost is a negative significance to intent to adopt e-procurement ($\beta = -0.116$, $t\text{-value} = 2.034$, significant at 0.01).

In the results from the bidders' sample, two items were valid to measure transaction cost. They were (a) e-procurement help to reduce the transaction cost, which helped to reduce opportunities for fraud and corruption, and (b) e-procurement technology enhances more competition among bidders in bidding processes, which also helps to reduce opportunities for fraud and corruption. The results (Chapter Seven) showed that transaction cost was significant to the intent to adopt e-procurement ($\beta = 0.259$, $P\text{-value} < 0.05$).

Both results (Chapter Six and Chapter Seven) indicate that reduction of transaction cost through e-procurement in public procurement process is one of the key constructs for reducing the chances of corruption. This research finding is consistent with prior research results. Piotrowicz and Irani's (2010) research demonstrated reduced transaction costs, reduced buying costs, reduced service costs, faster receipt of payments, and fraud prevention through electronic procurement were the most common financial benefits of an organisation. Ojha and Palvia (2012) highlighted a five case studies on electronic government project in India and the finding of the study revealed that levels of corruption were reduced through the antecedents of electronic government application. Ojha and Palvia research argued that electronic government applications (e-procurement) reduced the civil servants' monitoring costs and other costs of the government. Iimi and Benamghar's (2011) World Bank research paper on efficiency in public procurement in rural road projects of Nepal findings suggested that competition in bedding enhanced to reduce the procurement cost, wider distribution of tender information increase the competition as well as transparency and accountability. Further, Bhattarai (2011) argued that Department of Road Nepal saved US 39 million dollars through the use of electronic tendering processes in 2010. This study believed that reduction of transaction cost through e-procurement was one of the key benefits for both government and bidders and it did help to reduce corruption.

8.3.7. Transparency and Accountability, and Intent to Adopt E-procurement

H7: Higher level of perception of the potential of public e-procurement technology to increase transparency and accountability is positively related to the willingness to adopt.

For both samples of government officials and bidders: H7 was supported and significant for the intent to adopt e-procurement. This study revealed the existing body of research on how increasing transparency and accountability through e-procurement affects the level of corruption in public procurement. The terms transparency and accountability are two important pillars for the government and bidders to reduce corruption. Both results indicate that transparency and accountability were significant to the intent to adopt e-procurement. Kolstad and Wiig's (2009) research results claimed that transparency could reduce political and bureaucratic corruption as well as facilitate cooperation over opportunistic rent-seeking, maintain norms of integrity, and trust. Filho & Mota (2012) and other studies have pointed out that the main contribution of e-procurement was through reforming government procurement systems and enhanced efficiency and quality of government services, as well as enhanced transparency and accountability (Brun et al. 2010; Wen & Wei 2007). This study argued that transparency and accountability was one of the anti-corruption factors that helped to reduce corruption in procurement.

From the government sample results, eight items were found to measure transparency and accountability. They are (a) e-procurement technology contributes to more transparent and accountable procurement process (b) e-procurement helps to reduce human errors (c) e-procurement technology services is convenient to acquire information (d) e-procurement provides a better relationship between government and bidders (e) e-procurement brings an increase in transmission of timely public information in contract awards on price, volume, and execution time (f) e-procurement increases the availability of public information on bids (g) e-procurement services increase accuracy of orders (h) e-procurement can reduce the time in receiving payments. Two items were deleted in the process of achieving a good model fit. These all factors play an important role for the government to increase transparency and accountability as well as help to reduce corruption. The statistical results (Chapter Six) showed that transparency and accountability is a positive significance to intent to adopt e-procurement ($\beta=0.219$, $t\text{-value}= 3.319$, significant at 0.01).

Results from the bidder's sample revealed that two items were valid to measure transparency and accountability. They were (a) e-procurement technology increase competition among bidders in procurement processes (b) e-procurement technology makes procurement process faster and easier. The result (Chapter Seven) showed that transparency and accountability was significant to the intent to adopt e-procurement ($\beta=-0.204$, $P\text{-value} < 0.05$).

Both results indicated that increasing transparency and accountability through e-procurement was a key anti-corruption factor of public procurement. This research finding was consistent with prior research results. Singh (2009) survey findings indicate that the impact of electronic government services improved governance and greater transparency. Bertot, Jaeger and Grimes' (2010a) research suggest that ICT enabled technology was seen to promote openness and transparency in order to reduce corruption. Other research by Kim et al. (2009) highlighted that electronic government is increasingly being used to improve transparency in government work and services and to combat corruption. Kim's research findings demonstrated that implementing Korean 'OPEN' is a system for anti-corruption. Cordella's (2007)

research concluded that electronic government not only improved transparency and accountability, but also changed the nature of services provided by the public administration. Thus, public e-procurement can facilitate the bidders' real time information access, automate procurement procedures, provide greater consistency in bidding procedures, and importantly reduce the human intervention in bidding processes. Our research found that these anti-corruption factors lead to reducing the chances of corruption. Haque and Pathrannarakul (2013) found that there was an impact from the introduction of electronic government technology in enhancing the transparency and accountability of public organisations. Further Haque and Pathrannarakul's research pointed that instant information access positively affected the increased the transparency of the organisation, and empowered the employees, which in turn significantly increased the accountability of the organisation. Conversely, the lack of transparency and accountability created opportunities for the public officials or politicians to exacerbate corruption-related problems (Kolstad & Wiig 2009). Croom and Brandon-Jones' (2007) findings demonstrated different factors of e-procurement impact on supply governance including transparency of sourcing and supply processes, improved communication with suppliers, and greater knowledge sharing with suppliers. Panayiotou, Gayialis and Tatsiopoulou (2004) identified the expected benefits of e-procurement in Greek Government to be cost reduction, efficiency and productivity, effectiveness and transparency. Rotchanakitumnuai's (2013) survey results found that transparent e-procurement process had a positive effect on good governance practice, cost effectiveness and accountability, and decreasing collusion among vendors in Thai e-government procurement (E-GP).

Evidence in the literature evidence and the study results justified that transparency and accountability is a pillar of anti-corruption factor especially in public procurement management. The items were used to measure the transparency and accountability avoiding human errors, real time access information, reduces human intervention in tendering processes, automation procurement procedure, more competition in bidding processes, more consistency in bidding processes can be considered to link increase transparency and accountability in public procurement. This study reveals that transparency and accountability through e-procurement is a key construct to reduce corruption.

Table 7.10 demonstrated a summary of hypothesis testing results of both government and bidders sample from Chapter Six and Chapter Seven. All seven hypotheses were supported in the perception of the government sample. Five hypotheses were supported and two of them were rejected on the perception of the bidder's sample data.

Table 8.1 Summary of the hypothesis testing of the study

Hypotheses		Government sample (Using Smart PLS)			Bidders sample (Using AMOS)		
		Coefficient value	t-statistics	Remarks	Coefficient value	P-values	Remarks
H1	<i>Higher level of perception of the potential of public e-procurement technology to reduce information asymmetry is positively related to the willingness to adopt.</i>	0.263	3.268**	Supported	0.298	<0.05	Supported
H2	<i>Higher level of perception of the potential of public e-procurement to reduce monopoly power is positively related to the willingness to adopt.</i>	0.554	9.176**	Supported	0.346	<0.05	Supported
H3	<i>Higher level of perception of the potential of e-procurement to increase trust is positively related to the willingness to adopt.</i>	-0.269	3.992**	Supported	-0.079	0.628	Rejected
H4	<i>Higher levels of perceived ease of use will be positively related to the willingness to adopt anti-corruption technology (e-procurement).</i>	0.210	4.391**	Supported	0.236	<0.05	Supported
H5	<i>Higher levels of perceived usefulness will be positively related to the willingness to adopt anti-corruption technology (e-procurement)</i>	0.259	6.940**	Supported	-0.006	0.933	Rejected
H6	<i>Higher level of perception of the potential of public e-procurement to reduce transaction cost is positively related to the willingness to adopt.</i>	-0.116	2.034**	Supported	0.259	<0.05	Supported
H7	<i>Higher level of perception of the potential of public e-procurement technology to increase transparency and accountability is positively related to the willingness to adopt.</i>	0.219	3.319**	Supported	-0.204	<0.05	Supported

Note: Significant levels (all two-tailed) denoted by * (5 percent, t-value 1.96); ** (1 percent t-value >2.58); *** (10 percent t-value > 1.65)

8.4. Summary of Findings

8.4.1. Summary of Theories Linking Anti-corruption Technologies

This study applies three theories and their exploratory powers in anti-corruption role of public e-procurement. Principal-Agent theory (agency theory), Technology Acceptance Model, and Transaction Cost Theory were used in this research. The Principal-Agent theory is considered to be the main theory in this research. The main contribution of Principal-Agent theory is to evaluate the risk of corruption between two party's Principal (government) and Agent (bidders) in public procurement and also examine contractual problems to determine the most efficient contract type that satisfactorily govern agency relationship (Whipple & Roh 2010). According to Dawson, Watson and Boudreau (2011, p. 1) "*agency theory has long been a stalwart of IS research and is one of the most commonly used lenses to study the relationship between a principal and an agent*". Dawson, Watson and Boudreau (2010) research highlighted that the agency theory can be useful in the contractual and social relationship between consultant and clients. Three anti-corruption factors: monopoly power, information asymmetry, and trust were selected from the Principal-Agent theory.

Another important theory, Technology Acceptance Model is widely acceptance model in information system research (Han & Jin 2009). Two prominent construct were used in this study to evaluate the perceptions using e-procurement technology to reduce corruption: perceived usefulness and perceived ease of use. Alryalat et al.'s (2013) research concluded that perceived usefulness of the electronic government has a significant positive influence on Jordanian citizen's intention to adopt e-government. Rahim (2008) applied TAM model and identified factors affecting acceptance of e-procurement systems in an Australian City council. Similarly, Chu et al. (2004) explored the key success factors of electronic tendering in Taiwan. This study justify TAM two constructs are an anti-corruption factors when used a strategy to combat corruption.

Transaction cost theory concept try to minimise the organisation cost including information cost, negotiation costs, and monitoring costs (Williamson 1981). Prior research applied transaction cost theory in the area of e-procurement assimilation research (Vaidya et al. 2008), information technology adoption behaviour of organisation in the presence of transaction cost, agency cost, and information uncertainty (Kauffman & Mohtadi 2004). The main contribution of transaction theory in this research: to reduce transaction cost through e-procurement as transmitting and reacting information, shorter order cycle, increased information availability, and processing capacity, and improve capability of an organisation to monitor their partner's behaviour. Based on the theory's constructs, the study developed a research model and the model was tested based on the two stakeholder's perceptions. The theories constructs were found to perceive to make an important contribution to reduce corruption and the misuse of power in public procurement.

8.4.2. Summary of Research Methodology

This study employed the positivist paradigm to examine the intent to adopt public e-procurement technology in government, and to explore the potential of public e-procurement technology to reduce corruption in government procurement. The main research question of this study is “Which factors are associated with the intent to adopt e-procurement technology as an anti-corruption technology? To address this question, seven-sub question were developed and seven research hypotheses were formulated. The research model was developed by integrating the theoretical constructs into a single research model. Data was collected from the field survey questionnaire of two stakeholder’s perceptions: those of government officers and bidders of Nepal. This study used a convenience sampling approach as to determine a level of interest shown by the participants to respond the survey. In total, forty-six government officers, and two hundred and twenty bidders filled a complete questionnaire. Data were analysed through structure equation modelling (PLS for government sample SmartPLS 2.0, SEM for bidder’s sample-AMOS 21). Reliability validity, goodness of fit data and model were demonstrated of both samples. Finally, structural model was examined for the relationship between seven independent factors into one dependent factor.

8.4.3. Impact of Public E-procurement on Reducing Corruption

This study focuses on anti-corruption factors of public e-procurement to reduce corruption using questionnaire survey approach. Both sample results demonstrated that intent to adopt e-procurement in public level reduces reduction of monopoly power, reduce the information asymmetry problem, increasing trust, perceived ease of use, perceived usefulness, and reduces transaction cost, and increase transparency and accountability. From the both results (Chapter Six and Chapter Seven), the five anti-corruption factors were most significant to intent to adopt e-procurement. Reduction of monopoly power of government officers and minimisation of information asymmetry problems in principal-agent relationships were found strongly significant to intent to adopt e-procurement. Transparency and accountability is another pillar of public e-procurement to reduce corruption in public procurement. Most of the respondents were agreed to support that public e-procurement was one of the best tools to fight against corruption. Some of the key items such as real time access to information, avoiding human intervention in tendering processes, monitoring and tracking, increased competition among bidders in bidding processes, more consistency in procurement processes, shorter order cycles, managerial control and collaboration, making procurement processes faster and easier, and avoid unnecessary hidden project costs were strongly agreed by the respondents.

Most of the respondents (government officials and bidders) claimed that after the implementation of the e-procurement system, this completely avoided the human intervention in tendering processes and as a result, they had positive perceptions about to use of e-procurement system. More interestingly, before the adoption of the system, bidders used a coercive power, avoided the rule of law, mobilised youth forces, as well as using guns in some situations for securing contracts, while other potential bidders were simply not able to submit tender documents because of

perceived coercive threats from other influential bidders. Now after e-procurement implementation, bidders can submit bids through electronic submission anywhere and at any time.

These findings are consistent with other similar research. Kaliannan and Awang's (2010) research found that suppliers had a positive perception about the use of the Internet to do their business transactions and were ready to use e-procurement systems. One of the major milestones for implementation of e-procurement was to reduce corruption in Malaysia. Andersen (2009) work concluded that electronic government is a useful tool in the global effort to reduce corruption. Asogwa's (2013) study finding suggests that electronic government provides faster access to government information, lower administration costs, increased transparency in government ministers, and reduced bribery and corruption. Ojha and Palvia's (2012) research on five e-government projects (e-procurement project) case example in the fight against corruption in India found that e-government programs were more effective at combating corruption.

Overall, the findings of this study suggest that public e-procurement anti-corruption capabilities can help to guide government, bidders, and public procurement practitioners to a better understanding of the value of e-procurement for reducing corruption.

8.5. Conclusions

This Chapter discussed both sets of sample results in order to answer the research questions within the context of reviewed prior research literature. The first section discussed the results of research hypothesis based on two sample results. Each hypothesis was discussed in detail and either supported or rejected the hypothesis from within the relevant reviewed literature. From the government officer's sample results, all the hypotheses were supported and all the anti-corruption factors (research constructs) selected in the study were valid and reliable to measure the intent to adopt e-procurement technology to reduce corruption. Nevertheless, from the bidder's sample, hypotheses H3 and H5 were rejected. Other hypotheses H1, H2, H4, H6, and H7 were supported. The next section discusses the summary of findings: (a) summary of theories linking anti-corruption technologies, (b) summary of research methodology used (c) impact of public e-procurement on reducing corruption. An overall result supports the proposed research model to evaluate the perceptions of the potential of e-procurement to reduce corruption. The next Chapter will discuss the conclusions of the study.

CHAPTER NINE

CONTRIBUTIONS AND FUTURE RESEARCH

9.1. Chapter Overview

This Chapter summarises the research contributions, the implications of theoretical knowledge, research limitations, and future opportunities of public e-procurement technology for government reform and reducing corruption. The content of the Chapter includes an introduction, details of research conclusion, implication of the research (theoretical, managerial, practitioner), limitation and future research, followed by the conclusion of the chapter.

The brief structure of this Chapter is shown in figure 9.1.

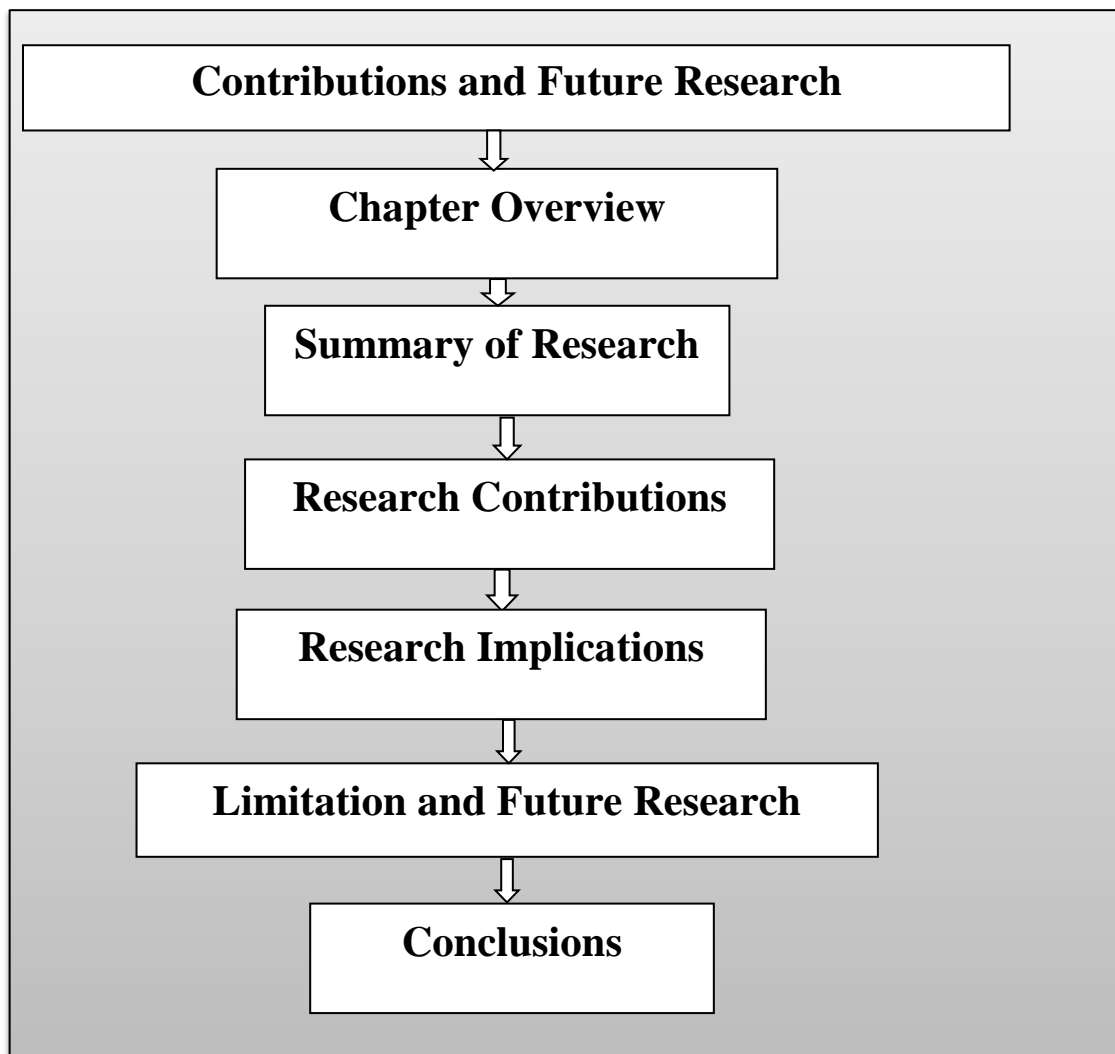


Figure 9.1 Chapter 9 overview

9.2. Summary of the Research

This study discussed three important key areas: public procurement, corruption in public procurement, and public e-procurement. E-procurement technology is an electronic government technology tool that is used especially in procurement management of government work and services or in private organisation procurement management. Prior research and many international and government

reports indicate that corruption in public procurement is a major issue in developed and is even more alarming in developing countries. This study investigated the issues of the potential for public e-procurement to reduce corruption in the developing country of Nepal. Public e-procurement is considered as to be the best tool to reform the traditional paper based systems and transform them into modernised ICT enabled procurement or tendering management systems in developing countries like Nepal. This study addressed the theoretical and practical problem of the potential of public e-procurement to reduce corruption. This study employed the positivist paradigm to examine the intent to adopt e-procurement technology in government to reduce corruption. Survey questionnaire is the main method of collecting empirical data. In this regards, this study examine the perceptions of two stakeholders: government officers and registered bidders of Nepal. Quantitative data analysis (SPSS 21.0, Smart PLS 2.0, and AMOS 21.0) technique was applied to analysis empirical data.

This study was conducted to fill the research gap on what factors were perceived to be associated with the intent to adopt e-procurement technology as an anti-corruption technology: (a) reduction of information asymmetry problems, (b) reduction of monopoly power (c) increasing trust, (c) perceived ease of use, (d) perceived usefulness, (e) reduction of transaction cost, (f) transparency and accountability.

This research is presented in nine chapters. Chapter One discussed the background of information (public procurement, corruption in public procurement, public e-procurement technology), the research problem, research questions, significance of the research, term and their uses, overview of research methodology, and contribution of research. Corruption in public procurement in developing countries (e.g. Nepal) is sky rocketing every year. Corruption is motivated by different factors such as lack of transparency and accountability in government work and services, hidden or unjustified procurement planning, lack of monitoring, inconsistent cost estimate, political pressure, lack of assessment, misuses of official powers, lack of information gap between government or bidders or, citizens, and lack of trust. One main research question and seven sub questions were formulated to address the study's research problem.

Chapter Two demonstrated the detailed review of literature on public procurement, corruption in public procurement processes, public e-procurement, role of public e-procurement in public procurement processes, and e-procurement in the Nepalese sector. The main contribution of this Chapter is to demonstrate: (a) corruption issues in different stages of the public procurement process, (b) what kinds of ICT enabled technology tools and types are practicing in public or private level with different country case example, (c) discussed the perceived benefits of e-procurement in the context of reducing corruption, (d) identify the anti-corruption factors of e-procurement in public procurement processes, (e) review of corruption and procurement issues of Nepal.

Chapter Three described and justified IS theories linking to anti-corruption technologies. This Chapter reviewed the five theories: Agency Theory (Principal-Agent Theory), Technology Acceptance Model, Fraud Triangle Theory, Transaction Cost Theory, and Diffusion of Innovation Theory. Three information systems theories: Principal-Agent Theory, Technology Acceptance Model, and Transaction Cost Theory were selected to this study and developed into a theoretical model.

Chapter Four described and justified the anti-corruption factors based on Chapter Three's reviews of IS theories. Chapter Four identified the seven anti-corruption factors that played a leading role in minimising corruption in public procurement. Based on a review of anti-corruption factors, this study developed a research model and research hypothesis. The research model provides a better understanding on the anti-corruption capabilities of public e-procurement for reducing corruption in the context of three dynamic theories variables as an independent construct and intent to adopt e-procurement as a dependent construct.

Chapter Five justified that the research methodology was used to answer the research questions. Chapter Five described the research approach, the research philosophy, survey methods, pilot study, data collection process, independent and dependent construct, data analysis approach, and ethical clearance. This study collected two-sample data from government organizations and its registered bidders of Nepal.

Chapter Six covered the data analysis of government sample. The partial least square (PLS) Smart PLS 2.0 was used to analyse the quantitative data. Various measurement techniques were followed to check validity and reliability of the data. The proposed research model was statistically valid. All research constructs were statistically significant to dependent variable intent to adopt e-procurement. The main contribution of Chapter Six is to justify that academically or theoretically, or practically for the government or policy maker to better understanding about e-procurement technology to reduce corruption.

Chapter Seven covered data analysis of registered bidder's sample. Chapter Seven presented a descriptive statistics, stage one CFA model, stage two measurement model, final stage structural model (Path model), and finally hypothesis testing. AMOS 21.0 and SPSS 21.0 were used to analyse the quantitative data. The different stages were followed to maintain the validity and reliability of the data. Five hypotheses were statistically significant to the intent to adopt e-procurement technology. This Chapter's contribution is to justify that the reduction of monopoly of power, reduction of information asymmetry problems, increasing transparency and accountability, perceived ease of use, and reducing transaction cost were the significant factors that affect the level of corruption.

Chapter Eight demonstrated discussion and research findings of the study. Chapter Eight combines the results from Chapter Six and Chapter Seven, and presented introduction, research hypothesis, summary of findings (theory, methods, and impact of e-procurement). Chapter Six discussed in depth the results and findings, and compared these with those developed during prior similar research.

9.3. Research Contributions

The study contributed to information systems research in number of ways.

- ❖ This research was conducted in the context of developing countries. This study contributes to the academic scholars, government agencies, and public procurement practitioners by enhancing their understanding of the perceived anti-corruption benefits of public e-procurement to reduce corruption. This

study provided a research model and identified seven anti-corruption factors that have significant impact upon the intent to adopt e-procurement. Seven independent constructs were derived from the review of theories related anti-corruption technologies namely Principal-Agent Theory, Technology Acceptance Model, and Transaction Cost Theory. The seven anti-corruption constructs were: (a) reduction of information asymmetry (b) reduction of monopoly power (c) increasing trust (d) perceived ease of use (e) perceived usefulness (f) reduction of transaction cost (g) transparency and accountability. These constructs were empirically tested through various statistical measurement techniques including partial least squares (PLS), confirmatory factor analysis (CFA) using structural equation modelling. The study followed different stages to measure the reliability and validity of the data. The result supports all the constructs items that achieved the reliability and validity.

- ❖ This study developed a research model based on the three theories and seven constructs related to anti-corruption technologies. This holistic model has explanatory the predictive power of factors influencing the intent to adopt e-procurement of two stakeholders perception's (a) government organizations explains 89 % of variation of intent to adopt e-procurement (b) registered bidder's sample explains 57% of variation of intent to adopt e-procurement. This research model can guide the developing and transitioning countries to make decisions about e-procurement.
- ❖ This study applied Principal-Agent Theory (Agency Theory) as a core theory to investigate a relationship between principal (government) and agent (bidders) corruption problems in procurement processes. The main contribution of this theory in this study is to explain a risk of corruption in public procurement processes between two parties. The three constructs derived from Principal-Agent Theory were: (a) reduction of monopoly power (b) reduction of information asymmetry, and (c) increasing trust were justified as anti-corruption factors. From both (government and bidder's) perspectives, the three anti-corruption factors: namely reduction of information asymmetry, reduction of monopoly power, and increasing trust, were strongly significant and correlated to intent to adopt e-procurement, except that increasing trust was not significant in bidders' perceptions.
- ❖ Another two theories, the Technology Acceptance Model, and Transaction Cost Theory has justified to link anti-corruption technologies. The main contribution of TAM model in this study is to explain the perceived benefits of public e-procurement to reduce corruption on two beliefs: perceived usefulness and ease of use. In government perspective, these two anti-corruption variables were found significant and correlated to intent to adopt e-procurement. In bidders' perspective, perceived ease of use is significantly correlated to intent to adopt e-procurement and perceived usefulness is not significant. Reducing transaction cost is an important contribution of technology adoption in an organisation. In this study main contribution of transaction cost theory is to reduce the transaction cost for both government organizations and bidders in procurement processes. Reducing transaction cost through e-procurement is found significant in both perspectives.

- ❖ Previous studies justified that perceived benefits of ICT enabled technology such as e-procurement help the organisation to improve overall performance. This study has linkup all the perceived benefits of using technology (e-procurement) to anti-corruption factors. This study literature and empirical evidence demonstrated that all anti-corruption factors effect to reduce corruption in government procurement processes.
- ❖ Many previous scholars and international reports pointed that electronic government enhanced transparency and accountability in government works and services (Brun et al. 2010; Filho & Mota 2012; Wen & Wei 2007). None of the academic study empirically measured transparency and accountability in the context of reducing corruption. One of the significant contributions of this research work is that it has identified and statistically justified transparency and accountability as two of the pillars of anti-corruption factors in both government organizations and bidder's perspective.

9.4. Research Implications

Public e-procurement has been identified as an instrument in public sector reform by the use of ICT such as Internet or web-based systems by government institutions in conducting procurement related tasks such as the acquisition of goods and services. It enables the government to monitor the efficiency and effectiveness of procurement and enhanced transparency and accountability.

9.4.1. Policy Reform

This study demonstrated that public e-procurement is an important electronic government tool that helps to reform the traditional paper based procurement system to modernised integrated government procurement system. Prior implementation experience of advance countries such as Australia, United Kingdom, United states, New Zealand, Singapore, Denmark, and emerging economies including South Korea, Brazil, Mexico, Brazil, Malaysia fulfil most of the objective with greater level of success and had greater level of transparent and accountable government procurement process. These countries have employed definitive policy, strategic framework, and integrated approach between government and e-procurement initiatives. In the context of developing countries, they have still lack of policy, and strategic frameworks to reform whole-of government procurement system. Many international organisations such as the UN, the World Bank, ADB, and OECD support for developing countries technically and financially for policy reform of whole procurement system. At the current stage, most of the developing countries are making a policy and developing strategic framework to implement e-procurement system. The Public Procurement Monitoring Officer (PPMO) is a guiding body of Nepal for procurement policy formulation, implementation, and monitoring procurement system. PPMO is going to complete whole e-procurement system of four years plan in three phases (I-III). This research provides guidelines for future e-procurement implementation strategy in government sector to reduce corruption. It is necessary to understand and implement of the anti-corruption factors of e-procurement in a policy / planning level. This research greatly encourages developing country government organizations, consultants, practitioners, and

researcher to make decision about procurement reform. This study outlines some important anti-corruption factors of e-procurement for the consideration of the procurement policy reform:

- ❖ The main reason to introduce e-procurement system is not just to replace paper-based system with a modernised IT integrated Internet based system, it is an important achievement to reform the public sector towards the fight against corruption
- ❖ Reduction of information the asymmetry problem between government and bidders through implementation of e-procurement that contribute real time information, consistency procurement processes, fairness and openness, more competition among bidders etc.
- ❖ Reduction of monopoly power of government official through implementation of e-procurement that contributes the automation, auditing capabilities and facilitate accounting control, fixed price contract etc.
- ❖ Increasing trust between government and bidders through implementation of e-procurement that contribute security of transaction, user friendly environment, anywhere and anytime bidding, monitoring and online tracking etc.
- ❖ Perceived ease of use and perceived usefulness of the e-procurement
- ❖ Reduction of transaction cost through implementation of e-procurement that contributes shorter order procurement cycle, common management framework, fixed price and more competition, avoid human interference etc.
- ❖ Enhanced transparency and accountability in government work and services through implementation of public e-procurement
- ❖ Quality, efficiency and effectiveness in procurement

9.4.2. Implications for Practitioners

The results from the study have several implications for procurement practitioners of developing and transitioning countries to make decisions about e-procurement system.

- ❖ This study results provide for better understanding of the potential of the public e-procurement as well as impetus to promote the importance of e-procurement as an anti-corruption agenda and the strength and relevance of the use of technology to deliver procurement reform
- ❖ The results of this study can help procurement professionals to enhance the knowledge about the anti-corruption factors of public e-procurement. This work is beneficial to procurement professionals or procurement development teams to include anti-corruption factors in technical design of e-procurement system.

- ❖ This study's results provide positive messages to government and practitioners about the anti-corruption role of e-procurement in procurement processes including project planning, project design and documentation, tender processes, contract award, and accounting and auditing. E-procurement can provide role as 'watchdog' for public sector integrity and reduce the red tape in procurement processes
- ❖ This study's results have contributed to explain the effect of adoption of e-procurement technology for good governance, which is a crucial and necessary part of government administrative process reforms and can reduce the opportunities for corruption
- ❖ Overall, this study provided a clear guideline the developed and emerging countries to make a positive decision to adopt e-procurement technology for not only increasing organisation performance as a part of anti-corruption agenda of their countries

9.4.3. Recommendations

As discussed above, this study work has several interesting contributions to make for researchers, government institutions/policy makers, procurement practitioners, and other international public organisations in providing better understanding of anti-corruption capabilities of the ICT enabled technology tools (e-procurement) in government work and services or procurement management. This research work has suggested some practical recommendations for emerging countries:

- ❖ *Government can encourage e-procurement as an anti-corruption reform in public procurement*

This study suggested that the emerging countries governments can promote public e-procurement as an anti-corruption tool to fight against corruption. Countries can encourage the awareness of transparency and accountability as key instruments tools for promoting integrity and preventing fraud and corruption in public procurement. Government can perform the excellent job through the e-procurement web portal of creating transparent and accountable government works and services. It can help to provide publically available and open procurement related information in a web e.g. forms, contracts, bids, and awards. Political will and efforts are necessary to implement the public e-procurement in the country. Governments should give priority for e-procurement in budgeting and ministerial decisions.

- ❖ *Government can utilise the perceived benefits of e-procurement to administrative reform*

A detail of research is necessary to review the existing law and policies for government administrative reforms that can give a clear picture to understand the procurement issues. In this regards, this study suggested that government agency or policy maker to understand the role of perceived benefits of e-procurement into reform the traditional paper based system to modernise IT integrated web based e-procurement system. In addition, government need to develop policy, strategic

framework to support adoption of e-procurement technology. Another most important things government need to be develop and lunches various awareness programmes including training, seminar, and workshop for government officials, and bidders about e-procurement. Procurement policies help governments work, services to be more transparent, and reduce opportunities for corruption in public procurement.

❖ *Government can explore the impact of e-procurement on organisation performance in the short and long term impact*

This study explored the theoretically and practically the impact dimensions of e-procurement on organisational performance including transparency and accountability, efficiency and effectiveness, competitiveness, dematerialisation etc. These e-procurement impact dimensions played a significant role to the organisation for overall performance in the short and long-term impact. This study survey results confirmed that the relationship between the e-procurement anti-corruption and its performance dimension to the impact of intent to adopt e-procurement technology. This study proposed research model suggests that the relationship between anti-corruption factors and e-procurement technology has a positive influence on the organisation performance including reduction of cost, reduction of information gap between government and bidders, reduction of monopoly power, increase trust, and transparency and accountability, and many other perceived benefits. Government or procurement practitioners may use the findings of the study to assist short and long-term organisational performance.

❖ *Government can achieve maximum value for money from e-procurement implementation*

Government or any organisation can obtain value-for money through the implementation of e-procurement. They can obtain better quality of services, avoid unnecessary purchases, fair treatment for all bidders, reduce procurement cost and transaction cost, reduce duplication, and improve purchasing efficiency etc.

❖ *Government can include study findings anti-corruption factors of e-procurement in the technical or design phase*

Governments or public procurement practitioner should include all the anti-corruption factors of the public e-procurement in technical design phase of public e-procurement.

❖ *Develop and implementation of public e-procurement strategy in planning level*

Governments should make action plans for implementing public e-procurement and establish a steering committee of executives whose credentials are impeccable to develop a public e-procurement implementation strategy. The main mission of the strategy should be designed to centralise e-procurement system, which makes to increase monitoring capabilities, transparency and accountability, easy access to information, and make consistency to all bidders and government agencies. As a result, it helps to combat corruption.

9.5. Limitation and Future Research

9.5.1. Limitations

This study investigated the perceived willingness of government officers and bidders to participate in public e-procurement systems when measured against the seven anti-corruption factors by testing the proposed research model. It has to be noted that this study has some limitations that should be taken into consideration.

- ❖ Evaluation of anti-corruption factors of public e-procurement by testing the proposed research model is relatively new IS research.
- ❖ The limited number of respondents (government 46, and bidder's 220) is another limitation of the study. This sample size is relatively low to run the model. This can be considered main barriers to generalise the results of the study.
- ❖ The sampling approach used in this study is another limitation. This study used a convenient sampling approach as determined by the level of interest shown by the participations to respond to the survey.
- ❖ The discussed findings and their implications were obtained from the study of a single country Nepal. Most of the developing countries have not well advance procurement management systems compared to advanced countries like USA, UK, Australia, Canada, South Korea etc. Developing countries are still in 'wait and see' conditions for the adoption of advanced IT integrated system. Conversely, impact of the systems on government works and services can see rapidly in developing countries context.
- ❖ Knowledge and practise of the e-procurement systems used is limited in developing countries. In context of Nepal, there are few government officials who have depth knowledge about the electronic procurement system. Therefore, the study has hardly found 46 government respondents who were involved in the system.

9.5.2. Future Research

This research provides some implications for future research.

- ❖ Future work will need to work on cross-sectional country analysis, large survey, add more anti-corruption variables, and employ rigorous research methodologies interview, focus group discussion about the better understanding of perceived benefits of e-procurement to reduce corruption in public procurement.
- ❖ More research is need to identify the anti-corruption factors of perceived benefits of ICT enabled technologies in reducing corruption in government procurement and it also needs strong empirical testing to validate all the anti-corruption factors that influence the adoption of e-procurement systems.
- ❖ Design science research (DSR) is a research methodology that focuses on development of IT artefacts in order to solve organisational problems (von Alan et

al. 2004). DSR methodology usually follows six steps as suggested by Peffers et al. (2007): problem identification and motivation, objectives of a solution, design and development, demonstration, evaluation, and communication. A practical DSR methodology can be considered for future work from this research in order to develop IT artefacts (e.g. e-government and e-procurement applications) to address corruption issues in developed and developing countries.

- ❖ The results of this study should be considered in the context of governments' public e-procurement and anti-corruption policies. This has been supported by (Concha et al. 2012) who observe that e-procurement has profoundly transformed the Governments' procurement process exceeding the policy makers' expectations (Concha et al. 2012).

9.6. Final Remarks

Numerous perceived benefits can be achieved through the IT systems such as increasing transparency and accountability; fast and easy access information; reduction of information gap among government, supplier, contractor, and citizen; single click button to monitor and tracking whole records; avoid unnecessary middle person etc. The main key objective of this study is to explore the perceptions of the potential of e-procurement to reduce in public procurement. This study reviews the seven IS theories linking to anti-corruption technologies and discussed all anti-corruption factors of the three theories (Principal-Agent Theory, Technology Acceptance Model, and Transaction Cost Theory). Based on the anti-corruption factors, study developed a research model and hypothesis. The research model helped to explain the relationship among the anti-corruption factors with intent to adopt public e-procurement. The model was examined on the perception of government officer's and bidders' sample data. The results (Chapter Six and Chapter Seven) confirm that the model is valid and reliable to evaluate e-procurement technology to reduce corruption. At a glance, the model provided reveals the opportunities to access the impacts of public e-procurement perceived benefits likely to reduce the chances of corruption in public procurement. From the point of view of the practitioner, it provides for better understanding of the potential of public e-procurement; as well as impetus to promote and prioritise public e-procurement as an anti-corruption agenda and the strength and relevance of use of technologies to procurement reform.

This research identified the seven significant latent variables that could influence the willingness to intent to adopt e-procurement at all levels of government on the perception of the government officials and bidders. It demonstrates the potential of public e-procurement in reducing corruption in public procurement processes. It also indicated that higher levels of intent to adopt public e-procurement had a positive relationship on the reduction of monopoly power, reduction of information asymmetry, increasing trust, perceived ease of use, perceived usefulness, reduction of transaction cost, and transparency and accountability that contributes to the reduced chances of corruption in public procurement. Therefore, the research objective was to identify the most important anti-corruption factors of public e-procurement on the perception of the government bidders in relation to intent to adopt e-procurement. This research can help to the developing countries and international organisations such as the UN, the World Bank, ADB, OECD, and

Transparency International in their endeavour to combat corruption in public procurement.

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Appendices

Appendix A: Ethics clearance of USQ



University of Southern Queensland

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OFFICE OF RESEARCH AND HIGHER DEGREES

Helen Phillips
Ethics Officer
PHONE (07) 4631 2690 | FAX (07) 4631 1995
EMAIL ethics@usq.edu.au

Monday, 23 January 2012

Mr Arjun Neupane
1/27 Lemway Avenue
Toowoomba QLD 4350

Dear Mr Neupane,

The Chair of the USQ Human Research Ethics Committee (HREC) recently reviewed your responses to the HREC's conditions placed upon the ethical approval for the below project. Your proposal now meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethics approval has been granted.

Project Title	Assessing the potential of e-procurement technologies for minimising corruption in developing countries.
Approval no.	H11REA110
Expiry date	10/03/2012
FTHREC Decision	Approved

The standard conditions of this approval are:

- conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
- advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
- make submission for approval of amendments to the approved project before implementing such changes
- provide a 'progress report' for every year of approval
- provide a 'final report' when the project is complete
- advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website: <http://www.usq.edu.au/research/ethicsbio/human>

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

Helen Phillips
Ethics Officer
Office of Research and Higher Degrees

Appendix B: Questionnaire for government officers



University of Southern Queensland

The University of Southern Queensland

Consent Form

TO: Participants

Full Project Title: Assessing the potential of e-procurement technologies for minimising corruption in developing countries

Student Researcher: Arjun Neupane

- ❖ I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
- ❖ I understand the purpose of the research project and my involvement in it.
- ❖ I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- ❖ I confirm that I am over 18 years of age.
- ❖ I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.

Name of participant.....

Signed.....Date.....

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ethics@usq.edu.au



Survey of the potential of public e-procurement technology in practice

- To reduce corruption in
public procurement

*Complete the questions in the pages
that follow and submit it to:*

Arjun Neupane (PhD Candidate)

*Faculty of Business and Law, School of Information
Systems, University of Southern Queensland (USQ)
Toowoomba QLD, 4350, Australia*

Email: Arjun.Neupane@usq.edu.au

Phone: 61-7-46875777, (Mob: 61-403040699)

[For government officer]

Survey instruments for government officer

The purpose of this questionnaire is to assess the potential of e-procurement technologies for combating corruption in Nepal. Public e-procurement is the value-added application of internet and e-commerce technology solution to facilitates, integrates, and streamlines procurement processes from government to bidders and vice-versa. So it is useful public procurement practices, must take into account at least these four elements: The Internet/e-commerce (enabler); Process automation and integration (action); the practice of public procurement (process); and Value for money principles (objective). As such, public electronic procurement has been defined as the use of any Internet-based Inter-organizational Information System, which automates and integrates any part of the procurement process in order to improve efficiency and quality in public procurement, and promote transparency and accountability in the wider public sector (Vaidya, Sanjib & Callender 2007).

Your participation in the survey is voluntary and answer will be kept strictly confidential.

GENERAL INFORMATION

1. What type of internet connectivity is used in your organization?

☐ Cable Internet
☐ Leased Line

☐ Others (Please specify)_____

2. Does your organization use web base system for procuring goods and services?

☐ YES
☐ NO

3. How many years did you serve in the government / organizations?

☐ Less than 1 year
☐ 1-3 years

☐ 4-7 years
☐ More than 7 years

4. Please specify to whom your e-procurement system is linked with?

☐ Suppliers Only
☐ Customers only

☐ Both

5. Perceived usefulness of e-procurement technology

The degree to which a person believes that using e-procurement technology would enhance job performance.

Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement technology would enable our department to accomplish our procurement tasks (e.g. to prepare tender document notice, tender notice publish date, last date for bid submission, bid opening date) faster than a manual system.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology service has improved our tendering process environment.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology improves the quality of the work I do.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology makes it easier to do my job (e.g. bid preparation)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I find the e-procurement technology useful in my job	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

6. Perceived ease of use of e-procurement technology

The degree to which a person believes that using the system would be easy to use with minimal training or experience.

Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement technology provides our department to handle all procurement task user-friendly environment for publishing tender / bid information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
It is easy to use of government tendering and contracting practices.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
It is easy for our organization to learn to use e-procurement services.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
It is an easy system to publish all the tendering information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Interested bidders can register with essential information through e-submission at any time anywhere.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
All bidders can directly download the entire tendering document through our e- procurement web portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

7. Reducing information asymmetry through e-procurement technology

Information asymmetry arises when an agent (bidder) has more information than the principal (government) has or vice versa. Such difficulties arise due to incomplete information, incompleteness of contract, and problems of monitoring behaviour. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement technology helps to more competition in terms of quantity (participation) and quality (openness and fairness) among our bidders in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Our department has frequently up-to-date procurement information (e.g. tender notice) posted in our procurement web portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement helps to track and monitor all the procurement related activities such as tracking bidders information, monitoring all procurement processes etc.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides consistency in procurement process (same rule and regulation to all bidders in tendering process) to all register bidders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology reduces discretion (e.g. limit financial delegation) in contracting process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found reduction in information asymmetry through e-procurement technology helps to reduce the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

8. Reducing the monopoly of power through e-procurement technology

Government officials have monopoly of power over provision of goods and service that are crucial for explaining the incidence of corruption without theft. Nevertheless, in some cases, government officials have misused the power for their own benefits. They may shortage the goods or services in order to give opportunities to the bribers. Public e-procurement provides equal conditions to suppliers so that they can attend to public institutions, regardless of the company size. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology provides our department auditing capabilities with real time procurement information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	PERCEPTION 1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology reduces monopolies or selection of favoured bidders (e.g. suppliers / vendors) in contracting process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
The potential of e-procurement technology provides automation in procurement process, which reduces the monopoly power of government officers in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
The potential of e-procurement technology improves internal efficiency across procurement process (e.g. tender notice time, reduce paper files, advertisement time), which reduces the monopoly power of government officers in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology facilitate accounting control thus it reduces the likelihood of fraud or accounting errors by enabling the electronic matching of requisition, purchase orders, invoice, and receipts.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology helps to provide fix price contract to all buyers and sellers (e.g. equal tendering price for all bidders, price shall fixed throughout the contract).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, reducing the monopoly power through e-procurement technology helps to reduce the chances of corruption in public procurement process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

9. Increasing trust between government and bidders through e-procurement technology

Transparent transaction process is a key driver of e-procurement. A fair and transparent process allows the buyer and seller to make their decision effective. Trust builds good atmosphere between government and bidders in contracting process. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology contributes us to track and monitor all bidders' information and document that can increase the level of trust between bidders and government departments.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology can helps to build trust between governments and bidders (e.g. good governance)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology contributes us the security of transaction in government contracting process that can increase trust between governments and bidders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides a fair competition among bidders in public tendering that can increase trust between governments and bidders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides an user-friendly environment among bidders in public tendering processes that can increase trust between governments and bidders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, increasing the trust between government and bidders helps to reduce the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

10. Reducing transaction cost through e-procurement technology

E-procurement process can help to reduce the transaction cost including transmitting and reacting information, shorter order cycle, increased information availability, processing capacity, and improve the capability of firms to monitor their partner's behaviour. Please answer on a scale of 1 to 5 corresponds to 5-Strongly Agree, 4- Agree, 3-Neutral, 2-Disagree, 1-Strongly Disagree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology provides government a shorter purchasing and response time, faster receiving order, and overall short order cycle, which can reduce transaction cost.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology can reduce the tender cost (advertisement cost, postal service cost).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement provides centralize tendering process that can reduce the transaction cost.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement provides a common management framework that can reduce the transaction cost.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found that decrease in the transaction cost is related to reduce the risk of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

11. Perceived reduction of corruption through e-procurement technology

Intent to adopt anti-corruption technology may play an important contribution to reduce corruption in government tendering and contract practices. The most important perceived anti-corruption factors of the e-procurement / e tendering are eliminating direct human link in tendering process, government and bidders can track all the processing works, reducing the information gap between government and bidders, and tracking all the bidding application. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology contributes us to enhances more transparent and accountable in procurement process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology helps to reduce human errors (e.g. tender checklists) as well as increase accuracy of orders in procurement process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement makes it more convenient to acquire information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
All government procurement policies, processes, and guidelines are available online (e-procurement portal).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement provides the better relationship between government and suppliers.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement brings improvement in the quality of product / services.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement brings an increase in transmission of timely public information on contract awards on price, volume, and execution of time.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement increases the availability of public information on bids/offers and other processes.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement can increase accuracy of orders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement can reduce the time for receiving payments.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

12. Intent to adopt anti-corruption technology (e-procurement)

In general, saving cost is the main important factor for organization to implement and adopt any kind of information systems or technology. Not only the cost reason, other factors are also to be considered importantly including better negotiation between buyer (government) and supplier, reduction of discretion in contracting process, monitoring and tracking, increase of international efficiency, transparency, and audits. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.

Appendices

DESCRIPTION For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5- Strongly Agree.	PERCEPTION 1(Strongly Disagree) 5(Strongly Agree)
Our organization would like to intent to adopt e-procurement system for our organization needs.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Our organizations is using e-procurement technology for handling our procurement processing task (E.g. contract planning, contact designing, tendering, contract awards etc.)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement helps our organization to coordinate with other bidders partners for government work and services.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Our organization adopts e-procurement system to enhance procurement efficiency and for better decision making in government work and services.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Our organizations adopt e-procurement system to avoid the human interference in public tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, our organization intent to adopt e-procurement system to increase transparency, for non-discrimination, equality of access, and open competition in government work and services.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

Thank you for giving your valuable time to complete and submit this survey. Your insight and information are very valuable for this research.

Use the space below to provide additional comments:

Should you have any further questions or concern about this survey or any of its questions or ethical issues, please contact Arjun Neupane: Arjun.Neupane@usq.edu.au. Or Office of Research and Higher Degree, Ethics Officer: ethics@usq.edu.au

Appendix C: Questionnaire for bidders



University of Southern Queensland

The University of Southern Queensland
Consent Form

TO: Participants

Full Project Title: Assessing the potential of e-procurement technologies for minimising corruption in developing countries

Student Researcher: Arjun Neupane

- ❖ I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
- ❖ I understand the purpose of the research project and my involvement in it.
- ❖ I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- ❖ I confirm that I am over 18 years of age.
- ❖ I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.

Name of participant.....

Signed.....Date.....

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ethics@usq.edu.au



Survey of the potential of public e-procurement technology in practice

- To reduce corruption in
public procurement

*Complete the questions in the pages
that follow and submit it to:*

*Arjun Neupane (PhD Candidate)
Faculty of Business and Law, School of Information
Systems, University of Southern Queensland (USQ)
Toowoomba QLD, 4350, Australia
Email: Arjun.Neupane@usq.edu.au
Phone: 61-7-46875777, (Mob: 61-403040699)*

[For registered bidder's]

Survey instruments for government register bidders (Supplier / vendor / contractor)

The purpose of this questionnaire is to assess the potential of e-procurement technologies for combating corruption in Nepal. Public e-procurement is the value-added application of internet and e-commerce technology solution to facilitates, integrates, and streamlines procurement processes from government to bidders and vice-versa. So it is the application of e-commerce technology and it is useful public procurement practices, must take into account at least these four elements: The Internet/e-commerce (enabler); Process automation and integration (action); the practice of public procurement (process); and Value for money principles (objective). As such, public electronic procurement has been defined as the use of any Internet-based Inter-organizational Information System, which automates and integrates any part of the procurement process in order to improve efficiency and quality in public procurement, and promote transparency and accountability in the wider public sector (Vaidya, Sanjib & Callender 2007).

Your participation in the survey is voluntary and answer will be kept strictly confidential.

GENERAL INFORMATION

1. What type of internet connectivity is used in your organization?
☐ Cable Internet ☐ Leased Line
☐ Others (Please specify)_____
2. Does your organization use internet / web base system for procuring goods and services?
☐ YES ☐ NO
3. Please specify what kinds of work and services you provide to the government.
☐ Construction ☐ Computer and IT
☐ Vehicle ☐ Others
4. How many years did you serve in the government / organizations?
☐ Less than 1 year ☐ 1-3 years
☐ 4-7 years ☐ More than 7 years
5. Do you have your own supply chain management?
☐ Yes ☐ No

6. Perceived usefulness of e-procurement technology

The degree to which a person believes that using e-procurement technology would enhance job performance. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

<p>DESCRIPTION</p> <p>For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.</p>	<p>PERCEPTION</p> <p>1 (Strongly Disagree) 5(Strongly Agree)</p>
E-procurement web portal would enable me to accomplish my tasks (e.g. prepare tender document, amount deposit for application fees) faster than a manual system.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology improves the quality of work I do.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology makes it easier to do my job (e.g. bid preparation).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I find the e-procurement technology useful in my job	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

7. Perceived ease of use of e-procurement technology

The degree to which a person believes that using the system would be easy to use with minimal training or experience. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement technology provides me a clear and user-friendly environment for accessing tender / bid information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
I find the e-procurement easier to get tender or bid information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement system makes me easier to prepare tender document.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
It is easier for modification or withdraws my tender documents through e-submission.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement services provide me perceive ease of use.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found e-procurement system useful to do my work. (e.g. tendering).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

8. Reducing information asymmetry through e-procurement technology

Information asymmetry arises when an agent (bidders) has more information than the principal (government) does or vice versa. Such difficulties arise due to incomplete information, incompleteness of contract, and problems of monitoring behaviour. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1 (Strongly Disagree) 5(Strongly Agree)
E-procurement technology contributes more competition in terms of quantity (participation) and quality (openness and fairness) in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides me more up-to-date tender information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
I am able to track and monitor my tendering processes easily from government e-procurement web portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides equal opportunities to all bidders for tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provide more transparent in bidding process than manual system.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found reduction in the information asymmetry is related to decrease the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

9. Reducing the monopoly of power through e-procurement technology

Government officials have a monopoly of power over provision of goods and service that are crucial for explaining the incidence of corruption without theft. Nevertheless, in some cases, government officials have misused the power for their own benefits. They may create the shortages of goods or services in order to give opportunities for bribery. Public e-procurement provides equal conditions to suppliers so that they can attend to public institutions, regardless of the company size. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)

<p>DESCRIPTION</p> <p>For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree5-Strongly Agree.</p>	<p>PERCEPTION</p> <p>1(Strongly Disagree) 5(Strongly Agree)</p>
E-procurement technology provides me auditing capabilities with real time procurement information, which reduces the chances of monopoly of power of government officers in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology provides automation in procurement process, which reduces the monopoly power of government officers in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
The potential of e-procurement technology improves internal efficiency across procurement process (e.g. tender processing time, reduce paper files), which reduces the monopoly power of government officers in tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology facilitate accounting control thereby reducing the likelihood of fraud or accounting errors by enabling the electronic matching of requisition, purchase orders, invoice, and receipts.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology helps to provide fix price contract to all buyers and sellers (e.g. equal tendering price for all bidders, price shall fixed throughout the contract).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found public e-procurement helps to reduce the monopoly power of government officers that can reduce the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

10. Increasing trust between government and bidders through e-procurement technology

Transparent transaction process is a key driver of e-procurement. A fair and transparent process allows the buyer and seller to make their decision effectively. Trust builds a good atmosphere between government and bidders in contracting process. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology contributes me to track and monitor my bidding document which can increase level of trust between government and bidders.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement technology contributes me the security of transaction (e.g. to provide personal, or bank details).	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Anywhere any-time bidding platform of e-procurement services may help to build-up level of trust between government department and me.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, increasing the trust between government and bidders through e-procurement is related to reduce the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

11. Reducing transaction cost through e-procurement technology

E-procurement process can help reduce the transaction cost including transmitting and reacting information, shorter order cycle, increased information availability, and processing capacity, and improve capability of firms to monitor their partners behaviour. Please answer on a scale of 1 to 5 corresponds to 5-Strongly Agree, 4- Agree, 3-Neutral, 2-Disagree, 1-Strongly Disagree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
E-procurement technology provides me a shorter purchasing and response time, faster receiving order, and overall short order cycles can reduce my transaction costs.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
E-procurement helps to reduce the transaction costs, which helps to reduce opportunities for fraud and	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
corruption.	
E-procurement technology enhances more competition among bidders in bidding process, which also helps to reduce opportunities for fraud and corruption.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, I found that decrease in the transaction cost is related to reduce the risk of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

12. Intent to adopt anti-corruption technology (e-procurement)

In general, saving cost is the main important factor for organization to implement and adopt any kind of information systems or technology. Not only the cost reason, other factors are also to be considered importantly including better negotiation between buyer (government) and supplier, reduction discretion in contracting process, monitoring and tracking, increase international efficiency, transparency and audits. Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
My organization would request government work and services via e-procurement portal/ e- tendering.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
I would continue visiting to e-procurement web portal for tender information.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
I can always relay on tender information provided in e-procurement portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
I would be willing to provide information like personal/ organization information to e-procurement portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
In future, I would intent to adopt e-procurement system for my organization needs.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
In future, I would implement e-procurement system for handling my procurement tasks.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

13. Anticipated benefits of e-procurement in bidders perspective

In your view, which of the following anticipated benefits of e-procurement system, Please answer on a scale of 1 to 5 corresponds to 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree.

DESCRIPTION	PERCEPTION
For each of the following statements indicate to what degree you agree by ticking 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree,5-Strongly Agree.	1(Strongly Disagree) 5(Strongly Agree)
Public e-procurement technology improve the transparency and accountability in public procurement process	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology services provided a real time access / real time bidding information from e-procurement portal.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Reduce opportunity and corruption due to automated procurement procedure	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology increases competition among bidders / suppliers in contracting process	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e--procurement technology helps to managerial control and collaboration between government and bidders in procurement process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology provides more consistency in bidding process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology reduces human interference in bidding process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

Appendices

Public e-procurement technology increases competition among bidders in procurement / tendering process.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Public e-procurement technology makes procurement processes faster and easier.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
Overall, perceived benefits of e-procurement help to reduce the chances of corruption in public procurement.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5

Thank you for taking time to complete and submit this survey. Your insight and information are very valuable to us.

Use the space below to provide additional comments:

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Should you have any further questions or concern about this survey or any of its questions or ethical issues, please contact Arjun Neupane: Arjun.Neupane@usq.edu.au. Or Office of Research and Higher Degree, Ethics Officer: ethics@usq.edu.au.

Appendix D: Descriptive statistics of government sample

Information Asymmetry (IA)			Monopoly Power (MP)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
IA1	4.28	.779	MP1	3.72	.720
IA2	4.17	.877	MP2	4.07	1.041
IA3	3.30	.963	MP3	3.83	.709
IA4	4.43	.655	MP4	3.74	.681
IA5	3.26	.880	MP5	3.50	1.090
IA6	4.41	.686	MP6	2.96	1.053
			MP7	4.20	.619
Increasing Trust (IT)			Perceived Usefulness		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
IT1	4.00	.789	PU1	4.43	.720
IT2	4.07	.742	PU2	4.43	.620
IT3	4.28	.621	PU3	3.65	.795
IT4	4.33	.701	PU4	3.91	.812
IT5	4.28	.958	PU5	4.59	.498
IT6	4.30	.986			
Perceived ease of use (PEU)			Transaction Cost (TC)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
PEU1	4.02	.882	TC1	3.83	1.235
PEU2	4.28	.688	TC2	3.85	1.333
PEU3	4.22	.664	TC3	3.33	.967
PEU4	4.57	.620	TC4	3.85	1.010
PEU5	4.65	.604	TC5	3.98	1.022
PEU6	4.83	.529			

Transparency and accountability (TA)			Intent to adopt e-proc. (ITA)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
TA1	4.17	.851	ITA1	4.63	.610
TA2	3.89	.795	ITA2	3.50	1.188
TA3	4.09	.590	ITA3	3.93	1.218
TA4	4.37	.878	ITA4	4.13	.885
TA5	4.09	.915	ITA5	4.50	.888
TA6	2.91	.839	ITA6	4.83	.383
TA7	3.91	.890			
TA8	4.35	.640			
TA9	3.93	.929			
TA10	3.74	.953			
N=46					

Appendix E: Descriptive statistics of bidders sample

Information Asymmetry (IA)			Reduction of Monopoly power (MP)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
IA1	4.35	.641	MP1	3.80	.780
IA2	4.42	.625	MP2	3.69	.665
IA3	4.24	.776	MP3	3.81	.700
IA4	4.50	.608	MP4	3.54	.749
IA5	4.57	.597	MP5	3.38	.739
IA6	4.49	.652	MP6	4.05	.636
Increasing trust (IT)			Perceived usefulness (PU)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
IT1	4.04	.688	PU1	4.25	.725
IT2	4.02	.637	PU2	3.65	1.011
IT3	4.23	.554	PU3	4.28	.734
IT4	4.34	.610	PU4	4.46	.801
Perceived ease of use (PEU)			Transaction cost (TC)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
PEU1	4.53	.651	TC1	4.26	.590
PEU2	4.51	.652	TC2	4.23	.599
PEU3	4.47	.584	TC3	4.35	.589
PEU4	4.32	.800	TC4	4.35	.590
PEU5	4.33	.637			
PEU6	4.66	.571			
Transparency and accountability (TA)			Intent to adopt e-procurement (ITA)		
Items	Mean	Std. Deviation	Items	Mean	Std. Deviation
TA1	4.43	.604	ITA1	4.45	.643
TA2	4.39	.634	ITA2	4.47	.608
TA3	4.37	.632	ITA3	4.34	.601
TA4	4.32	.728	ITA4	4.27	.645
TA5	4.06	.759	ITA5	4.35	.613
TA6	3.36	.760	ITA6	4.47	.630
TA7	4.02	.665			

TA8	4.08	.508	
TA9	3.34	.751	
TA10	3.28	.807	
N=220			

Appendix F: Structural model notes of bidders sample

Notes for Model (Default model)
Computation of degrees of freedom (Default model)
Number of distinct sample moments: 253
Number of distinct parameters to be estimated: 75
Degrees of freedom (253 - 75): 178
Result (Default model)
Minimum was achieved
Chi-square = 345.779
Degrees of freedom = 178
Probability level = .000

Appendix G: Structural model goodness to fit index summary of bidder's sample

CMIN					
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	75	345.779	178	.000	1.943

Model	NPAR	CMIN	DF	P	CMIN/DF
Saturated model	253	.000	0		
Independence model	22	2069.325	231	.000	8.958

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.027	.872	.818	.613
Saturated model	.000	1.000		
Independence model	.122	.328	.264	.300

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.833	.783	.911	.882	.909
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.771	.642	.700
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	167.779	118.922	224.437
Saturated model	.000	.000	.000
Independence model	1838.325	1696.571	1987.489

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.579	.766	.543	1.025
Saturated model	.000	.000	.000	.000
Independence model	9.449	8.394	7.747	9.075

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.066	.055	.076	.008
Independence model	.191	.183	.198	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	495.779	513.382	750.302	825.302
Saturated model	506.000	565.378	1364.588	1617.588

Model	AIC	BCC	BIC	CAIC
Independence model	2113.325	2118.488	2187.985	2209.985

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.264	2.041	2.523	2.344
Saturated model	2.311	2.311	2.311	2.582
Independence model	9.650	9.003	10.331	9.673

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	134	143
Independence model	29	31

Appendix H: Regression weights of structural model of bidder's sample

	Estimate	S.E.	C.R.	P	Label
PEU1 <--- PEU	1.000				
IA1 <--- IA	1.000				
IA4 <--- IA	1.073	.153	7.008	***	
IA5 <--- IA	1.195	.161	7.423	***	
IT3 <--- IT	.832	.080	10.420	***	
ITA1 <--- ITA	1.000				
ITA2 <--- ITA	.919	.116	7.897	***	
ITA5 <--- ITA	1.306	.149	8.774	***	
IT4 <--- IT	1.000				
TC3 <--- TC	1.000				
TC2 <--- TC	.732	.098	7.475	***	
PEU2 <--- PEU	1.220	.126	9.719	***	
TA9 <--- TA	1.000				
TA8 <--- TA	1.040	.106	9.798	***	
ITA6 <--- ITA	1.354	.154	8.806	***	
MP1 <--- MP	.945	.152	6.237	***	
MP3 <--- MP	.973	.160	6.095	***	
MP2 <--- MP	1.000				
MP6 <--- MP	1.207	.148	8.169	***	
PEU5 <--- PEU	.901	.107	8.395	***	
PU4 <--- PU	1.244	.153	8.152	***	
PU3 <--- PU	1.000				

Appendix I: Standardized regression weights of the structural model of bidders sample

	Estimate
PEU1 <--- PEU	.703
IA1 <--- IA	.587
IA4 <--- IA	.664
IA5 <--- IA	.754
IT3 <--- IT	.735
ITA1 <--- ITA	.601
ITA2 <--- ITA	.584
ITA5 <--- ITA	.823
IT4 <--- IT	.802
TC3 <--- TC	.832
TC2 <--- TC	.599
PEU2 <--- PEU	.857
TA9 <--- TA	.781
TA8 <--- TA	.820
ITA6 <--- ITA	.830
MP1 <--- MP	.511
MP3 <--- MP	.586
MP2 <--- MP	.633
MP6 <--- MP	.801
PEU5 <--- PEU	.647
PU4 <--- PU	.831
PU3 <--- PU	.729

Appendix J: Covariance's of the structural model of bidder's sample

	Estimate	S.E.	C.R.	P	Label
PEU <--> PU	.103	.025	4.175	***	
IA <--> PU	.100	.023	4.310	***	
MP <--> PU	.102	.024	4.276	***	
IT <--> PU	.174	.030	5.733	***	
TC <--> PU	.125	.027	4.606	***	
ITA <--> PU	.084	.021	3.992	***	
TA <--> PU	.129	.028	4.647	***	
PEU <--> IA	.073	.018	3.982	***	
PEU <--> MP	.064	.018	3.571	***	
PEU <--> IT	.149	.025	5.944	***	
PEU <--> TC	.065	.021	3.162	.002	
PEU <--> ITA	.079	.018	4.374	***	
PEU <--> TA	.098	.022	4.407	***	
IA <--> MP	.067	.017	3.893	***	

	Estimate	S.E.	C.R.	P	Label
IA <--> IT	.117	.022	5.234	***	
IA <--> TC	.106	.021	4.940	***	
IA <--> ITA	.075	.017	4.424	***	
IA <--> TA	.126	.024	5.322	***	
IT <--> MP	.133	.024	5.522	***	
TC <--> MP	.133	.024	5.544	***	
ITA <--> MP	.103	.020	5.065	***	
TA <--> MP	.085	.021	4.123	***	
IT <--> TC	.139	.024	5.655	***	
IT <--> ITA	.106	.021	5.161	***	
IT <--> TA	.138	.025	5.481	***	
ITA <--> TC	.114	.021	5.403	***	
TC <--> TA	.150	.026	5.849	***	
ITA <--> TA	.069	.018	3.786	***	
e31 <--> e32	.051	.020	2.591	.010	
e60 <--> e63	-.134	.033	-4.068	***	
e63 <--> e64	-.084	.026	-3.160	.002	