

ELECTRONIC PROCUREMENT SYSTEM: A CASE OF MINISTRY OF WATER SUPPLY AND DRAINAGE IN SRI LANKA

K. A. P. Gunawardhana and G. I. Karunasena*
Department of Building Economics, University of Moratuwa, Sri Lanka

ABSTRACT

The Ministry of Water Supply and Drainage (MWS&D) has placed the highest priority to provide safe drinking water and adequate sanitation facilities to the community. It is imperative to ensure speed, transparency, Value for Money (VFM), and integrity in all the development spheres to achieve desired result, in line with on time completion, quality achievement, and cost efficiency when procure the goods, works, and consultancy and other services. However, majority of water supply projects of the Ministry have based on the funds from the foreign funding agencies even though, inadequate capacities of existing manual procurement process to work compatible with the funding agencies procurement policy is a critical issue. Accordingly, in this study explored the concept of e-procurement as an instrument to modernise, simplify, and improve the existing manual process.

Case study approach was selected and officers of the each and every profession of the MWS&D, National Water Supply and Drainage Board (NWS&DB), and the registered contractors of the Ministry were selected for collect the data on the existing manual procurement process, gaps, and requirements. Semi-structured interviews and observations were carried out as main data collection techniques. Experienced professionals in the field of procurement were also consulted to ascertain their opinions on verification of the feasibility of the scope of the proposed e-procurement system. Findings of the study analysed and presented by using Content Analysis and Cognitive Mapping.

Results verified the possibility of introducing and implementing the e-procurement system to the MWS&D by using available resources, infrastructure, and capacity with the Information Technology facilities and legal sanction on e-documents under the two phases.

Keywords: E-Procurement System, Information Technology, Manual Procurement Process, Procurement.

1. INTRODUCTION

The world has been globalised due to the Information Technology (IT) development. Foreign funding agencies emphasise that the advantages of that development should be utilised by the government organisations in Sri Lanka in order to improve and upgrade the existing manual process with the experience of other developed countries. Hence, in this paper MWS&D tends to explore the existing procurement process, identify the way of upgrading the existing manual procurement process, and further find out the feasibility of introduce and implement of the electronic procurement system for the government organisations as an alternative solution to upgrade the existing manual procurement process. Finally, evaluation was carried out to verify the feasibility of identified scope of propose electronic procurement system to the MWS&D.

Water supply and sanitation is a major responsibility entrusted to the MWS&D. The government's objective is to provide access to clean drinking water and adequate sanitation for all citizens by year 2025. Therefore water supply and sanitation sector has shown continues growth during the last three decades. Hence the government of Sri Lanka continues (GOSL) to take the lead role in the water and sanitation sector by investing on infrastructure development, operations, and maintenance of most of the water and sanitation projects in the country by using the funds from the foreign funding agencies (Corporate Plan of NWS&DB in Sri Lanka, 2007). However existing manual procurement process is the key problem to

* Corresponding Author: E-mail - gayanik@uom.lk

implement the water supply projects effectively and efficiently due to the impacts of poor disbursement of funds as a result of delay in Project implementation (Performance Report of MWS&D in Sri Lanka, 2010).

Therefore, the funding agencies have emphasised that MWS&D should have alternative solutions to overcome the above barriers and expedite the implementation process of the future water supply projects. Hence, there is a necessity requirement to enhance the effectiveness of manual procurement process in the Ministry in order to achieve the desired result. In compatible with that, the significant gaps from the manual procurement process to propose upgraded system are also identified and then explored the feasibility areas for enhance the effectiveness of existing procurement process. Finally e-procurement system is identified as a solution to fulfil the requirement of the funding agencies.

E-Procurement is practically used by not only developed countries but also developing countries such as Thailand, Korea, and Malaysia further numbers of benefits have been utilised by these countries when compared the earlier manual procurement process, on the other hand, rests of other developing countries also (like India) have started to convert procurement system from manual process to e-procurement system with affected from technological development (Bulusu, 2004). Accordingly in the study of World Bank, Procurement Policy and Services Group (2003) explains that in order to being compatible with the World Bank's procurement policy in terms of increase transparency, competitiveness, and efficiency of the procurement process the e-procurement system can be used as an instrument to upgrade, modernise, simplify, and improve existing government procurement procedure in the Sri Lanka.

Thus, in this research MWS&D was selected to identify the suitable areas of the existing manual procurement process which can be converted from manual procurement process to e-procurement system as a solution to strength and upgrade the existing process and further, explore the possibility to improve and upgrade the system.

2. LITERATURE REVIEW

This section provides theoretical background of procurement and e-procurement. Further identifies and describes the relevant theories, specify the gaps in the area, recent advances in the area and practical experience of upgrading the manual procurement process in Sri Lanka (SL) and other countries. Finally, attention draws to explore the impact of e-procurement system as a solution of improve and upgrade the manual procurement process of the Ministry.

Prior to 1900, procurement procedure was recognised as an independent function. Prior to World War I, procurement was regarded as primarily clerical. During World War I and II – the functions of procurement process were increased due to the importance of obtaining raw materials, supplies, and services that needed to keep the factories and mines operating (Wales, 2010). Table 1 illustrates the overview of evolution of procurement process throughout the years.

Table 1: Overview of Procurement

Time Period	Descriptions of findings in Global Context (Wales, 2010)	Time Period	Descriptions of findings in Sri Lankan Context (SL Procurement Guidelines , 2006)
-1900	Procurement used only railroad organisation and few of other organisations	-1997	Procurement process is the part of the activities of the division of the Accounts in the organisation.
1900-1950	Procurement used for obtain raw material, supplies, and services	2006- onwards	Develop the procurement system with the assistance of the funding agencies. Government also identified procurement system as the integral part of the development separation of the economy through the new procurement Guideline of 2006, further consider as the key driver that use all the stages of the project life cycle
1950-1960	Procurement system developed as professional function		
1960-1980	Procurement system developed as purchasing strategy		
1980-1990	Enhance the procurement system as strategic method to the business		
1990- onwards	Procurement system is used as integral part/ method of sustainable development for the organisations		

World Bank (2010) describes that public procurement as the process by the government which buys the inputs for vital public sector investments. In procurement terms those inputs are generally grouped into three categories; civil works, goods, and services. Sri Lankan Procurement Guidelines (2006) state that there are three stages should be followed in the project life cycle in order to complete the procurement process as shown in Table 2.

Table 2: Sub Activities of Procurement

Stage of the Project Lifecycle	Activities of the Procurement Process	Sub activities of the Procurement Process
Planning Stage	Identification Packaging	Estimating demand / preparation of the procurement plan Formulation of the catalogue
Pre Contract Stage	Bidding Document Evaluation	Selection of Bidders Invitation for Bids Issuing of Bid document Request for Bid document Submission of offers Bid opening and Evaluation Award and Modifications
Post Contract Stage	Contract Administration	Contract Management Dispatch Advice Invoicing Payments

E-procurement is the proper advancement of the manual procurement process due to the development of IT hence, refers the literature to identify the overview of e-procurement system and summary of the findings illustrate in Table 3 as follows;

Table 3: Overview of E-Procurement System

Time Period	Description of findings
1990-2000 (e-procurement era)	Introduced e-procurement system in order to remove the administrative cost and bureaucratic traditional parts and items (Bartezzaghi and Ronchi, 2003).
2000-2005	E-procurement system was used to enhance the efficiency of the each stage in the supply chain (Sheth, 2010).
2005- onwards	E-procurement system was used for all the commercial and administrative transactions as an alternative method to improve and upgrade the existing procurement system (Inman, 2010).

The first generation of electronic procurement phenomenon started with buy-side electronic catalogues implemented by software companies like Ariba, SAP, Microsoft Market, Intelisys and Commerce One. This generation refers as e-procurement era. The internet could streamline inefficient procurement processes by removing the manual, paper based, administrative and bureaucratic elements inherent in traditional purchasing systems (Bartezzaghi and Ronchi, 2003). Inman (2010) highlights that e-procurement is the business-to-business (B2B) or business-to-consumer (B2C) or Business-to-government (B2G) purchase and sale of supplies, works and services through the internet as well as other information and networking systems such as Electronic Data Interchange and Enterprise Resource Planning.

Sri Lankan Procurement Guideline (2006) explains that “Procurement Entities if they wish, may carry out procurement activities electronically with the concurrence of the respective Procurement Committees (PC), however, electronic submission of Bids will not be allowed”.

2.1. IMPACTS AND ADVANTAGES OF E-PROCUREMENT

In this section carried out the literature survey find out the impacts of e-procurement system to the government sector in order to fulfil the requirements of the funding agencies.

When consider the e-Government Procurement (e-GP) in the world that breaking down the physical barriers of space and time and allows a more transparent and efficient information flow as well as improved access to information and services (Leipold, 2007). Beneficiaries include not only governments and suppliers but also the general public at large in having access to transparent information on the public expenditure of taxpayers’ money (Leipold, 2007). Further explains that rather than being a technological improvement on the already complex environment, e-GP needs to be understood as a tool to reform public procurement underpinned by an appropriate policy and legal framework, effective buyer and supplier activation including strong awareness and capacity building programs, technological infrastructure development, established standards, and sustainable operational e-GP applications.

Procurement process depends on number of supportive services. The following Figure 1 illustrates the current situation of electronic commerce in SL as assessed by Lane *et al.*, (2004) in terms of infrastructure, financial, environment and the legal framework due to the reason that these are the top rank supportive services according to the assessment.

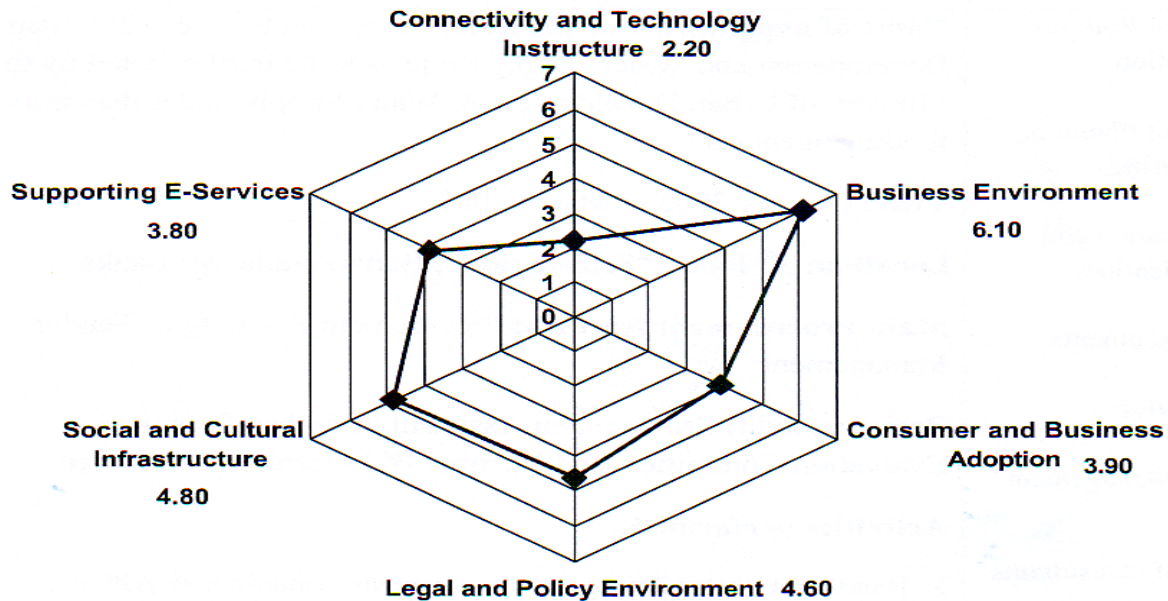


Figure 1: Analysis of E-Facilities in Sri Lanka

Lane *et al.* (2004) further explain that the Sri Lanka, with an overall score of 4.1, would appear to be somewhere below the median in terms of overall e-facilities. By comparison, countries like Sweden and Singapore have high overall e-facilities ranking scores of over 9. Through the above analysis electronic procurement/ commerce were identified as being: low telex density, an outdated legal infrastructure, a poor national communications backbone, prohibitive cost of internet access, a general low usage of e-documents and a lack of skilled human resources, Communication and Technology (ICT) industry in Sri Lanka.

United Nations publication (2006) states that the Thailand Cabinet mandated that all government purchases made after 1st January 2005 follow the e-GP procedure developed by the Department of Controller General of the Ministry of Finance in Thailand. The aim of e-GP is to make the purchasing process more transparent, efficient, and open to a wider range of suppliers. It is expected to take more time to fully implement e-GP nation-wide. The preliminary scope has identified under the two stages illustrate as follows;

- Initial stage of introduce and implement e-procurement system for selected limited number of activities.
- Subsequent Stage implements e-procurement system as a total solution to the manual procurement process.

Corporate Plan 2007-2011 of the NWS&DB (2007) highlights the gravity of the e-procurement system explaining that NWS&DB can achieve their goals and objectives through the e-procurement system with the development of available IT facilities, Human Resources Management (HRM) and other infrastructure.

In summary, the above comprehensive literature survey is carried out to identify the concepts of procurement and e-procurement, advantages and impacts of e-procurement, drivers and barriers to adopting e-procurement in the context of global, Sri Lankan and MWS&D. Finally, identify the ambiguities and the gaps of existing manual procurement process and e-procurement system in order to explore the feasibility areas for introduce and develop e-procurement system in the MWS&D. Therefore, following research methodology was adopted to identify and develop the feasibility areas to initiate the e-procurement system.

3. RESEARCH METHODOLOGY

This section provides the methodology for data collection which was adopted to investigate the existing level of procurement process in the Ministry.

3.1. COMPREHENSIVE LITERATURE REVIEW

Literature survey was selected as a secondary source regarding the generalised details of procurement, e-procurement, definitions, theories, rules and regulations of procurement and e-procurement in the MWS&D, Sri Lanka, and Global context by referring documentaries and researches undertaken by other institutes.

3.2. RESEARCH APPROACH

The case study approach was adopted as a primary source to investigate the existing level of procurement process in the MWS&D. Even though the case study organisation is singular, the study involves two echelons in the procurement process such as government officers and the contractors. This can be classified as an embedded case study design (Yin, 1994). Further, Eisenhardt (1989) explains that case study useful for exploring new or emerging process or behaviour of the organisation. Furthermore, according to the research problem, "how to enhance the effectiveness of the existing manual procurement process", suggests that the case study research approach for the study concerned (Yin 1994).

Fifteen numbers of officers were selected as the study profile including the profession of Engineering, Quantity surveying, Architecture, Planning, Contract Administration, Procurement and Project Management, and Accounts to cover all grades of the Ministry and further extended the collection of information up to the opinions of the five numbers of the experts in the field of procurement. As previously mentioned by Yin (1994) adopts the opinions of the experts for the value judgment of the findings and satisfy the quality of the criteria to increase the validity of the findings. Then, based on the opinions of the experts evaluate the feasibility of the scope of the proposed e-procurement system, identify the possibility of introduce and implement e-procurement system, and further explore the opportunities and threats to improve the scope of the propose procurement system.

3.3. ANALYSIS OF DATA AND PRESENTATION OF THE FINDINGS

The analyses of the qualitative data were done through the content analysis. Kuma (2005) explains this is analysis the contents of the data under the main themes that emerge the responses given by the interviewees. However, data displaying capabilities of content analysis is always a problematic issue, even though it enables better interpretation of qualitative data (Miles and Huberman, 1994). Therefore, the content analysis alone is not sufficient and effective in order to overcome these shortcomings. Hence, cognitive maps were selected as data displaying technique which demonstrate the relationships among the data analysis.

Literature review and case study methods were mainly adopted to study the phenomenon of the MWS&D and in addition collect the data through the observations and attending the meetings also. Then, collected data was analysed and presented through the content analysis and cognitive maps to explore the existing procurement process in the MWS&D. Finally, opinions of the experts were reviewed to identify and verify the feasibility of research problems, aim, and objectives.

4. DATA ANALYSIS AND RESEARCH FINDINGS

The aim of this section is explore the existing procurement process in the MWS&D by analysing the data collected through the data collection techniques of literature survey, interviews, and observations further, in detailed discusses on processing and analysing data in respect of the methods of qualitative techniques.

4.1. EXPLORATION OF EXISTING PROCUREMENT PROCESS IN THE MWS&D

According to the findings, existing procurement process could be categorised under the six sub activities first, *registrations of contractors and publication of name list* at present those activities are doing manually. As an example one of the officers in the NWS&DB stated that “*Manual procedure is followed due to the reasons on involvement of number of documentary evidence*” he further added that “*However publication of the name list of the registered contractors have been done by using both method of manual and electronic*”. It was apparent that procurement activities function manually. IT facilities use only for transfer the data from one place to another.

When it comes to the second and third sub activities the *appointment of Procurement Committee (PC) and Technical Evaluation Committee (TEC) members and Preparation of bidding documents*, officers of the MWS&D noted that “*We send formal request for the appointment through the manual procedures with the relevant documentary evidence but appointments have been informed to us by using both method of manual and electronic*”. Officers of the MWS&D further stated that “*Preparation of bidding documents have been done through the manual procedures due to the facts that involvement of number persons, institutes, and documents, however we use IT facilities only for typing and drafting the bidding documents and publications of Invitation for Bids*”.

The fourth function is *collection and submission of bidding documents*, Representatives of the contractors viewed that “*Formal request for collect the bidding document send through manually or electronically but normally we have to collect the document from the Ministry or sometimes they send documents through the post*”. When it comes to the fifth function of *evaluation and clarification procedures*, officers of the MWS&D stated that “*In the Ministry use only the manual evaluation process due to the reason of involvement of the number persons, institutes, clarifications, and documents. Sometimes both manual and IT facilities use for seek clarification but final decision make in line with the recommendations of the ordinary group meetings*”. It was shown that all the critical activities of the procurement process have been done through the manual process.

Consider the final functions of *awarding and contract administration*, representatives of the Contractors pointed out that “*Ministry uses only the manual procedure and we also agreed that because of legal sanction and validity of the documentary evidence for future contract management activities*”.

Thus, it is evident that majority of the present procurement activities have been done manually and usages of IT facilities are limited only for 30% of the activities that are also jointly carried out in parallel with the manual system.

4.2. DRAWBACKS OF EXISTING MANUAL PROCUREMENT PROCESS

Enhancement of the disbursement ratio of the funds is the main concern of the funding agencies and the GOSL, but representative of the contractors noted that “*Delay of the activities in the existing procurement process, more time consuming for the activities, and fraud and corruption involved are the main constrains to achieve the desired result*”. However, officers of the MWS&D argued that “*We were identified that the manual procurement system is suitable for large and complex projects and officers familiar with the system are positive drawbacks of the existing system*”. Therefore, empirical findings apparent that manual procurement process represents the lesser disbursement of funds when compared with the requirement of the funding agencies due to the reasons that delay in activities of the procurement process.

Efficiency of the existing procurement process highlighted all the interviewees as an example officer of the NWS&DB stated that “*I couldn't see the efficiency of the activities in the present procurement system due to the reasons of more time consume for activities, involvement of human errors, repetitive of activities, more documentary involvement, and cost and time overrun*”. It was identified that manual procurement process has shown inefficiency process in the procurement activities due to the facts that unnecessary movements, activities, time, and cost.

Reliability, accuracy, and transparency of the existing procurement activities are the highly sensitive areas for the private sector. As an example representatives of the contractors' stated that “*We can't expect the*

above aspects because existing procurement process involved fraud and corruption practice, human errors, large number of documentary involvement, and lack of knowledge of the officers". That exposed the lesser reliability, accuracy, and transparency of the existing procurement system due to the above mentioned reasons..

Quality, cost, and time effectiveness of the manual procurement system, according to the views of the representative of the contractors, *"Present manual system take more time for the procurement activities, therefore it will lead to the delay of the procurement process subsequently that will create involvement of fraud and corruption in the system consequence of that quality of the goods and services will be reduced"*. However, officers of the MWS&D emphasised *"Manual Procurement process familiar to the officers in the Ministry"* further added that *"Manual procurement process is the suitable system for the large and complex projects"*. It was apparent that existing procurement process not considers the quality, cost, and time effectiveness in the activities of the procurement process due to the reasons that excessive time consuming of the activities.

Considerations of VFM, enhance the competition, and encourage by the funding agency; as an example officers of the MWS&D stated that *"Manual procurement system should be developed and upgraded in order to achieve the desired objectives of the funding agencies"*. It was shown that existing process doesn't consider the VFM due to the facts that lesser achievement of economic aspects, efficiency, effectiveness, transparency and accuracy. Hence, the Ministry is willing to improve the process in line with the requirement of the funding agencies.

In the interviews most of the respondents stated that the manual procurement process in the Ministry is lead to more time consuming of the activities in the procurement process, further cost for preparing documents, bidding, and delivering the documents become more expensive and which lead to increase the price of the procured goods, works, and services. Further they highlighted that it will lead to various subsequent bad effects to the final outcome of the projects such as cost overrun, time extension, reduce the reliability and quality, and involvement of bribe and corruption.

Presently, numbers of steps have been taken by the MWS&D in addition to the available basic requirements in order to fulfil the above gaps of the existing procurement process. Therefore, in the next sub sections propose the framework for e-procurement system on the available basic facilities and requirements in the MWS&D.

4.3. PROPOSE THE FRAMEWORK FOR THE E-PROCUREMENT SYSTEM OF THE MWS&D

Analysis of data gathered from the case study and the literature survey were based on proposed frameworks of e-procurement system which consists of key four elements as infrastructure, financial, environment and the legal. Infrastructure focuses on the proposed improvement in IT office facilities, server and user computers, English and IT knowledge of the officers and financial on the propose avenues to rise funding such as donor aids. Environment focuses on enhancing the training and awareness of propose system for both internal and external parties such as end-users and legal covers the IT Act and legal sanction on e-documents. The next sub section discusses the identified barriers based on the opinions of the experts.

4.4. BARRIERS AVAILABLE IN ORDER TO OPPOSE TO THE E-PROCUREMENT SYSTEM

In this subsection explore the barriers available for the proposed e-procurement system through the data collected from the opinions of the experts. It is first necessary to assess the existing levels of office facilities, server and user computers, knowledge about internet and e-mail, English knowledge of the officers, and new technical methods and compare them to optimum needs to build a plan to bridge the gaps within the country. Initially, it should be targeted at the areas of best potential such as particular divisions, departments, sub offices, and selected educational and training establishments of the Ministry and the other relevant organisations within the western province. There is considerable room in the MWS&D for manoeuvring in the establishment of an infrastructure for the above purposes.

4.5. UPDATED FRAMEWORK FOR E-PROCUREMENT SYSTEM

According to the findings of the literature survey in previous sections it was revealed that procedure for upgrade the existing procurement process should be implemented step by step depend on the availability of infrastructure and other facilities. As per the opinions of the experts in the field of procurement the valid IT Act and legal sanction on e-documents are the mandatory requirements for introduce and implement the each and every activities of the e-procurement system. However some activities of the proposed system can be implemented without having valid IT Act and legal sanction on e-documents. Therefore, identified and verified the activities of the proposed e-procurement system that can be carried out through 01st Phase and 02nd Phase as follows;

01st Phase of Introduce and Implement e-Procurement System to the MWS&D

- Publication of Information for Bids (IFB), registered suppliers and other relevant information of the Ministry via the internet, Preparation of Annual procurement Plans of the Ministry via the internet and Integrated Web Based Procurement monitoring system with the Ministry of Public Finance and other departments of the MWS&D.

02nd Phase of the System as a Total Solution to the Manual Procurement Process

- Registration of suppliers, E-Tendering system, Uploading the bidding documents, On- Line request for bidding documents, On- Line Submission of offers, Bid Opening and Evaluation, Clarification, On- Line Auctions and Reverses Auctions, Proceed the PC/ TEC meetings and decisions, Notification of Tender Awards/Modifications and Contract Management, Sign of Contract agreement and submission of bonds, Submission of Dispatch Advises by suppliers' and Invoicing, Inception meeting, Interim and final payments, and Request and issue the completion certificates.

When compare with existing literature there is an opportunity to upgrade the existing procurement process as per the fulfilment of the requirement of the funding agencies further that was verified by the experts in the field of procurement also. First stage of new e-procurement system will provides an interactive web base procurement monitoring and management system between MPF, MWS&D, and NWS&DB in combination with the entire ongoing water supply projects in island wide in timely manner. Therefore, introduce and implement first stage of new e-procurement system is cost effective in long run, user friendly, and finally it will lead to the sustainable improvement of the procurement process towards the country development when consider the results of the data analysis.

5. CONCLUSIONS

Literature revealed that the manual procurement process has number of defects and disadvantages to the beneficiaries. Further, the funding agencies encourage the borrowers to upgrade and strength the existing procurement process to overcome the aforementioned defects. Case study findings on the existing procurement process in the Ministry revealed the approaches to upgrade the system and the prevailing gaps of the existing process. It was also ascertained that e-procurement system is the only possible solution in order to upgrade the existing manual procurement process. Then proposed the framework for introduce and implement the new e-procurement system to the Ministry. Finally, evaluation and verification on the feasibility of the scope of the proposed system were carried out through the opinions of the experts in the field of procurement.

Accordingly, outcomes of the study concerned can be summarised as follows,

- Existing Procurement process should be upgraded
- E-procurement system should be recommended as a solution to upgrade the existing manual process in the MWS&D
- Drivers of the proposed e-procurement system should be used against the barriers in order to decide the scope of the proposed e-procurement system
- Proposed model should be implemented under the two stages

It is hoped that this framework will be useful in implementing e-procurement system in similar organisational settings.

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