SURVEY ON ELECTRONIC PROCUREMENT IMPLEMENTATION IN MALAYSIA CONSTRUCTION COMPANIES

NG KIM AIK

A Project Report Submitted In Partial Fulfillment Of The Requirements For The Award Of The Degree Of Master Of Science In Construction Management

Faculty of Civil Engineering
University Technology Malaysia

November, 2005
Dedicated to my beloved family…
My Wife Gina, Papa, mama, brother & sister
who always support and encourage me.
ACKNOWLEDGEMENT

First of all I would like to express my gratitude to my supervisor, Dr. Shaiful Amri Bin Mansur for his guidance and advice throughout the development of this project report.

I would also like to take this opportunity to thank my elder brother, Ng Kim Tek for his guidance and encouragement.

Last but not least, I would like to extend my thanks to my beloved wife and family.
ABSTRAK

ABSTRACT

Construction material procurement is one of the most important sections in the construction project life cycle. The procurement concept is moving ahead from traditional manual paper-based to electronically-based due to improvement in Internet and World Wide Web technology. In such a highly competitive environment nowadays, it is necessary for every construction company to maintain an efficient and effective material procurement to cut administration cost and to keep abreast of the market condition to procure materials at the right price, quality and time. Suggested by its name, electronic procurement (E-procurement) is the application of Internet technology in material procurement. The main objective of this study is to identify factors affecting implementation of E-procurement and Malaysia construction companies practice and strategy towards it. Research methodology includes comprehensive literature review and questionnaire survey. Through literature review, questionnaire was designed and distributed to the targeted survey respondent situated in Kuala Lumpur and Selangor using postal mail format. From the survey responded, the factors and strategy were analyzed and identified. As a conclusion, the main objective of this project has been achieved. The results obtained from the survey shown that perceived value, trust on Information Technology and trust on supplier are the important determinant factors towards implementation of E-procurement. Also, it has been identified that construction companies are aware of the development of E-procurement but they will not commit major resources towards implementing it.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE OF PROJECT REPORT</td>
<td>i</td>
</tr>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLE</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF FIGURE</td>
<td>xiii</td>
</tr>
<tr>
<td>LIST OF SYMBOL</td>
<td>xv</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xvii</td>
</tr>
<tr>
<td></td>
<td>xviii</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.1 Background</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.2 Problem Statement</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1.3 Objectives</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1.4 Scope of Research</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1.5 Research Methodology</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>1.6 Organization of Research</td>
<td>4</td>
</tr>
</tbody>
</table>
2 TRADITIONAL MATERIAL PROCUREMENT

2.1 Introduction

2.2 Overview of Procurement

2.2.1 Definition

2.2.2 Procurement Cycle and Main Activities

2.2.2.1 Recognizing the Requirement

2.2.2.2 Selection of Supplier

2.2.2.3 Preparing Inquires/Inviting Tender

2.2.2.4 Negotiation

2.2.2.5 Issuing Purchase Order

2.2.2.6 Quality and Expediting

2.2.2.7 Reception, Inspection, Storage and Payment

2.3 Procurement In the Construction

2.3.1 Procurement in the Construction Project

2.3.2 Procurement Activities in Construction Company

2.3.2.1 Land

2.3.2.2 Professional Services

2.3.2.3 Contracting Services

2.3.2.4 Maintenance Services

2.3.3 Typical Features of Construction Procurement

2.3.3.1 Project Oriented Procurement Items

2.3.3.2 Repetitive Activities That Have to be Done in Procurement

2.3.3.3 Tight Schedule

2.3.3.4 Need for Storing Large Amount of Document and Information

2.4 Problems in Construction Material Procurement Process

2.4.1 Inaccurate Planning and Purchasing

2.4.2 Mistake in Selection of Supplier
1. Substituted Materials
2. Ineffective Negotiation
3. Miscommunication Between Department in Project
4. Delays in the Exchange of Design Information
5. Change in Schedule
6. Wrong Materials
7. Inaccuracy in the Bill of Quantity
8. Delays in Manufacture and Fabrication
9. Delays in Delivery of Materials and Equipment
10. Inappropriate Selection of Devices for Expediting Order
11. Incomplete Reporting of the Status of all Orders
12. Inappropriate Construction/Contracting Method
13. Contract Annulment
14. Untrained Staff in Procurement

2.5 Problems Category
1. Insufficient Data
2. Lack of Common Systems
3. Management Failure
4. Inefficient Communication

2.6 Concluding Remarks

3 ELECTRONIC MATERIAL PROCUREMENT
1. Introduction
2. Impact of Information Technologies on the Procurement Process
   1. Innovative in Procurement Process
      1. CD-ROM and E-Catalogue
      2. Bar Coding
      3. Electronic Data Interchange (EDI)
3.2.1.4 ERP, MRP 31
3.2.1.5 Internet and World Wide Web 32
3.2.2 Strategy Changes of Procurement 35
3.2.3 Evolution of Procurement 35
3.3 Electronic Commerce 36
3.3.1 Background 36
3.3.2 Taxonomy for Electronic Commerce 37
3.3.2.1 Business-to-Business (B2B) 37
3.3.2.2 Business-to-Consumer (B2C) 38
3.3.2.3 Business-to-Administrator (B2A) 38
3.3.2.4 Consumer-to-Administrator (C2A) 38
3.4 Impact of Electronic Commerce in Construction Industry 39
3.5 Electronic Procurement (E-procurement) 40
3.5.1 E-procurement Technologies 41
3.5.1.1 E-procurement Software 41
3.5.1.2 Internet Market Exchanges 41
3.5.1.3 Internet B2B Auctions 42
3.5.1.4 Internet Purchasing Consortia 43
3.5.2 Advantages to E-procurement 43
3.5.3 Disadvantages to E-procurement 45
3.5.3.1 Infrastructures and Security 45
3.5.3.2 Trust and Reliability 46
3.5.3.3 Regulatory Issues 47
3.5.3.4 Value of Implementation 48
3.5.3.5 Organization 49
3.5.3.5.1 In House Experts 49
3.5.3.5.2 Employee Education 49
3.5.3.5.3 Content Management 50
3.5.3.5.4 Content Rationalization 50
3.5.3.5.5 Downsizing 50
3.5.3.5.6 Better Communication 51
3.6 Concluding Remarks 51
4 RESEARCH METHODOLOGY

4.1 Introduction

4.2 Survey

4.2.1 Data Collection

4.2.2 Survey Objectives

4.2.3 Survey Target

4.2.4 Survey Method

4.3 Questionnaire

4.3.1 Design of Questionnaire

4.3.2 Questionnaire Structuring

4.4 Data Analysis

4.4.1 Statistical Techniques

4.5 Concluding Remarks

5 SURVEY ANALYSIS AND FINDINGS

5.1 Introduction

5.2 Survey Results, Analysis and Findings

5.2.1 Demographic of the Survey Respondent

5.2.2 Internet Accessibility and Computer Usage

5.2.3 Practice of Material Procurement and Involvement of E-procurement

5.2.3.1 Selection of Supplier

5.2.3.2 Negotiation with Supplier

5.2.3.3 Issuance of Purchase Order

5.2.3.4 Material Delivery Tracking

5.2.3.5 Issuance of Purchasing Payment

5.2.3.6 Arrangement of Supplier Correspondent

5.2.3.7 Communication Channel

5.2.4 Factors Affecting the Implementation of E-procurement

5.2.4.1 Perceived Value

5.2.4.2 Trust on Supplier
5.2.4.3 Trust on IT

5.2.5 Factors Hindering the Use of E-procurement

5.2.6 Direction and Strategy Towards E-procurement

5.3 Concluding Remarks

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

6.2 Conclusions

6.2.1 Traditional Material and Electronic Procurement

6.2.2 Current Practice of Material Procurement

6.2.3 Factors Affecting the Implementation of Electronic Procurement

6.2.4 Factors Hindering the Success of Electronic Procurement

6.2.5 Direction or Strategies Towards Implementing Electronic Procurement

6.3 Recommendation to Improve Implementation of E-procurement

6.4 Limitation of the Research

6.5 Recommendation for Further Research

REFERENCES

APPENDICES
<table>
<thead>
<tr>
<th>TABLE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Procurement life cycle</td>
<td>7</td>
</tr>
<tr>
<td>3.1</td>
<td>Significant benefits of E-procurement</td>
<td>44</td>
</tr>
<tr>
<td>4.1</td>
<td>Rating system for the questionnaire</td>
<td>59</td>
</tr>
<tr>
<td>5.1</td>
<td>Survey results on the importance of the communication</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>method in purchasing construction material</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td>Importance for different communication method</td>
<td>70</td>
</tr>
<tr>
<td>5.3</td>
<td>Survey results on the importance factors for implementing</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>E-procurement from the view point of perceived value</td>
<td></td>
</tr>
<tr>
<td>5.4</td>
<td>Importance of factors based on respondent’s perceived</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>value</td>
<td></td>
</tr>
<tr>
<td>5.5</td>
<td>Survey results on the importance factors for implementing</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>E-procurement from the view point of Trust on Supplier</td>
<td></td>
</tr>
<tr>
<td>5.6</td>
<td>Importance of factors based on respondent’s Trust on</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Supplier</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>5.7</td>
<td>Survey results on the importance factors for implementing E-procurement from the view point of Trust on IT</td>
<td>75</td>
</tr>
<tr>
<td>5.8</td>
<td>Importance of factors based on respondent’s Trust on IT</td>
<td>75</td>
</tr>
<tr>
<td>5.9</td>
<td>Survey results on the importance factors that hindering the success for implementing E-procurement</td>
<td>76</td>
</tr>
<tr>
<td>5.10</td>
<td>Importance of Factors that hindered implementation of E-procurement</td>
<td>76</td>
</tr>
<tr>
<td>6.1</td>
<td>Comparison between traditional material procurement and E-procurement</td>
<td>80</td>
</tr>
<tr>
<td>6.2</td>
<td>Current practice in different stage of material procurement</td>
<td>82</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE NO.</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>The procurement chain</td>
<td>7</td>
</tr>
<tr>
<td>2.2</td>
<td>Buyer’s and supplier’s cycle</td>
<td>9</td>
</tr>
<tr>
<td>2.3</td>
<td>Project definition</td>
<td>13</td>
</tr>
<tr>
<td>2.4</td>
<td>Procurement interface with other phase in construction project</td>
<td>14</td>
</tr>
<tr>
<td>3.1</td>
<td>Procurement evolution</td>
<td>36</td>
</tr>
<tr>
<td>3.2</td>
<td>Benefits of e-procurement to the construction industry</td>
<td>44</td>
</tr>
<tr>
<td>4.1</td>
<td>E-procurement implementation factor</td>
<td>57</td>
</tr>
<tr>
<td>4.2</td>
<td>Flow of the research study</td>
<td>58</td>
</tr>
<tr>
<td>5.1</td>
<td>Survey respondent designation</td>
<td>62</td>
</tr>
<tr>
<td>5.2</td>
<td>Project undertaken by the respondent</td>
<td>63</td>
</tr>
<tr>
<td>5.3</td>
<td>Respondent company years of operation</td>
<td>63</td>
</tr>
<tr>
<td>5.4</td>
<td>Internet accessibility</td>
<td>64</td>
</tr>
<tr>
<td>5.5</td>
<td>Computer own by the respondent</td>
<td>64</td>
</tr>
<tr>
<td>5.6</td>
<td>Survey results of respondent on the selection of supplier</td>
<td>65</td>
</tr>
<tr>
<td>5.7</td>
<td>Survey results of respondent on negotiation with supplier</td>
<td>66</td>
</tr>
<tr>
<td>5.8</td>
<td>Survey results of respondent in the issuance of purchase order</td>
<td>67</td>
</tr>
<tr>
<td>5.9</td>
<td>Survey results of respondent on material tracking</td>
<td>67</td>
</tr>
<tr>
<td>Section</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5.10</td>
<td>Survey results of respondent on issuance of payment</td>
<td>68</td>
</tr>
<tr>
<td>5.11</td>
<td>Survey results of respondent on arrangement of supplier correspondent</td>
<td>69</td>
</tr>
<tr>
<td>5.12</td>
<td>Survey results of respondent on respondent direction and strategy towards implementing E-procurement</td>
<td>77</td>
</tr>
<tr>
<td>6.1</td>
<td>Factors affecting the implementation of E-procurement from the view point of Perceived Value</td>
<td>83</td>
</tr>
<tr>
<td>6.2</td>
<td>Factors affecting the implementation of E-procurement from the view point of Trust on Supplier</td>
<td>83</td>
</tr>
<tr>
<td>6.3</td>
<td>Factors affecting the implementation of E-procurement from the view point of Trust on Information Technologies (IT)</td>
<td>84</td>
</tr>
<tr>
<td>6.4</td>
<td>Key importance factors affecting implementation of E-procurement</td>
<td>84</td>
</tr>
<tr>
<td>6.5</td>
<td>Factors hindering the success of E-procurement</td>
<td>85</td>
</tr>
</tbody>
</table>
## LIST OF SYMBOLS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>The Procurement Chain</td>
</tr>
<tr>
<td>RI</td>
<td>Relative Index</td>
</tr>
<tr>
<td>N5</td>
<td>Number of respondent whom answered “Most Important”</td>
</tr>
<tr>
<td>N4</td>
<td>Number of respondent whom answered “Very Important”</td>
</tr>
<tr>
<td>N3</td>
<td>Number of respondent whom answered “Moderately Important”</td>
</tr>
<tr>
<td>N2</td>
<td>Number of respondent whom answered “Less Important”</td>
</tr>
<tr>
<td>N1</td>
<td>Number of respondent whom answered “Least Important”</td>
</tr>
<tr>
<td>%</td>
<td>Percentage</td>
</tr>
</tbody>
</table>
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Questionnaire cover letter</td>
<td>92</td>
</tr>
<tr>
<td>B</td>
<td>Questionnaire survey</td>
<td>94</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1 Background

The importance of proper management of material procurement is highlighted by the fact that they account for substantial portion of project cost and time (Naief, 2000).

In such a highly competitive environment nowadays, it is necessary for every construction company to maintain an efficient and effective material procurement to cut administration cost and to keep abreast of the market condition to procure materials at the right price, quality and time. Traditionally, contractor use paper based system to procure materials. They search for material from paper based catalog provided by suppliers through telephone and fax. The traditional material procurement process involves generation, copying and transfer of many paper documents. For example, requisition of material, quotation, purchaser order and etc (Kong et al., 2004).

Over the last few years, the internet has evolved from being a scientific network only, to a platform that is enabling a new generation of business (Heng Li et al., 2002). The internet is changing the way business is done in construction industry.
The World Wide Web has become a source for information, goods and services (Issa et al., 2003). E-procurement had emerged as one of the most discussed topic in material procurement. Without doubt, it will dramatically change the way purchasing is done in the near future (Essig and Ulli, 2001).

Suggested by its name, electronic procurement (E-procurement) is the application of Internet technology in material procurement. It involves the use of various forms of Information Technology (IT) to automate and streamline the procurement process in business organization, improving efficiency and transparency, thereby reducing the cost of operation within and between business parties (de Boer et al., 2001). In short, E-procurement is a user friendly; Internet based purchasing system (Nikolaos et al., 2004)

1.2 Problem Statement

In view of the many advantages of E-procurement, research studies have been conducted to explore the factors for implementation of E-procurement in oversea. Research study by Joyce Chan and Matthew Lee (2002), found that perceived value; trust on Information Technology (IT) and trust on supplier are the most important determinants factor of E-procurement implementation in Hong Kong. While in Malaysia, previous research by Lim et al. (2002) on the survey of internet usage shown that procurement through internet is low in the construction industry. The questions arise are, how was the current practice of material procurement in the local construction companies? Why was it implemented and not implemented? What are the factors hindering the success and direction of the local construction firms towards E-procurement.
1.3 Objectives

The objectives of this research are:

(i) To determine traditional material procurement and E-procurement
(ii) To identify current practice of material procurement in construction companies.
(iii) To identify factors affecting the implementation of E-procurement from the viewpoint of perceive value, trust on material supplier and trust on Information Technologies.
(iv) To identify factors hindering the success and direction of construction companies towards implementing of E-procurement.

1.4 Scope of Research

The scope of research will be as follow:

(i) Focus on material procurement process during construction stage of the project life cycle.
(ii) Focus on construction companies operates within Wilayah Persekutuan; Kuala Lumpur and Selangor, Malaysia.
(iii) Focus on G7 construction companies registered under Construction Development Board, Malaysia as the targeted respondent.
(iv) Focus on business to business relationship.
(v) Focus on buyer and seller relationship.
1.5 Research Methodology

This research was carried out by literature review and mail questionnaire survey.

1.6 Organization of Research

A comprehensive literature review was made on procurement process in construction industry in Chapter 2. Definition and traditional procurement practice was studied. Through the review, common problems encountered in construction procurement process were identified.

In Chapter 3, the impact of information technology on the procurement process will be discussed. Definition and development of electronic commerce were studied as the theoretical background for electronic procurement. Advantages and disadvantages were discussed.

In Chapter 4, methodology to carry out the research was explained. Both literature review and questionnaire survey was discussed. Flow chart of research stages was shown.

In Chapter 5, analysis and findings was discussed. Practices, factors and strategy towards implementation of E-procurement were discussed. Tables and figures of finding were shown.

In Chapter 6, conclusion was made based on analysis and finding, recommendation was made, limitation was discussed and further research was recommended.
REFERENCES


Harcourt Brace College Publisers