

EVALUATION OF ADOPTING E-PROCUREMENT AND ITS IMPACT ON PERFORMANCE IN APPAREL SUPPLY CHAIN IN SRI LANKA

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ABSTRACT

Apparel industry is one of the key industries in Sri Lanka which represents over 7% of Sri Lanka's GDP and employs directly about 15% of the country's workforce. Procurement plays a major role in apparel value chain in determining the cost and quality of the end products. With the development and increment of the use of technology, shifting to E-procurement has become vital in business world mainly because of the benefits it provides to the organization. In Sri Lanka most of the organizations have started the use of e-procurement blindly without estimating the costs or benefits resulted. This research aims to measure the effect of using e-procurement on performance of apparel supply chain and tries to identify the barriers and benefits on usage of E-procurement. The study was conducted using information collected from apparel organizations who are currently using e-procurement with the objective of supporting the apparel organizations which are planning to implement e-procurement in future. Objectives of the research were achieved by using statistical techniques; exploratory factor analysis, confirmatory factor analysis and structural equation modelling. The study concludes that e-procurement usage positively impacts on the performance of apparel organizations. Moreover, it shows that barriers in E-Procurement can be categorized to three main categories; namely, Organizational barriers, HR related barriers and External barriers while most prominent benefits of implementing E- Procurement in an apparel organization are elimination of paperwork & improved transparency in transactions.

Key words: Procurement, E-procurement, Apparel, Performance, SEM, Supply Chain

1. INTRODUCTION

In current highly competitive environment, it is necessary for every organization to maintain an efficient and effective procurement process in order to cut administration cost and to keep abreast of the market condition, so as to procure material and services at the right price, quality, quantity and time (Arasa & Achuora, 2012). According to Nasrun, Nawi, Roslan, Salleh, & Zulhumadi, (2016) shows e-procurement as the automation of an organization's procurement processes using web-based applications. Implementation of E – Procurement provides an organization with plentiful benefits and performance enhancements. However, the path which leads to implementation is abundant with barriers and challenges which should be overcome for a successful use of E- procurement functions in the firm.

Even though there are ample research in the area of E-Procurement, it was observed that there is a deficient in Sri Lankan context. Most importantly, apparel industry is considered as one of the most significant industries in Sri Lanka. Apparel design, manufacturing and exportation can be considered as one of the biggest manufacturing industries in the country and plays a major role in the advancement of the Sri Lankan economy. Apparel industry represents more than 7% of Sri Lanka's GDP and employs about 15% of the country's workforce while accounting for more than 50% of total exports.

Propelled by the globalization, the apparel industry must cope with high demanding customers. Consumers in today's market demand products to be produced at competitive price with the fastest turnaround time possible. The textile and apparel sourcing companies, therefore have to be nimble enough to make prompt responses to the changing consumer preferences and demand along with value added activities (Yuen & Cheng, 2013).

This research focuses on adapting technology in procurement activities and moving towards E – procurement in apparel supply chain to estimate the development in industry. The research is expected to give an insight to medium and small-scale apparel manufacturers on how to implement E-Procurement productively. The article further elaborates the factors affecting in implementation of E – Procurement, challenges in implementing E – Procurement and the impact of E – Procurement strategies in performance of apparel supply chain.

Major objectives of the study can be summarized as below.

- Identify the benefits of implementing E – Procurement in Apparel Industry
- Determine barriers in adapting E – Procurement practices in Apparel supply chain
- Determine impact of E – Procurement on the performance of Apparel supply chain

2. LITERATURE REVIEW

2.1. E – Procurement

Researchers have defined E – Procurement in different ways with relation to different aspects. For example, according to Kishor (2007), E-Procurement can be termed as the modern way of utilizing electronic tools like the Internet and e-mail for business-to-business purchases. Besides, it also helps to source and provide services for sales online using Internet-based technology.

Chepkemoi, (2014) illustrated the E-procurement processes. According to him existing procurement functions need to be “electrified” end-to-end in order to support the entire e-procurement framework. The functions include requisition and order management, real-time tracking and receiving of goods, online order fulfillment, automatic billing, invoicing and payment, and also the workflow management, commerce transactions, reporting and analysis tools.

2.2. Factors affecting the implementation of E- Procurement

Numerous researchers have explored the benefits and barriers in implementing E- Procurement in different industries. As per the researcher's knowledge, the existing literature mainly cover banking, Construction, Tea industry, hospitality industry etc.

Some researchers have demonstrated the Critical Success Factor which influence in successful implementation of E procurement in an organization. This includes;

- Top management support
- E-procurement implementation strategy
- Business case and project

- Business process Re-engineering Technology standards
- Security and authentication
- System integration
- Change management
- Performance measurement.
- Training and education
- Willingness to Adoption by all the stakeholders (Shukla, 2016)

While the above-mentioned success factors motivate the establishment of E-procurement, there are barriers which refrain the organizations from involving as listed below.

- Management barriers- limited resource, resistance in change and information sharing
- Organization barriers- different culture, different compatible internal and external, post supplier relationship
- IT barriers- security, lack of compatibility, no common technology
- User barriers- fear, change, lack of information skill system (Shukla, 2016)

Other than that, challenges such as system security, cost implications, legal infrastructure and insecurity in E transactions also affect the implementation (Evelyne, 2014)

Even though there are countless challenges and barriers in establishing E-procurement, the benefits are guaranteed when implemented successfully. Literature have been developed to discuss about the benefits of E-Procurement to the organizations and some such literature are as discussed here.

Use of e-procurement for obtaining contracts supports in achieving benefits such as increased efficiency of employees, save cost by getting faster and cheaper goods and services, improve transparency and reduce corruption in procurement services among the employees and managers. Moreover, E-procurement may encourage five types of cost savings namely order cost, administrative cost, lead-time order cost, transactional costs and opportunity cost of capital. (Nasrun, Nawi, Roslan, Salleh, & Zulhumadi, 2016). It is claimed that a company engaging in E- procurement can cut cost by 8 to 15% (Shukla, 2016)

It is expected that the emergence of web based E-procurement would further reduce the order fulfilment cycle time, lower the inventory levels, enhance the order fulfilment, (Shukla, 2016) enables wider vendor choices, standardize the efficient procurement processes, enable greater control over procurement spending and better employee compliance, provide more accessible Internet alternatives for buyers and results in less paperwork and fewer repetitive administrative procedures (Gunasekaran & Ngai, 2008).

2.3. E-Procurement and Performance

Literature relevant to E-Procurement and performance of the organizations are rare to be found. According to Tai, Ho, & Wu (2010), many companies fail to see the impact of E- procurement on organizational performance. It has both long- term and short-term influences on performance. These impacts include rate of return on investment, payback period, profit and annual revenue.

E-procurement not only results in process efficiency but also provides higher leverage opportunities in areas such as cost reduction, efficiency of resources utilization to increase productivity, introduce of new technology, new products, new processes, and new markets.

Research on impact of inter-organizational information systems (IOS), and particularly the use of electronic data interchange (EDI), has shown that they impact significantly in improving the efficiency of business processes and the overall performance of the organizations.

2.4. Apparel Supply Chain

Purchasing and procurement has undergone continuous changes in apparel industry, from a transactional approach to partnership sourcing, then shifted to lean enterprise and currently moving toward a world-class network sourcing (Burt, Dobler & Starling, 2003). Efficient procurement is crucial in the textile and apparel industry since the demand for and price of a garment product are mostly time-dependent.

As per the review of literature and researcher's knowledge, even though there are numerous researches on E-Procurement and E-procurement implementation in several industries, the Apparel industry is kept unexplored specifically in Sri Lankan context. This research aims to fulfill the existing gap by exploring the implementation of E-Procurement in Apparel supply chain.

3. METHODOLOGY

3.1. Data Collection

The main technique used for data collection is a survey using a structured questionnaire. Measurements in the questionnaire was developed using data gathered through literature review. The process of data collection is elaborated below.

3.1.1. Measurement Development

Extensive literature survey was carried out to create the framework of the study. Even though, it was difficult to find literature on Sri Lankan context because there hasn't been many research done on this area, the research done in other countries were explored and they were used as the foundation to create the questionnaire. The following key themes were extracted during the literature review. Accordingly, the types of E-Procurement systems which are used generally were identified and this includes factors such as

- Online ordering
- Electronic payment
- Electronic catalogues
- E tendering
- Electronic data interchange
- Communication with suppliers
- Searching of suppliers
- Order status control

Literature also shows that the following general benefits can be achieved by implementing E-Procurement.

- Opportunity to improve relationships with existing and new suppliers
- Efficient purchasing process
- Gain proper visibility and transparency to the transactions
- Eliminate paperwork
- Reduced errors than manual processes
- Better utilization of human resources
- in procurement department
- Increased market share
- Improved customer service levels
- Increased efficiency in overall supply chain
- Reduced inventory levels
- Improved customer satisfaction
- Move towards green purchasing

More over literatures shows that there are general barriers companies have to come across while implementing E-Procurement. This includes

- Suppliers not willing to adopt e-platforms
- Lack of new technological implications in the organization
- Lack of motivation of employees
- Lack of top management support
- Lack of new technological implications in the organization
- Cost of implementation
- Resistance and fear to change to new

- technology
- Security concerns in information exchange
- Security concerns in online transactions
- Difficulty in integrating organization
- information systems with supplier information
- Interoperability with existing systems of the organization is difficult
- Organizational policies
- National policies

Moreover, there are certain Key performance indicators (KPIs) that can be used to measure the performance achieved by implementing E-procurement. Literature shows that the following KPIs can be used to measure the performance increment in an organization.

- Lead time reduction
- Improve Fill rate
- Improve Service level
- Reduction in customer complaints
- Reduce Purchasing Cost
- Reduce Total Logistics Cost
- Reduce Procurement Cycle Time

Using the above information collected, the questionnaire was developed and proceed with the primary data collection as explained below.

3.1.2. Primary data collection

Primary data was collected through an online questionnaire, which was prepared based on the information collected through the literature review. The questionnaire was prepared to gather information related to three research objectives and to collect information on industry background. It collected information on benefits achieved by E-Procurement, extent of barriers which affect in implementation and data which can be used to measure the two latent variables in proving third objective.

- Performance of the organization
- E procurement implementation

Most of the researches carried out on similar topics were found to be empirical studies with the usage of qualitative data analytic techniques. In this study, the data was collected through a perception approach because of the unwillingness of the organizations to provide financial information. However, the perception based data is converted to quantitative data and a quantitative analytical approach was used to achieve the research objectives and to answer the research questions. Statistical analytical methods were used to analyze the data to achieve the objectives of the research as discussed below.

3.2. Analytical methods used in achieving Objective 1 – Determining benefits of E- Procurement – Descriptive Analysis

Descriptive analysis is the statistical method of representing the summary of collected data in a study. Descriptive statistics are used to extract meaningful summaries from a bundle of data. Tools like mean, median, standard deviation, variance, range, skewness and kurtosis can be used to represent the data set and those tools can be used in arriving at primary sensible conclusions in the study. Descriptive analysis can be used in identifying a trend and a pattern in the collected data from the sample which represents the overall population.

3.3. Analytical methods used in achieving Objective 2 – Barriers in Implementing E-Procurement – Exploratory Factor Analysis

Exploratory factor analysis was conducted to find the components which act as barriers in E-Procurement implementation. SPSS Statistics 21 software was used for this purpose.

Exploratory factor analysis (EFA) is a widely utilized and broadly applied statistical technique in social sciences (Costello & Osborne, 2005). This attempts to bring inter-correlated variables together under more general, underlying variables. More specifically, the goal of factor analysis is to reduce “the dimensionality of the original space and to give an interpretation to the new space, spanned by a reduced number of new dimensions which are supposed to underlie the old ones” (Rietveld & Van Hout, 1993), or to explain the variance in the observed variables in terms of underlying latent factors” (Habing, 2003) Thus, factor analysis offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analyses (Rietveld & Van Hout, 1993).

3.4. Analytical methods used in achieving Objective 3 – Determining relationship between E-Procurement and organizational performance

Objective 3 of the research is to identify the impact of using E-Procurement on the performance of the organization. In available literature, qualitative analyses are most commonly used in determining how E-Procurement affects the performance of an organization.

Confirmatory factor analysis and Structural equation modeling were used for that purpose. A model was developed to measure the relationship between E-Procurement usage and the performance improvement in the organization. Latent and observed variables used in this context are given in Table 1.

Table 1. Latent variables and observed variables in objective 3

Latent Variable	Observed Variables
E- Procurement usage	Level of usage of, Online ordering Electronic payment Electronic catalogues E tendering Electronic data interchange Communication with suppliers Searching of suppliers Order status control
Performance of the organization	Level of increase of, Lead time reduction Improve Fill rate Improve Service level Reduction in customer complaints Reduce Purchasing Cost Reduce Total Logistics Cost Reduce Procurement Cycle Time

3.4.1. Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was used to verify the factor structure of the set of observed variables (Suhr, n.d.), where it was checked that the relevant observed variables belong to the pre-determined category. According to Furr (2003), CFA is useful when researchers have clear (or competing) hypotheses about a scale – the number of factors or dimensions underlying its items, the links between specific items and specific factors, and the association between factors.

3.4.2. Structural Equation modelling

After assessing and confirming the CFA output, a relationship between latent variables was calculated using structural equation modelling. This was also done by using SPSS AMOS 22.0.

SEM can be used to answer any research question involving the indirect or direct observation of one or more independent variables or one or more dependent variables. However, the primary goal of SEM is to determine the validity of a proposed model (Malo, 2016). This research aimed to achieve both goals using SEM analysis.

4. FINDINGS AND DISCUSSION

4.1. Background Analysis

Analysis of the background of the respondents and the organizations, it was evident that almost all the respondents have a certain level of knowledge and the experience in procurement process and purchase material. Therefore, the accuracy and the reliability of the responses is assured, and hence the analysis done through the data collected seems to more reliable to do further analyses. Hence, the findings of the analysis can also be treated as a reliable output backed by proper information.

Furthermore, almost all the organizations which has responded currently use e-procurement. Therefore, the respondents have the hands-on experience regarding the barriers and challenges in the process of introducing e-procurement, benefits achieved through e-procurement and regarding the performance enhancement resulted by e-procurement. Therefore, the reliability and accuracy of the findings are ensured.

4.2. Benefits of Implementing E-Procurement

The table 2 shows the output of descriptive analysis where the benefits are ranked according to their importance. The most prominent 3 benefits are elimination of paperwork, visibility and transparency in transactions and reduction of errors.

In conclusion e-procurement implementation has many benefits over apparel industry and the most prominent ones are the ones discussed above. Those benefits lead to many other benefits making the work easier for procurement department.

Table 2. Summary of benefits in E-Procurement

Ranking	Benefit	Mean
01	Eliminate Paperwork	4.3333
02	Visibility and Transparency in Transactions	3.6667
03	Reduce Errors	3.6333
04	Move to green purchasing	3.6000
05	Efficient purchasing	3.4667
06	Better utilization of Human resources	3.4333
07	Efficiency in supply chain	3.3333
08	Improve customer service	3.2000
09	Improve relationship with suppliers	2.9667
09	Customer satisfaction	2.9667
10	Reduce inventory level	2.9333
11	Increased market share	2.8667

4.3. Barriers in Implementing E-procurement

To proceed with factor analysis the KMO value of the sample should be greater than 0.5. In this case the KMO value is 0.685, which indicate that the data set is well appropriate to continue with factor analysis

From EFA, three basic factors were emerged as barriers and it identified the observed variables belong to each factor. Table 3 shows the extracted barriers and the variables belong to latent variable/factor. The three factors extracted from EFA are named as

- Organizational barriers
- HR related barriers
- External barriers

Table 3 shows the variables that belongs to each factor. For example, variables belong to Factor 1 (Organizational barriers) are

- Lack of expertise
- Cost of implementation
- Security concerns in information exchange
- Security concerns in online transactions
- Interoperability with existing systems of the organization is difficult

Table 3. Barriers in Implementing E-Procurement

Factor	Variables
F 1 –Organizational Barriers	Var 5 - Lack of expertise
	Var 6 - Cost of implementation
	Var 8 - Security concerns in information exchange
	Var 9 - Security concerns in online transactions
	Var 11 - Interoperability with existing systems of the organization is difficult
	Var 12 - Organizational policies
	Var 2 - Lack of new technological implications in the organization
F 2 – HR related Barriers	Var 3 - Lack of motivation of employees
	Var 4 - Lack of top management support
	Var 7 - Resistance and fear to change to new technology
F 3 – External Barriers	Var 1 - Suppliers not willing to adopt e – platforms
	Var 10 - Difficulty in integrating organization information systems with supplier information
	Var 13 - National policies

Reliability of the extracted factors was determined through Cronbach's Alpha test. To ensure the reliability of the factors each factor should have a Cronbach's Alpha value greater than 0.7. The values obtained are as follows implying the obtained factors are reliable.

- Factor 1 – 0.889
- Factor 2 – 0.762
- Factor 3 – 0.767

4.4. Impact of E-procurement on organizational performance

The final CFA output is shown Figure 1. Construct validity of the CFA model was determined through the following indices given in Table 5 which portrays a best fit in all cases.

Table 5. Modal Fit of CFA output

Measure	Threshold	Achieved fit
Chi-square/df	< 3 - Good	0.95
P-value for the model	> 0.05	0.585
RMSEA	< 0.05	0.0
GFI	> 0.95	0.613
CFI	> 0.90 – Best fit	1.00
TLI	> 0.90 – Best fit	1.593
RMR	< 0.09	0.463
PCLOSE	> 0.05 – Best fit	0.743

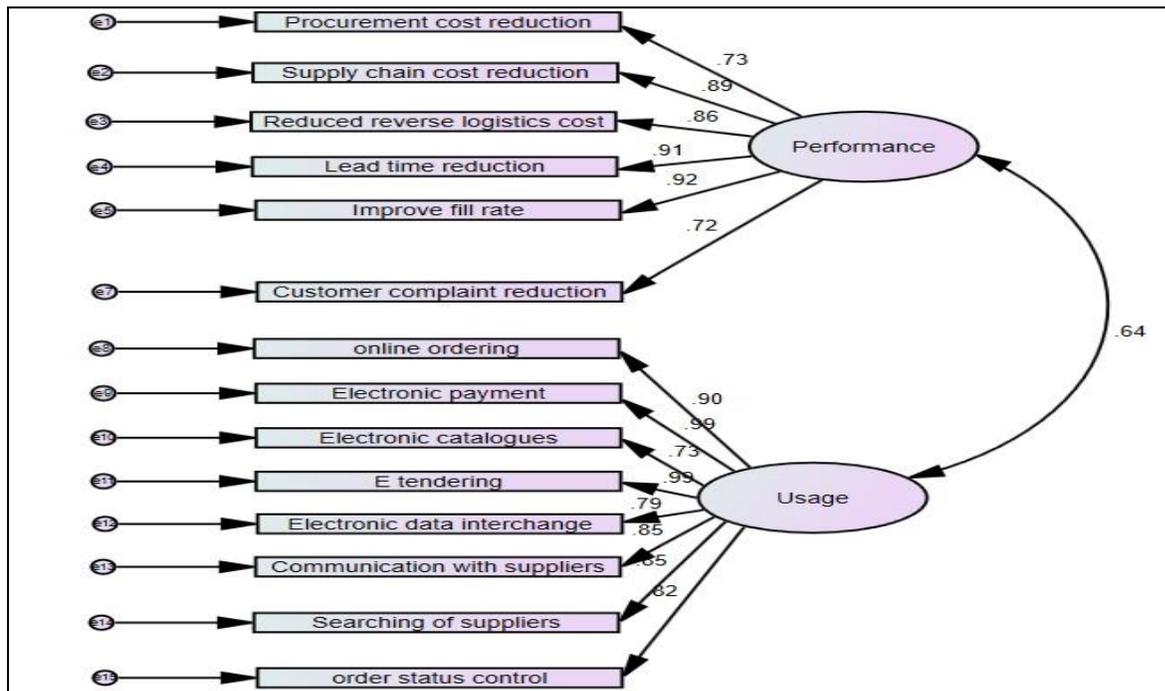


Figure 1. Final CFA output

Reliability was tested using Cronbach’s alpha test and the values obtained for Performance is 0.896 and for E-procurement usage is 0.745 which shows that the reliability of the model is achieved. After ensuring suitability of the model develop through CFA, SEM was conducted. The hypothesis tested through SEM was;

- H1 - E-procurement implementation have a positive impact on the performance of an apparel organization

The output from the structural equation modelling is portrayed in figure 2.

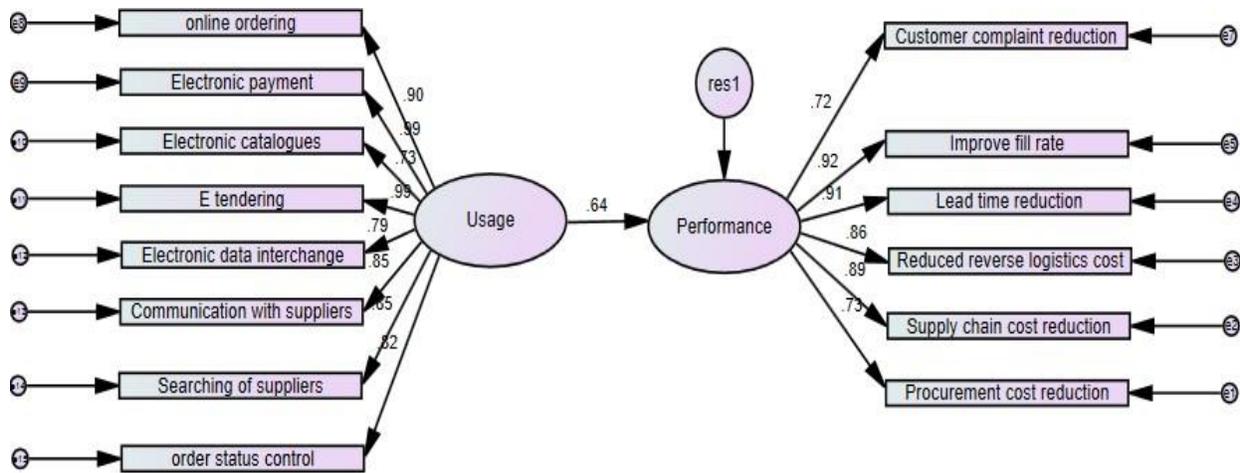


Figure 2. SEM Output

Validity of SEM model was determined through following indices in table 6 and a best fit is achieved in most cases

Table 6. Modal Fit of SEM output

Measure	Threshold	Achieved fit
Chi-square/df	< 3 - Good	0.95
P-value for the model	> 0.05	0.585
CFI	> 0.95 – Best fit	1.00
GFI	> 0.95	0.613
SRMR	< 0.09	0.463
RMSEA	< 0.05	0.0
PCLOSE	> 0.05 – Best fit	0.743

Considering the output from CFA and SEM, H1 can be accepted. The figure 3 shows the output of SEM.

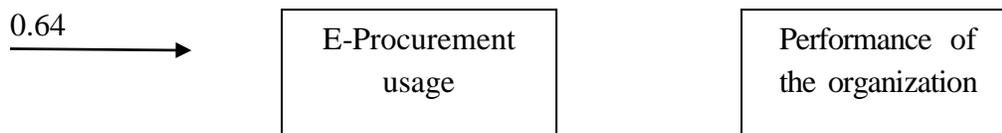


Figure 3. SEM Model

E-procurement usage affects the performance in many ways. It reduces procurement costs and other supply chain costs by a considerable amount. Also, e-procurement increases the efficiency of the procurement process improving overall performance. Other than that e-procurement plays a major role in satisfying all the stakeholders involving employees, suppliers as well as customers by reducing the work load and by reducing the errors.

The output can be explained as 1% usage of E-procurement improve the performance of an apparel organization by 0.64%.

5. CONCLUSION

The research has three main objectives and all three objectives and by the end of the research project all three research objectives are accomplished and successful results are obtained.

The research objectives achieved through the study are as follows.

First objective of the research was to identify the benefits of implementing E – Procurement in Apparel Industry. After the analysis it was identified that main three benefits of e-procurement are reduction of paperwork, improved visibility and transparency in transactions and reduction of errors.

Further, next objective which is to determine the major barriers in adapting E – Procurement practices in Apparel manufacturing organizations was achieved through CFA. Accordingly, the main barriers in implementing e-procurement were identified as organizational barriers, HR related barriers and external barriers.

Determining the impact of E – Procurement on the performance of Apparel supply chain was the primary objective of the research and was achieved through SEM analysis. The output can be stated as ‘E-procurement has a positive impact on performance of apparel organizations. When the usage of e-procurement is increased by 1%, performance of the organization is enhanced by 0.64%’

5.1. Limitations to the study

The major limitation was collecting financial data from the organizations to measure the performance. However, since the organizations were not willing to share financial information, the researcher was compelled to use the data collected through the perception of experienced managers to measure the performance.

Another limitation was the limited time frame which limited the sample size. Because of the limited sample size, the best model fit could not be achieved in CFA and SEM. If the sample size was larger, the model would be more accurate and precise.

5.2. Recommendations for future research

This research is based on perceptions of experienced managers. If this could be done using exact financial data and other performance indicators, instead of limitations the results would be more precise and reliable. Even as a case study for a single organization, if the research could be extended with exact information it would be more valuable to the industry.

Other than that, the research could be extended to other potential industries where e-procurement will be useful in future like construction industry, tea industry, food manufacturing industry, hotel industry etc. That would be supportive for those industries in adopting e-procurement.

The latent variables in the research can be further broken down to determine cost performance, efficiency enhancement, accuracy increment etc. to determine the exact effect of using e-procurement.

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