

Structural Equation Modeling Approach to Analyze the IT Governance Moderation in the Relationship of E-Commerce Adoption to Organizational Performance in Sri Lanka

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Abstract

As advance communication technologies significantly effect in business performance, adoption to advance communication technologies is becoming in essential requirement to the organizations today. This is directly affected to the county economy. Therefore, organizations should pay high attention to digital communication systems which improve the business performance. To get use of the technology, organizations must start to invest on new technologies to business like e-commerce solutions to experience the business performance improvement. In this article authors explain the relationship of adoption to E-commerce solutions and its direct relationship to organizational performance. Further this article explains the Information Technology (IT) -governance moderating effect to organizational performance. The data validated using Small and Medium Scale manufacturing (SME) as SMEs are known as the back born of any developing nation and manufacturing is the largest industry sector in Sri Lanka.

Index terms— information technology; E-commerce adoption; organization performance; IT governance; structural equation modeling.

1 Introduction

MEs are known as the backbone of any developing nation in the world as it generates employment opportunities and economic growth [1]. In Sri Lanka according to [2,3] SME effecting significantly in county economy. In it accounts for more than 75 percent of the total number of enterprises, provides 45 percent of the employment and contributes to 52 percent of the Gross Domestic Production (GDP) [4]. To improve the SME's performance, information technology adoption playing a vital role in SME development [5,6]. According to [7] E-commerce adoption has a significant, positive relationship between SME's average sales growth rate and therefore adopters of e-commerce technology have significantly higher average sales growth rate than non-adopters. Adoption of Ecommerce and technologies strengthening the SMEs [8,9]. According to [6]in Sri Lanka there is a positive relationship between E-commerce adoption and organization performance in manufacturing sector SMEs. Further according to [10] has proposed a model which shows that the relationship of E-commerce adoption and organizations performance is moderated by Information technology governance. Therefore, according to literature study main research question is compiled as determine the Information technology governance moderating effect to the relationship of Ecommerce adoption and organizational performance.

A questionnaire-based survey is conducted and modeled in Structural Equation Modeling (SEM). In the following section under methodology data collection and analysis part will be discussed in detail.

2 II.

3 Literature Review

In SMEs, adoption to Ecommerce like advanced technologies in ICT gives lot of gains for businesses. The majority of the business and business professionals have become interested to uncover the multiple benefits business will be able to harness by implementing appropriate ICT solutions based on the internet [11]. There is enough empirical evidence indicated that Ecommerce adoption and SME performance is positively correlated. According to [7] done a study to find the contribution to the literature found that there is a positive relationship between E-commerce adoption and organization performance. According to [12] done a study to investigate whether information and communication technologies (ICT) resources, including investment and use of specific types of ICT as well as innovative work practices, have a positive impact on several dimensions of firm performance. In a study done in Kenya for organization performance by ICT usage concluded that it has positive effect [13].

For better performance for business, Ecommerce adoption plays a vital role in SMEs. Ecommerce as a technology provide many opportunities for an organization to improve the business process and communication. But still the adoption is well below the expectation in developing countries [14]. Taking maximum advantage of the technology when implementation is done also should be considerable factor to analyze. Therefore, implementing a holistic IT governance model is not just IT delivery but improve the business confident also. Most of the SMEs implementing technology usage in the business but they need to understand whether the investment is worth and deliver real value to the business. Adopting to Ecommerce is part of the IT implementation.

A research study done to explore the relationship between IT governance practice and business/IT alignment, by creating business/IT alignment maturity benchmark and comparing the use of IT governance practices in different cases via qualitative approach. As results they found that the maturity level should be 2 (out of 5 the have defined in the research) to positive influence the alignment between IT and business. Further they have identified 11 different IT governance practices [15]. Those are: included with IT governance, IT performance measures, Knowledge management etc.

With the purpose of developing a framework to examine the effectiveness of IT governance, a study conducted which draws on extant literature in IT governance, strategic information systems planning, strategic alignment maturity, information systems security, business and IT alignment, international organization for standardization in information systems, and organizational performance. The purpose of the study is to identify determining factors for IT governance effectiveness, IT governance effectiveness factors and organizational performance. As results they found that there are five factors which can make groups. Those are external environment characteristics, information intensity, organization culture, organizational demographics, linking organization practices with strategy [16].

A comprehensive study done in manufacturing SMEs in India in IT governance. In India a massive investment done in IT infrastructure and planning to do further. Therefore, they wanted to analyze the effectiveness of those and whether the investment is worthwhile. Out of the list of results found, they found that IT governance ensure the effective audibility and scalability of business functions and IT governance save the time via standardization of processes. Which ultimately improve the business performance [17].

A study found that there is a moderate effect on IT governance to the relationship of Ecommerce adoption and organizational performance. The testable framework is developed as a conceptual model. Figure ?? illustrate the model.

Source: [10] Figure ??: Moderator effect on the relationship of Ecommerce adoption to organizational performance According to [10] IT governance has discussed under following topics. IT value delivery, strategic alignment, risk management, resource management.

4 III.

5 Methodology

To test the governance effect to the relationship of the E-commerce adoption and Organizations performance testable model is developed as shown in figure ??1

6 a) Structural Equation Modeling (SEM)

SEM is a collection of statistical techniques that can be used to confirm a theory hypothesized on a phenomenon [18,19]. To confirm a theory. SEM is developing and validates a set of models consisting interrelated structural relationship among theoretical contracts and indicator variables [18]. The theoretical contracts refer to unobservable factors that are used to describe the phenomenon explained by the theory. Those theoretical contracts are represented by observable indicator variables [18]. In this study initially, Exploratory Factor Analysis (EFA) has been conducted and followed with Confirmatory Factor Analysis (CFA).

7 b) Exploratory Factor Analysis (EFA)

In this model there are three constructs been identified as E-commerce adoption [11,14,[20][21][22][23][24], organization performance [7,10,13,[25][26][27][28] and Information Technology governance [10,17]. Each construct

97 is measured using questionnaire items three, three and four respectively. The acceptance of data for the analysis is
98 presented in table 01. Items covered in the questions in adoption including maintain sales, supplier, procurement
99 process and non-financial transactions online. Under organization performance in this study tested for customer
100 satisfaction, internal process efficiency and supplier's integration process efficiency. In IT governance distinguish
101 process among customers, continues quality improvement, enter to new markets and efficiency in production
102 process. This has been explained in the discussion section with the results obtained in detail. To access reliability
103 of the instrument, the internal consistency is checked. Internal consistency of the measurement model refers
104 the degree to which all the indicators appointed to measure the same constructs are interrelated [29]. In this
105 study, the internal consistency accessed using Cronbach's Alpha [30] and Composite reliability [31]. Further,
106 indicator reliability was accessed using indicator loading [18]. Its measures how much of the indicator variance
107 is explained by the corresponding latent variable. According to [18,32,33] the values in the measurement model
108 was not acceptable for IT governance which has less than 0.5 for Average VarianceExtracted (AVE). However,
109 according to [32], if the AVE value is less than 0.5 and composite reliability (CR) is higher than 0.6 still the
110 converged validity is adequate. For E-commerce adoption and organization performance AVE is acceptable and
111 for all the variables Cronbach's alpha is acceptable when it is higher than 0.7 [18]. With the confirmation of EFA
112 study continued with CFA.

113 8 c) Confirmatory Factor Analysis

114 The model is developed in AMOS and testes according to the SEM techniques.

115 Moderating variable moderates the effects of an independent variable on its dependent variable. The social
116 science researchers define moderator as the variable that "interfere" in the relationship between an independent
117 variable and its corresponding dependent variable [34].According [35] to the which integrates findings literature
118 regarding the impact of corporate governance on firm performance, they have found that external governance
119 has a moderating effect on firm performance. Therefore, in this study reaches investigate that in the aspect of
120 IT governance and check the moderating effect for organizational performance. According to [36] there are few
121 steps involved in analyzing the multi-group CFA when analyzing the moderating effect in AMOS. Here in this
122 study moderator is analyzing with respect to low and high governance.

123 Both high and low level of governance is measured with constrained and unconstrained models. Then obtained
124 the difference in chi-square value between constrained and unconstrained model for both high and low level of
125 governance. According to [36]both constrained and unconstrained models are been developed. Figure 02 shows
126 the model developed to test the effect. According to the analysis the chi-square value and degree of freedom
127 is reported in table 01. According to the table 02: Chi-square value is 5.258 (45.801-40.543) in low governance
128 between constrained and unconstrained model. While the Degree of Freedom is 33-32 =1. For the test to be
129 significant, the difference in chi-square value should be higher than the value of Chi-square with 1 degree of
130 Freedom, which is 3.84. Therefore, both the low and high level of governance is moderating the relationship of
131 Ecommerce adoption and Organizational performance.

132 IV.

133 9 Discussion

134 In the study moderating effect is measured for both high level and low level of adoption. This is evident through
135 past studies as well [15,16,37]. Furthermore, this finding provides an extended justification for a proposed
136 theoretical model for SME development in Malaysia [10]. In a study done in Malaysia for SME in ICT adoption
137 state that proper utilization of ICT significantly affect the organization performance [38]. Therefore, it can
138 conclude that organization performance is increasing with proper IT governance in SMEs.

139 According to the questionnaire items filtered in EFA and results obtained in CFA this study shows that when
140 organizations experience uniqueness of the products through Ecommerce solutions organizational performance will
141 be enhanced. Even organizations adopted to Ecommerce but not provided with unique features and functionalities
142 performance improvement is not so significant. Further results in the study shows if Ecommerce solution provide
143 more quality to the products, performance will be improved. This can be achieved through tactics which
144 will ultimately improve the organization performance. Quality is measured as customer satisfaction, therefore
145 maintain high customer satisfaction through online purchase would be significant for business improvement [39].
146 After adopting to the Ecommerce solutions, Industries should be able to find new markets. Hence, Ecommerce
147 solution should be able to do market analysis and find opportunities. This is back-end operations in the
148 Ecommerce platform. Artificial intelligence, Big data, Machine leaning and deep leaning like data analysis
149 techniques should can be apply [40]. Therefore, embedded Ecommerce solution to the systems organizations will
150 be achieve higher organizational performance. Now a day's social media data is used to understand the real
151 demand for product and find new markets [41]. This would improve process efficiency and cost advantage with
152 minimum inventory. According to finding if the production efficiency is improved after adopting to Ecommerce
153 organization performance will be improved. This means Ecommerce should be able to streamline the production
154 lines and make maximum production efficiency. If the organization can predict the real demand of the customer
155 and economy of scale (EOS) organization will be able to achieve maximum cost benefit to improve organization

156 performance. This is evident through past literature by using advance data analysis techniques, production
 157 systems will improve their operations [42,43].
 158 V.

10 Future Studies

160 This study is conducted with the intention to contribute literature in manufacturing sector organizations in the
 161 small and medium sector in Sri Lanka. According to Industrial Development Board of Sri Lanka, this study is
 162 important to conduct to other sectors in the country as many organizations use technology below the expectation
 163 and not exercising the real time use of technology for better business performance. Therefore, there is a clear
 164 gap between existing use of the technology and governance in other sectors of the country. Furthermore, the
 165 IT governance perspective should be moderated according to the industry which the studies in the future to be
 166 conducted. When it comes to larger scale organizations there is a high possibility of applying more advance tool
 167 and techniques used in the Information Technology industry for data analysis for better business forecasting,
 168 advance data communication methods for wider bandwidth to access remote data centers and conduct business
 169 operations entirely online. According to [44] in the qualitative analysis of the study conducted found that concern
 170 for cyber security is a significant factor to be considered therefore information technology governance should be
 171 embedded with proper use of the security measures to protect the network and build the trust among users in
 the domain. ¹

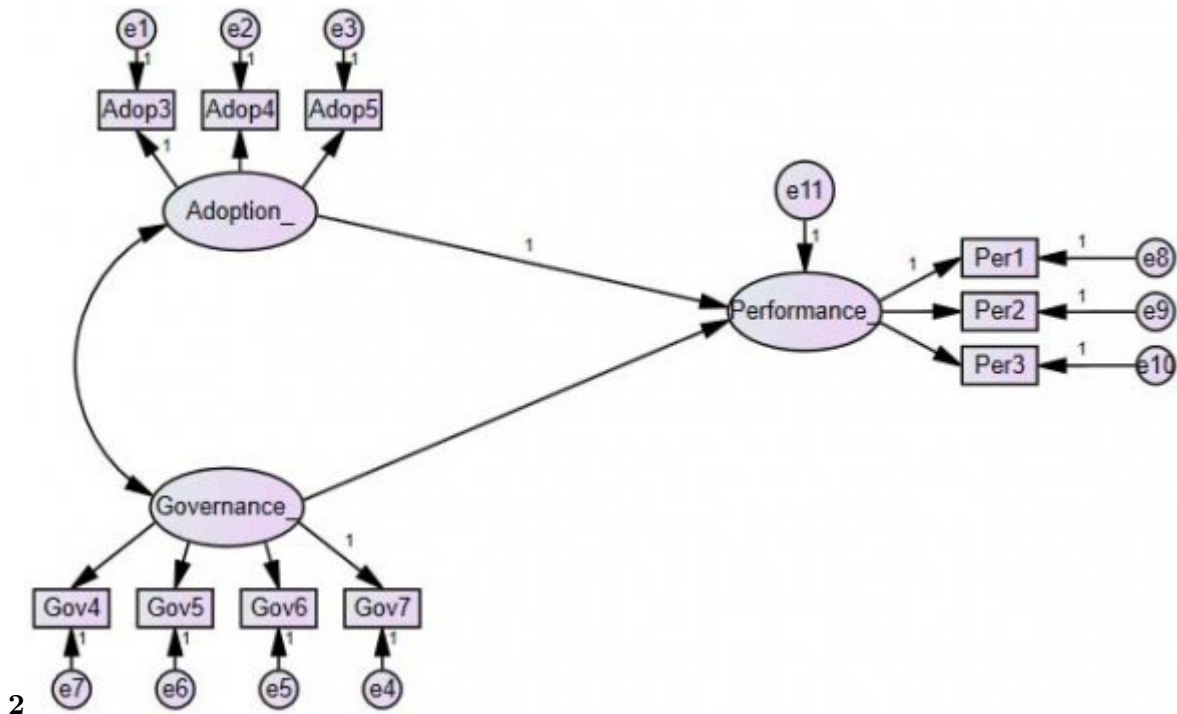


Figure 1: Figure 2 :

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validity of the data is checked and achieved the
goodness of data and contracts under Exploratory
Factor Analysis (EFA). Then Confirmatory Factor
Analysis (CFA) is executing to check the model
goodness of fit.

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Figure 2:

1

Construct	No of Items	AVE	CR	Cronbach's Alpha
Organization Performance	3	0.69	0.869	0.867
Ecommerce Adoption	3	0.535	0.774	0.767
IT Governance	4	0.433	0.751	0.745

Figure 3: Table 1 :

2

Multi-level	Model	Constrained	Unconstrained	Chi-square & DF Difference	Results on Moderation
Low Governance	Chi-square DF	45.801 33	40.543 32	5.258 1	Significant
High Governance	Chi-square DF	86.862 33	28.938 32	57.924 1	Significant

Figure 4: Table 2 :

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