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The impact of e-logistics on firm performance in context of supply chain

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ABSTRACT- In this paper, we focus on the relative efficiency of e-logistics and its impact on the performance of individual firms positioned along the supply chain. These days there is an urge that a firm activities having an impact on its performance should be enhanced, nowadays the competition is between supply chains. In this study, the supply chain of large firms was analyzed. This led to the examination of an entire supply chain from both upstream and downstream perspectives. Supply chain execution and supply chain planning e-logistics tools were identified and their relative efficiency was assessed. Data was collected through a questionnaire, circulated to a representative sample (n=475). In this study descriptive stat, correlation and regression are used for analysis. We attempt to map out the tools' potential to enhance the performance of, individual firms, in particular the link between e-logistics configurations and key performance dimensions. Findings revealed that the e-logistics do have an impact on the performance of the firms.

Keywords: Supply chain, supply chain management, performance, electronic logistics, e-logistics

I. INTRODUCTION

Few decades back the concept of logistics has introduced in military where supplying of weapons used to be carried out through transportation. The term logistics existed for some significant time, defined as: *"The science of the movement of supplying and maintenance of military forces in the field", "the management of materials flow through an organization, from raw materials flow through to finished goods", "the detailed planning and organization of any large complex operation"* (Collins, 1990). The former description gives us meaning of military origins, the latter two definitions tell about the modern business. The second definition is very much related to our topic that defines supply chain management (Graham, 2013).

The logistics concept emerged in the 1960s and 1970s.This concept was use to serve the customer in cost effective way. Way that company reaches and serves their customers differently than that of their competitors. Hence the need is to see the logistics in wider business context and far more than a technique. Logistic concept faded because of their high cost. On a national level, it was estimated that logistics cost in the U.S alone accounted for 15 percent of the gross national product (Heskett, 1973). Logistics was not considering the role of profitability, it was giving little capital investment, process and delivery cycle times were long and was not going for global competition (Graham, 2013). So, the logistics replace with SCM. Industry activities embrace the field of SCM. The origin of the name is being debated. Some were saying that it was an activity integration promise fulfillment. Current supply chain enthusiasts promoted the ideas of logistics pioneers. In order to capture opportunities for improvement of business performance companies often neglect value of their customers. E-logistic capability is to satisfy existing need of their customer at least possible cost. This is known as a customer driven business. The broad problem area is that of a function such as e-collaboration or e-logistics which has an effect on operational competence of supply chain and customer service in addition to losing of business opportunities may be analyzed. To find out how a business can use the opportunities to gain competitive advantage in order to maintain efficient supply chain activities and to create value for their customers. To adapt and implement E-logistics many researchers in the past suggest various models. Examine the gap between the adaption

and successfully implementation researchers integrate multiple theoretical views. Researches apply configuration process to find out missing links that are creating resistance in the use of E-Logistics. This process results in development of new algorithm and also decision support system to improve the performance of E-Logistics along with the increase in adaption rate (Xiaodie Pu, 2016). Effective use of ICT can improve client package, setup proficiency, data excellence and provision of shared design and implementation, as well as upgraded receptiveness, is sound recognized benefits presentation (Pettit, 2016).

This research tries to identify the impact of e-logistics on firm's performance in supply chain context. So, the study proposes that:

H_1: E-logistics has a significant impact on the firm's performance

There is scarce literature that discusses the relationship of e-logistics with firm's performance in supply chain context in a country like Pakistan. The current literature discusses the relationship between these variables. This study is unique in the sense that it extends the search for a supply chain model in the context of e-logistics. In the Pakistan situation, although studies have been performed, there is still a need for an inclusion of many other variables. Adding these variables together would help much benefit firms may get when making their strategic choices.

II. METHODS

Research Design

The authors adapted a survey questionnaire with demographic characteristics of respondents such as gender, age, experience, and education for quantitative data. The second segment inquires about the study's key variable. Data was collected using a Likert scale questionnaire. The responses received via this questionnaire were evaluated, and the results were obtained by processing the data through different techniques and methods.

Participants

The sample of the present study was sample size 475 respondents. This study covered companies who were using electronic system in their supply chain management to take part in the race of technology. Hence it was used for data collection.

Data Collection Tool

The questionnaire items measuring the e-logistics are obtained from Cristina Giménez (2015). On the other hand, the questionnaire considering the effect of firms performance is taken from (Williams, 2007). The measurement instrument's reliability (internal consistency) is tested through Cronbach's Alpha. The internal consistency is also tested through composite reliability. The average variance is derived using convergent validity on the latent variables in this analysis. The difference between the latent variables is also tested using discriminant validity. We were able to determine the health of the collected data using descriptive analysis. Structural equation modeling was used in the study for testing the hypothesis.

III. RESULTS

First, the theoretical model's internal consistency (reliability) is determined. Cronbach's alpha and composite reliability were used to ensure the internal accuracy of each latent variable. The first criterion for determining internal consistency is Cronbach's alpha. Cronbach's alpha is a method for calculating reliability based on the association between variables. Results showed that Cronbach's alpha of all latent variables ranged between 0.599-0.811. This showed that all latent variable has high internal consistency as Cronbach's alpha is higher than 0.50 as recommended by (Fornell & Larcker, 1981).

The second criterion for evaluating the internal consistency of all latent variables is composite reliability. Composite reliability (CR) checks the internal accuracy of all variables using the outer loading. In CR, the constructs' accuracy is specified, while in AVE, the amount of variance attributed to the construct is estimated in relation to the amount due to measurement error. For each construct, composite reliability is measured and then compared with the cut-off value of 0.6 (Bagozzi & Yi, 1988). Results showed that the composite reliability of latent variable has high internal consistency as composite reliability is higher than 0.70 as recommended by (Arnold & Reynolds, 2003).

Convergent validity can be used to assess the association between all observed variables of the same variable. Average variance extracted (AVE) is used to determine convergent validity of latent variables.. Results showed that the convergent validity of all latent variables ranged between 0.551-0.911. Convergent validity was analyzed in terms of AVE, using a cutoff point of .50 (Pirson & Malhotra, 2011).

This showed that all latent variables have high convergent validity as AVE is higher than 0.50 thresholds. Results of convergent validity of each latent variable are presented in Table 1.

Discriminant validity determines the distinction between all latent variables. The AVE values were compared to the square of the correlation between the variables to determine discriminant validity. According to Fornell & Larcker (1981), an AVE that is higher than the coefficient of the correlation between factors provides evidence of discriminant validity.

Table 1. Results of Cronbach's Alpha, Composite Reliability and Convergent Validity

Construct	Cronbach's Alpha	Construct Reliability	Convergent Validity
E-logistics	0.811	0.904	0.911
Firm Performance	0.599	0.776	0.511

The results showed that the average extracted variance of the square root is greater than the correlations between latent variables. Results have been listed in the table 2.

Table 2. Discriminant Validity (Fornell-Larcker Criterion)

Construct	E-log	Firm-performance
E-logistics	0.808	
Firm Performance	-0.442	0.736

*The highlighted diagonal values shows the square root of AVE

Descriptive Statistics

E-logistics

The Table below depicts 475 responses of the respondents for the current study variable that is e-logistics. There are different reactions of investors that come out from this when they are opting to e-logistics. For the first item of the variable e-logistics 49 respondents strongly disagrees, 172 disagree, 145 respondents agree, 77 were strongly agreed, whereas 32 are neutral on this. For the second item of e-logistics 9 out of 475 respondents strongly disagree, 65 disagree, 215 agree, 77 strongly agree and 109 are neutral. The third item for e-logistics got 475 responses out of which 18 of the respondents strongly disagree, 95 disagree, 203 agree, 108 strongly agree, and 51 are neutral. The fourth item for e-logistics got 22 responses to strongly disagree responses out of 475, 156 disagree, 171 agree, 83 strongly agree and only 43 are neutral on this. The above table also shows the mean values of all the four items of anger variable representing the positive or negative responses of the respondents. The mean values against five items of anger are 3.06, 3.60, 3.61 and 3.29 respectively. All the mean values for e-logistics are positively indicating positive responses from the investors.

Table 3. Descriptive Statistics and Frequency Distribution with respect to e-logistics

Items	Item-wise Frequency and Descriptive Statistics (N=475)						
	SD	D	N	A	SA	Mean	Std. Dev.
e-log_1	49	172	32	145	77	3.06	1.315
e-log _2	9	65	109	215	77	3.60	.976
e-log _3	18	95	51	203	108	3.61	1.150
e-log _4	22	156	43	171	83	3.29	1.222

Note: SD is strongly disagree, D is disagree, N is neutral, A is agree and SA is strongly agree

Firm Performance

Table 4 below depicts 475 responses of the respondents for five items of the current study variable that is firm performance.. For the first item of the variable firm performance 55 respondents strongly disagrees, 155 disagree, 133 respondents agree, 46 were strongly agreed, whereas 86 are neutral on this. For the second item of firm performance 71 out of 475 respondents strongly disagree, 96 disagree, 206 agree, 58 strongly agree and 44 are neutral. The third item for firm performance got 475 responses out of which 72 of the respondents strongly disagree, 104 disagree, 171 agree, 54 strongly agree, and 74 are neutral. The fourth item for firm performance got 48 responses to strongly disagree responses out of 475, 81 disagree, 150 agree, 67 strongly agree and only 129 are neutral on this. For the fifth item of firm performance out of a total of 475 responses 43 strongly disagree, 76 disagree, 176 agree, 54 strongly agree and 126 were neutral. The above table also shows the mean values of all the five items of the firm performance variable representing the positive or negative responses of the respondents. The mean values against five items of firm performance are 2.92, 3.18, 3.07, 3.23, and 3.26 respectively. All the mean values for firm performance are positively indicating positive responses from the investors.

Table 4. Descriptive Statistics and Frequency Distribution with respect to firm performance

Items	Item-wise Frequency and Descriptive Statistics (N=475)						
	SD	D	N	A	SA	Mean	Std. Dev.
firm performance 1	55	155	86	133	46	2.92	1.205
firm performance2	71	96	44	206	58	3.18	1.302
firm performance3	72	104	74	171	54	3.07	1.280
firm performance4	48	81	129	150	67	3.23	1.186
firm performance5	43	76	126	176	54	3.26	1.133

Note: SD is strongly disagree, D is disagree, N is neutral, A is agree and SA is strongly agree.

Correlation Analysis

Table 5 below indicates the correlation matrix. As it can be seen from the correlation matrix, e-logistics carries a moderate association with firm performance.

Table 5. Correlation Analysis

Variable	PVCSR	Investment Decision
e-logistics	1	
Firm performance	.395**	1

The e-logistics is the exogenous and latent variable of this research which is denoted as "E-log". The e-logistics is measured through 4 items. The e-logistics was analyzed through these four items. E-logistics comprised on the mean score of four items and denoted as e-log.

In this study, the endogenous variable (dependent variable) was firm performance. Firm performance is the dependent variable of this research which is denoted as "Firm-Performance". The firm performance was measured through five items Outer loading of two items were lower than 0.5 that's why omitted. So, firm performance was analyzed through three items. Firm performance was analyzed through these three items. Firm performance comprised on the mean score of three items and denoted as "Firm-Performance".

Path Coefficient of Structural Model

Following are the research hypotheses that were tested through the structural model.

H_1: E-logistics have a significant impact on the firm performance.

In the hypothesis, it was hypothesized that e-logistics is significantly related with the firm performance. The P-Value is 0.002**;** since the P Value is less than $p < 0.05$ according to criterion the hypothesis is accepted. Results showed that $\beta = -0.157$, which displayed that e-logistics has a significant impact on firm performance.

Table 6: Testing of Structural Model

Structural Path	Estimate	T Score	P
e-logistics -> firm performance	-0.157**	2.871	0.002

Note: ** Represents significant at 1percent, whereas * represents significant at 5percent

IV. DISCUSSION AND CONCLUSIONS

The findings of the current study show that there exists a significant relationship between e-logistic and firm performance. From above results we concluded that there is positive relationship between the IV and DV. As discussed earlier H_1 is accepted this was showing the effect of e-logistics on firm performance. E-logistics was a vital component and a tool that the companies used to achieve optimal supply chain performance (Mwangi, 2013). A good logistics system activity brings benefits not only to service quality but also to company competitiveness (Yue, 2017). Previous researches show that e-transportation has a positive influence on supply chain management performance.. As a result of competitive environment, businesses adopt new ways to create a positive relationship, which will assist the company in achieving a competitive advantage, these activities emphasize on developing long-term relationships with existing customers, and to provide products and services to satisfy customers' needs, to reach their level of satisfaction. (Grigaite, 2011). This shows that when customer is satisfied they give positive response towards company performance which will affect supply chain management performance. So, previous research also supports our hypothesis. A firm's success is highly dependent on the ability to learn and adjusts through viable strategies to dynamic market conditions. The results indicate that firms who adopt

the e-coordination and e-logistics tools consequently would be able to learn quickly from their previous trading experiences and hence can maximize overall profits. In future research can be done on the other aspects of e-coordination such as inventory management and e-transportation.

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