Determinants of E-Logistic Customer Satisfaction: A Mediating Role of Information and Communication Technology (ICT)

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Abstract— In the recent decade, with the increase in e-logistic services, the problem of e-logistic customer satisfaction is raised. E-logistic services spread so rapidly worldwide which overlook the significant segment of customer satisfaction. Therefore, the prime objective of the current research study is to develop a comprehensive framework for e-logistics customer satisfaction. Various studies highlighted the area of e-logistic customer satisfaction, however, in a rare case, literature formally documented the problem of e-logistic customer satisfaction. Hence, less attention has been paid to the aspect of customer satisfaction in e-logistic. To address this gap, four hypotheses are proposed concerning the relationship of e-payment, e-traceability, website design with information communication technology (ICT) and e-logistic customer satisfaction. By using the convenience sampling technique, 500 questionnaires were distributed among the e-logistic users. The results of the current study found that e-payment, e-traceability, and website design has a significant positive relationship with ICT and ICT has a significant positive relationship with e-logistic customer satisfaction. This study is contributing to the body of knowledge by developing a comprehensive framework to solve various e-logistic problems. Hence, the current study is helpful for e-logistic companies to mitigate e-logistic customer satisfaction problems.

Keywords: E-logistic, e-payment, e-traceability, website design, information communication technology (ICT), customer satisfaction.

1. Introduction

In the current decade, with an increase in e-commerce-logistic services, the problem of e-logistic customer satisfaction is raised. E-commerce logistic services spread so rapidly worldwide which overlook the important segment of customer satisfaction. As satisfaction is the key to success for several businesses [1]. Various prior studies emphasized on logistic customer satisfaction and found that logistic customer satisfaction is one of the crucial areas [2], [3], [4], [5], [6], [7] [40]. However, most of the researchers could not introduce a comprehensive framework to satisfy the e-logistic customers.

Determining how best to deliver e-logistic services without sacrificing the overall quality is an ongoing challenge [8]. However, still e-logistic process struggling to mitigate the customer satisfaction problem. In the context of customer satisfaction, e-logistic goods payment is also one of the problematic areas. Even though various mechanisms and security measures have been designed to mitigate payment problems, however, many security challenges still exist [9], [10], [11]. Approximately 95% of customers are worried regarding privacy or security while using credit cards on the internet, and six out of ten respondents fear about credit card theft [12]. Therefore, payment of e-logistic goods is a key influencing area of customer satisfaction.

Furthermore, another problematic area in e-logistic customer satisfaction is related to traceability. E-logistic goods status is important for customer satisfaction. Various prior studies emphasized on traceability based quality control, which has mainly stressed on the functions and structure of information tracing systems [13], [14]. But a proper system of traceability is not documented by previous studies. Nevertheless, web site design has a significant influence on customer satisfaction [15], [7]. Because online business process experience depends heavily on the website information to compensate for the lack of physical contact with the customer, that is why online information quality becomes more crucial [16].

However, it is quite possible to mitigate these problems through proper information and communication technology (ICT) process. In recent years, with extensive use of the internet technology, customer satisfaction particularly in logistics industry has drawn close attention from practitioners as well as academics [17]. Most of the logistic companies are now emphasizing on information and communication technology (ICT). Poor infrastructure and low investment found in ICT which effect on customized logistics provision [18], [19]. ICT has the ability to provide better payment technology, traceability, and a better website design to enhance e-logistic customer satisfaction. Hence,

ICT is playing a mediating role between the relationship of e-logistic customer satisfaction with payment, traceability and website design.

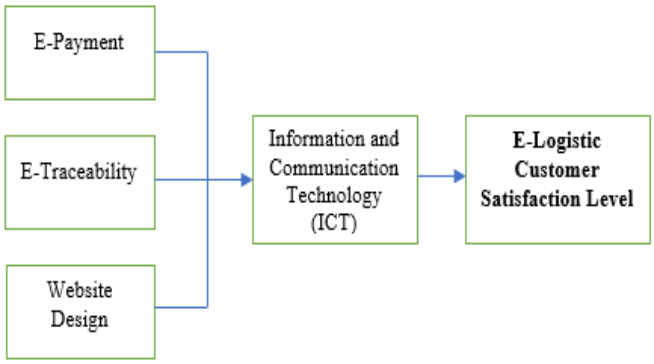

Fig. 1: Theoretical framework

The prime objective of the current research study is to develop a comprehensive framework for e-logistics customer satisfaction in Pakistan. As, e-commerce market of Pakistan is a very volatile and logistic industry facing various problems [20]. Moreover, the logistic industry of Pakistan is lacking as compared to other developing countries such as China, India, and Malaysia.

Hence, the current study contributing to the body of knowledge by developing a research framework to solve various e-logistic problems, particularly in Pakistan. This study highlighted the neglected area of information and communication technology (ICT) which is key to enhance customer satisfaction level, especially in the e-logistic market of Pakistan. Therefore, the current study is quite helpful for practitioners and researchers to mitigate e-logistic problems.

2. Literature Review

Various modes of e-commerce businesses (e-logistic) are operating in Pakistan, such as online retail store, online service agency, a virtual bookshop, and manufacturing industries: where almost hundred percent transactions made through the internet, from product selection to final bill payment [20]. Moreover, even NGO's, educational industry and banking industries are also trying to adopt e-commerce mode instead of traditional mode. Hence, in the whole process, the role of ICT is more crucial. Because, information and communication technology (ICT) has great importance in the promotion of logistics services [21]. Thus, it has significant contribution to enhanc e-logistic customer satisfaction level.

2.1 E-Payment, Information Communication Technology (ICT) and E-logistic Customer Satisfaction

E-payment is one of the elements of ICT because e-payment system requires ICT. E-payment has various features such as security, convenience, acceptability, efficiency and privacy [9], [22], [11], [23], [24], which increase the satisfaction level of customers. ICT is a system which allows e-logistics companies to make financial transactions with other businesses; it is called the business to business (B2B) commerce. It also facilitates other customers to make payments such as business to consumer (B2C).

E-payment has the ability to retain the customer by increasing the satisfaction level [25], [24]. On the other hand, transportation management (TM) is a type of ICT [26] and e-payment is one of the functions of transportation management [22]. Thus, indirectly e-payment is also one of the type of ICT.

Therefore, e-payment is linked with ICT directly and indirectly. As process of e-payment needs ICT to make financial transactions. It means that ICT facilitates e-payment system which increases the satisfaction level of e-logistic customer. Thus, a relationship exists between e-payment and ICT. Hence, from above discussion it is hypothesized that;

H1: There is a significant relationship between e-payment and ICT

2.2 E-Traceability, Information Communication Technology (ICT) and E-logistic Customer Satisfaction

Traceability is the ability to verify the history, location, or application of an item using documented record identification. According to ISO (9001;2000) traceability can be defined as, the ability to trace history, tracking both status of the product as well as the location data records. As the internet is a major source of traceability in e-logistic, hence, it requires a better ICT to trace e-logistic goods.

Many companies have focused on information technology (IT) to enhance tracking capability within e-logistic [27]. Because, in the e-logistic system, most transections performed through the internet and there is minor face to face communication, that is why traceability is essential to satisfy the customer.

Traceability is an important service in business to business (B2B) and business to consumer (B2C) which is facilitated by the help of ICT. Transportation management (TM) has different functions such as payment and traceability [28], [29]. According to [26], transportation management (TM) is one of the types of ICT. Therefore, traceability and ICT have a relationship with each other. Therefore, it is hypothesized that;

H2: There is a significant relationship between e-traceability and ICT

2.3 Website Design, Information Communication Technology (ICT) and E-logistic Customer Satisfaction

A systematic way to manage information is key to increase the satisfaction level of customer. It is important for electronic businesses (e-logistics) to design better websites with all essential services and information's to gain trust from customers [30]. According to [31, 41, 42], appearance of website and information affect customer satisfaction.
However, ICT is vital to manage information on the website. ICT creates a bridge between merchant and customer. It combines the information of merchant and customers on one platform to facilitate both parties. Website design is a source of customer perception about the service quality [30]. Therefore, quality of information, system and satisfaction level always influence the use of e-commerce [32].

ICT enhances the products as well as services of companies and allow new forms of partnership between different consumers and suppliers through various websites. It is mandatory for e-logistic firms to develop not only useful and secure but also trustworthy with respect to privacy as well as security [33], [34].

Furthermore, according to [35], approximately 67% customers decided to terminate their transaction when asked to provide credit card details and personal information. Therefore, web design is critical to enhance the satisfaction level of e-logistic customers. However, ICT is playing a fundamental role to develop a website. Thus, it is hypothesized that;

H3: There is a significant relationship between website design and ICT

Finally, as discussed above, ICT has a relationship with e-logistic customer satisfaction. Hence;

H4: There is a significant relationship between ICT and e-logistic customer satisfaction

3. Methodolgy

3.1 Research Design

The current research study adopted a descriptive research design and followed a quantitative research technique. As quantitative research technique is one of the best technique to accept or reject the hypothesis [36]. A convenient sampling method was used to collect the data from all over the Pakistan for one time only. Therefore, it is a cross sectional research study.

3.2 Sample and Procedures

The sample consists of e-logistic users in Pakistan. Data were collected by using questionnaire and questionnaires were distributed by using convenience sampling technique. The sample size was selected by using the series of [37]. According to him less than 50 sample size will be considered a weaker sample, a sample size of 100 will be considered as weak sample, 200 will be sufficient, 300 will be good, 500 sample sizes will be very good and sample size of 1000 will be considered as outstanding. Hence, by following the [37], 500 sample size was selected.

Five hundred (500) questionnaires were distributed among the users of e-logistic. Out of five hundred (500), four hundred and fifty (450) responses were received. The response rate was 90%, which is quite reasonable to run the analysis.

3.3 Measurement

Measurement scale was divided into two sections. The first section of the questionnaire was comprised of different personal and demographic variables. This section collected the respondent's information regarding gender, age, income, education, and status. The second section was comprised of key variables of the study, including e-payment, e-traceability, website design, information communication technology (ICT) and e-logistic customer satisfaction. This section of the study used previous literature and already used studies. However, the five-point Likert scale was used for the measurement of all items ranging from "Strongly Disagree (1)" to "Strongly Agree (5).

3.4 Statistical Analysis Techniques

The hypothesized model of the current research study was tested by using the SPSS version 20. In this process, to analyze the reliability of the instrument, Cronbach's alpha(α) was identified. The strength of analysis was examined through correlation analysis. Furthermore, the relationship of dependent and independent variable was examined through regression analysis.

3.5 Reliability

The results of reliability analysis of the current study indicate that all the 26 items were sufficiently reliable to measure the opinions and views of potential respondents. The Reliability tests are shown in below Table 3.1.

Table 3.1 Reliability of Measurements Instrument

Scales	Items	Cronbach Alpha
E-Payment	5	0.862
E-Traceability	5	0.714
Website Design	4	0.846
ICT	6	0.874
E-Logistic Customer Satisfaction	6	0.850

The above Table 3.1 demonstrates the reliability of each dimension of the questionnaire. According to [38], Cronbach's alpha(α) Alpha values should be equal to or more than 0.7 for all scales. In the current study, Cronbach's alpha(α) is more than recommended value, as shown in Table 3.1. Therefore, based on above results, all the items of each variable were finalized for the survey.

4. Results and Analysis

4.1 Profile of the Respondents

Personal and demographic information regarding gender, age, income, education level, status is given in below Table 4.1.

Table 4.1 Profile of the Respondents

Variables	Category	Frequency	Percentage
Gender	Male	360	80
	Female	90	20
Age	15-20 Years	20	4.4
	20-25 Years	45	10
	25-30 Years	110	24.4
	30-35 Years	140	31.1
	35-40 Years	93	20.6
	Above 45 Years	42	9.3
Income (PKR)	Below 30,000	5	1.1
	30,000-40,000	13	2.8
	40,000-50,000	37	8.2
	50,000-60,000	91	20.2
	60,000-70,000	130	28.8
	Above-70,000	174	38.6
Education	Matriculation	15	3.3
	Intermediate	33	7.3
	Bachelor	106	23.5
	Master	173	38.4
	M-Phil	86	19.1
	PhD	37	8.2
Status	Student	53	11.7
	Employed	149	33.1
	Businessman	220	48.8
	Unemployed	28	6.2

4.2 Normality Test

Skewness and Kurtosis values are considered to examine the normality of data. According to [39], values of skewness and kurtosis should be within ± 1.0 and ± 3.00 respectively. By the help of normality analysis, it is found that data is normally distributed because all the values are lays in the range of recommended value.

4.3 Correlation Analysis

Correlation analysis of the current study found that e-payment, traceability and website design has a moderate correlation, as correlation values are 0.5, 0.45 and 0.4 respectively. However, information communication technology (ICT) has high correlation with a value 0.6. Moreover, all the variables have a significant positive value below .05. Therefore, all variables have a significant positive correlation.

4.4 Multiple Regression Analysis

Regression analysis is used to examine the relationship between dependent variable and independent variables. To examine the relationship between variables, significant value ($p>0.01$) and beta value are considered.

4.5 Hypothesis Testing

4.5.1 E-Payment and Information Communication Technology (ICT)

According to the results of the current study, both variable e-payment and information communication technology (ICT) has a significant positive relationship with each other. As the beta value is $\beta=0.458$ and $p<0.01$. It means that e-payment is contributing more than 45%. Therefore, H1 is accepted.

4.5.2 E-Traceability and Information Communication Technology (ICT)

The results of current research study found that there is a significant positive relationship between e-traceability and information communication technology (ICT) with $\beta=0.339$ and significance value $p<0.01$. It means that e-traceability is contributing more than 33%. Thus, results are supporting H2.

4.5.3 Website Design and Information Communication Technology (ICT)

Analysis of the current study found a significant positive relationship between website design and information communication technology (ICT). Beta value is showing that website design contributing 20%, as beta value is $\beta=0.20$ and significance value is $p<0.01$. Hence, the results of the current study validate H3.

4.5.4 Information Communication Technology (ICT) and E-Logistic Customer Satisfaction

Finally, the regression results of the current research study validate H4. There is a significant positive relationship between information communication technology (ICT) and e-logistic customer satisfaction. The results showing that $\beta=0.70$ and $p<0.01$. It demonstrates that information communication technology (ICT) leads e-logistic customers satisfaction almost 70%.

Table 4.1 summarizes the regression results of the current research study.

Table 4.2 Regression Results

Hypothesis	Model Variables			Estimate	S.E.	C.R.	P	Results
H1	ICT	←	EP	0.458	0.075	6.106	***	**Supported**
H2	ICT	←	ET	0.339	0.010	33.90	***	**Supported**
H3	ICT	←	WD	0.20	0.080	2.500	***	**Supported**
H4	ELCS	←	ICT	0.70	0.067	10.44	***	**Supported**

Where,

EP = E-Payment, ET = E-traceability, WD = Website Design, ICT = Information and Communication Technology, ELCS = E-Logistic customer satisfaction

4.6 Research Findings

The literature demonstrates that there are many variables influencing e-logistic customer satisfaction. However, the most crucial variables are, e-payment, e-traceability, website design and information communication technology (ICT).

In the case of e-payment and information communication technology (ICT), significance value is 0.00 (p=0.00), showing that, there is a significant relationship between e-payment and information communication technology (ICT). However, the beta estimate is 0.458 (β=0.458) which indicating a 45.85% contribution of e-payment. However, it is a positive relationship. Therefore, there is a significant positive relationship between e-payment and information communication technology (ICT). It demonstrates that increase in one variable will also increase in another variable with the same direction.

In the case of e-traceability and information communication technology (ICT), significance value is 0.01 (p=0.01), showing a significant relationship between e-traceability and information communication technology (ICT) with a beta estimate is equal to 0.339 (β=0.339) which indicating 33.9% contribution of e-traceability. In this case, the beta value is positive which showing a positive relationship. Thus, there is a significant positive relationship between e-traceability and information communication technology (ICT). Furthermore, it is showing that increase in one variable will also increase in another variable with the same direction.

In the case of website design and information communication technology (ICT), significance value is 0.00 (p=0.00), showing that, there is a significant relationship between website design and information communication technology (ICT). However, the influence of website design is quite low as compared to the other two factors, as the beta estimate is 0.20 (β=0.20), indicating 20% change. However, it is a positive relationship. Therefore, there is a significant positive relationship between website design and information communication technology (ICT). Thus, increase or decrease in one variable will also cause to increase or decrease in another variable.

Finally, in the case of information communication technology (ICT) and e-logistic customer satisfaction level, significance value is 0.00 (p=0.00), showing that, there is a significant relationship between information communication technology (ICT) and e-logistic customer satisfaction level. However, beta estimate is 0.70 (β=0.70), which indicated a 70% contribution of information communication technology (ICT) to increase the e-logistic customer satisfaction level. However, it is a positive relationship. Therefore, there is a significant positive relationship between information communication technology (ICT) and e-logistic customer satisfaction level. It demonstrates that increase in information communication technology (ICT) will enhance the e-logistic customer satisfaction level.

5. Conclusion

During this research, it is observed that e-logistic is one of the vital element for the growth of the economy. It is most significant for the economy of Pakistan. In order to develop a good e-logistic system, it is mandatory to enhance e-logistic customer satisfaction level, which is a problematic area in the industry of logistics. However, the e-logistic system in Pakistan facing different problems related to e-payment, e-traceability, and website design. According to the findings of the current study, these problems can be mitigated by improving the information communication technology (ICT). Information communication technology (ICT) is behaving like a bridge between e-payment, e-traceability, website design and e-logistics customers. Information communication technology (ICT) provides the facility to make payment electronically with no time, more security as well as privacy which increases the satisfaction level of customers. It is quite possible to reduce traceability problems through the better information communication technology (ICT) system. As it provides the facility to investigate the status of e-logistic goods by the use of the internet. Nevertheless, information communication technology (ICT) is helpful to manage information on the website of the e-logistic company. By the help of information communication technology (ICT), it is possible to solve website related problems through providing all information on website and reduce the complexity of information. Hence, information communication technology (ICT) is one of the promising system to mitigate different problems and to increase e-logistic customer satisfaction level.

It is recommended to the e-logistic companies of Pakistan to invest more in information communication technology (ICT). The introduction of latest information communication technology (ICT) can increase the satisfaction of e-logistic customers.

Future research on this context can be more beneficial for e-logistic companies of Pakistan. The current research study is limited to three problem linked areas, such as e-payment, e-traceability, and website design. Hence, this research study can be improved by including other problematic areas of e-logistics, such as distribution rate, staff service quality and transit time of e-logistic goods.

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