

Can Perceived Ease of Use Improve M-Commerce Adoption? Role of Mobile Network Service Quality

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ABSTRACT

In India, the e-commerce sector is rising at an enormous pace, but an even larger share has been in the hands of offline retailers until now. A unique type of consumer behaviour has been seen because of the simple accessibility of the internet, where the customer searches for products and its information on the internet and then buys them offline. With this, the researcher is here analysing the mediating effect of perceived ease of use on adoption of m-commerce services with the usage of advanced mobile network generations. Data were collected from 616 respondents by making stratas of respondents in such a way that different telecom users who are doing online transactions were taken. Data were analysed by using structural equation modeling technique, and it was examined that the mediator (perceived ease of use) has a great impact on m-commerce adoption.

KEYWORDS

Convenience, M-Commerce, Network, Perceived Ease of Use, SEM, Service Quality

1. INTRODUCTION

M-commerce has evolved from a trend to reality. Customer demand trends and technological advancement have mitigated challenges and narrowed the line between offline and online trade. E-commerce is part of our shopping habits today, from purchasing groceries to appliances (Tam, Loureiro & Oliveira, 2019). Nowadays, online retailers are using the Internet to convey, communicate, and disseminate information, sell the product, receive feedback, and conduct satisfactory customer surveys. On the other hand, customers used the Internet to purchase the product online and compare prices, product features, and after-sales service facilities that they would receive if they purchased the product from a particular store (Sarkar, Mukherjee & Lahiri, 2020).

Furthermore, as customers have become more tech-savvy, so e-commerce executives need to comprehensively consider the needs and factors of customers that affect their preference to choose and shop on e-commerce websites. There are usually two points of understanding the behaviour of online consumption. The first phase involves how to persuade customers to shop online, and the second phase is to encourage them to buy back, which is vital to the success of an M-commerce portal (Chiu & Cho, 2019).

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Developing countries have seen an incredible and impressive increase in infrastructure production for telecommunications technology over the past decade. In terms of improving access to wireless connectivity, which has a tremendous effect on the lives of billions of people worldwide, development is remarkable. Internet access has not only improved the simplicity and speed of communication, but has also provided marketers with the ability to redefine the art of communicating with potential consumers. A good mobile telecommunications service network is also favourably correlated with a country's economic growth (Yadav, Sharma & Tarhini, 2016). Data services are insightfully changing our lives. Anywhere and anytime, cellular providers make internet connectivity available. This enables instant access to social networks, intranet employment, shopping, internet browsing, entertainment, etc. Cellular companies are striving to improve service and provide their users with a better experience. The growth and advancement of cellular broadband services have been enabled by research and development in different areas of cellular technology (Alomary & Kostanic, 2013).

This study investigates the impact of mobile network service quality on the adoption of mobile commerce services with the help of one mediator, i.e. perceived ease of use (PEOU). First, we will examine whether the determinants of the mobile network service quality, which are: speed, trust, satisfaction, security, privacy, and cost, have an impact on M-commerce services or not. Second, we will examine that, with the mediator's help, i.e., perceived ease of use (PEOU), its adoption will increase or not. Perceived ease of use also has their determinants that are: convenience, and website quality.

2. LITERATURE REVIEW

2.1 Mobile Network Service Quality

The mobile network industry can be considered a typical service industry. In a world country like India, where the market is increasing dramatically, the rapidly evolving characteristics of both network networks and handsets and the restrictions imposed by regulators make the market more challenging and unpredictable. In such a scenario, estimating customer satisfaction poses real challenges for researchers. Customer satisfaction, however, has been hypothesized by many researchers as a result of perceived service quality. Therefore, it is important to estimate the perceived quality of service to assess customer satisfaction (Chakraborty & Sengupta, 2013). The conventional word of mouth (WOM) type has become obsolete and converted into electronic word of mouth due to technological advances (eWOM). eWOM is the type of online open comments about a product or business made by potential, current, or former customers. Meanwhile, the social network is a new forum that allows users to share views and experiences with their friends and acquaintances about goods or services in an online platform (Abedi, Ghorbanzadeh & Rahehagh, 2020).

There are some determinants of mobile network service quality which are covered in this study are elaborated with their supporting studies in the following table:

2.2 Perceived Ease of Use

The Technology Acceptance Model (TAM) is one of the most popular model used by researchers in the study of technology adoption by individuals. TAM indicated that it is possible to use perceived ease of use to predict the attitude towards using new technology, which in turn influences the behavioral intention actually to use the actual device. The perceived ease of use is "the extent to which the prospective adopter expects the adopted new technology to be a free effort to transfer and use it" (Davis, 1989). Therefore, if users believe that online transactions are easy to use and hustle-free, they would be more likely to use that system (Chong, Ooi, Lin & Tan, 2010). A key factor in the technology acceptance model is perceived ease of use; it is the degree to which a person assumes that using a specific technology will be free of cognitive effort. An e-service that appears to be easy to read, understand, and use can reduce customer confusion and overall risk during pre-purchase

Table 1. Literature Review of determinants of mobile network service quality

Variable	Authors with year	Findings
Speed	Frimpon & Adaku (2018)	Speed refers to the distribution rate of the distributed service, which is the data in this case. Speed is an important metric for customers to determine their broadband choices and decide how they plan to use the Internet. Technically, speed is divided into two categories i.e., download speed and upload speed.
Trust	Tam, Loureiro & Oliveira (2020)	To research the role of trust in e-commerce and its effect on individual performance outcomes, we use total trust, one dimension calculated by these three trust dimensions: competence, benevolence and integrity. Trust is also depends upon impulse buying and previous customers' review.
Satisfaction	Iqbal (2020)	Customer satisfaction is derived from quality service, contributing to long-term customer loyalty. If the service quality is satisfactory or meets customers' expectations, then customers become loyal towards that particular portal.
Security	Ho & Oh (2009)	Online customers cannot physically verify the quality of goods in advance or to test the safety and security of personal information (credit card numbers, ID numbers, etc.) sent through the Internet. The fear of customers would repeatedly be generated without the existence of visible trustworthiness criteria for consumers to differentiate the legitimacy and reputation of e-vendors. For this purpose, e-security seal programmes have been introduced, thus creating standards or principles that allow consumers to differentiate trustworthy e-sellers from others.
Privacy	Zhu, Srivastava & Sutanto (2020)	Privacy of information may be described as the right of an individual to monitor the circumstances under which his or her personal information is accessed and used. Where the Internet is concerned, the ability of the user to monitor how their knowledge is acquired, disseminated and used has been diminished.
Cost	Chakraborty & Sengupta (2013)	Providers of mobile networks should be expected to provide good voice quality, the ability to connect easily to other networks and good service quality at a fair price.

assessments (Featherman, Miyazaki & Sprott, 2010). In TAM, ease of use has a direct effect on behavioural intention to use.

Furthermore, the perceived ease of use also has a direct impact on usability and approach. TAM generally interprets and predicts individual acceptance of information technology (Yeh & Li., 2009). Researchers worldwide have turned their attention to internet banking and e-commerce and similar technology to adopt new technologies. Technology Acceptance Model (TAM) and its later versions are the most commonly used models that helped the users to move their intention towards new technologies acceptance (Goyal, Maity, Thakur & Srivastava.,2013). TAM is founded on the premise that people's perceptions of usefulness and ease of use influence how technology is implemented,

but the authors expand their distribution into long and near-term perceptions (Snowden, Spafford, Michaelides & Hopkins., 2006).

In this study, two dimensions of perceived ease of use (PEOU) have also taken and these were convenience and website quality.

Table 2. Literature Review of determinants of Perceived Ease of Use

Variable	Authors with Year	Supported Findings
Convenience	Jiang, Yang & Jun (2013)	It was identified that convenience has five determinants that play an important role: ease access, search, evaluation, transaction, and possession/post-purchase convenience.
Website Quality	Akram, Hui, Khan, Tanveer, Mehmood & Ahmad (2018)	The quality of the website has a positive effect on the Online Impulse Buying Behaviour (OIBB); second, sales promotion greatly affects the OIBB and serves as a good moderator in the relationship between the quality of the website and the purchasing of online impulses. Third, the use of credit cards has a positive impact on online impulse purchases. In addition, the use of credit cards strengthens the relationship between the quality of websites and the online impulse purchasing.

2.3 M-commerce Adoption

The advancement of 4th generation mobile telecommunications technologies in recent years has fueled the rapid expansion of mobile commerce (M-commerce) worldwide. M-commerce uses wireless devices and data connections to conduct transactions that result in the exchange of value for information, services, and goods because of its effect on businesses worldwide, M-commerce has attracted the attention of everyone, offering consumers faster access than e-commerce (Marriot, Williams & Dwivedi, 2017; Sun & Chi, 2019). M-commerce is an extension of the e-commerce in which business activities are carried out in a wireless environment via mobile devices. (Tarhini, Alalwan, Shammout & Al-Badi, 2019).

3. RESEARCH METHODOLOGY

3.1 Sampling

Data were collected from those who are doing online transactions so that different telecom users were included by using stratified random sampling (example: Airtel, Vodafone Idea, Reliance Jio, and Other). In others BSNL users were taken. For each network users, stratas were constructed. Data were collected through online social media platforms. Duplicacy of data were eliminated by doing proper screening of repeat email addresses and then removed them. At the beginning of the survey, we have

one data-item (Are you doing any type of online monetary transaction from your mobile devices?). If any respondent tick “NO” that person was excluded from the study. In this way, a questionnaire was sent to 1000 persons only 730 were responded. But from those 730, only 616 respondents were taken as only 616 persons were those do are doing monetary transaction from their mobile devices.

3.2 Sample Size

According to Hair et al., 2006, researcher can take the sample size according to data-items in the study. As in this study, there are 35 data-items of three variables (mobile network service quality, PEOU, and M-commerce adoption), do ten times of it, the number we obtained is the minimum size of the study. So, here in this research, 350 is the minimum sample size. But, for more accuracy of the study, researcher here took data from 616 respondents. During the initial phase when researcher did a pilot testing, a questionnaire was sent to 130 respondents, of whom 121 responded. A pilot investigation was conducted in the preliminary stage to examine the accuracy of the research instrument and was carried out on a small number of participants who were part of the sampling universe. At that time, data were collected from those online customers who were doing job in the telecom sector and also doing online transactions from their mobile devices as they have proper knowledge about the service quality of the mobile network. So, after doing the pilot study 2 data-items were removed from the study, and these data-items were:

- Extra charges for delivery makes you think not to order online next time.
- Lack of touch and feel facility in M-commerce gives you a negative feeling towards online buying.

Among respondents, 49% of respondents were female, and 51% were male. Stratas of different telecom users were shown in the following table:

3.2 Conceptual Framework

Table 3. Stratas of users of mobile network

Telecom Operator	Airtel	Vodafone Idea	Reliance Jio	Other (BSNL)
Number of Users	257	132	218	9

3.3 Hypotheses Formulated

Once developing the conceptual framework, these hypotheses were formulated:

H_{01} : Mobile network service quality not positively influences perceived ease of use.

H_{02} : Perceived ease of use not positively influences M-commerce adoption.

3.4 Reliability Statistics

The most prevalent method for estimating the reliability value is the Cronbach Alpha method. This informs the objects’ relationship and says whether or not they belong to the same domain. If the value of the Cronbach’s alpha exceeds 0.70 for the questionnaire, this indicates that the items have strong internal consistency (Gliem & Gliem, 2003).

Figure 1. Conceptual Framework of the study

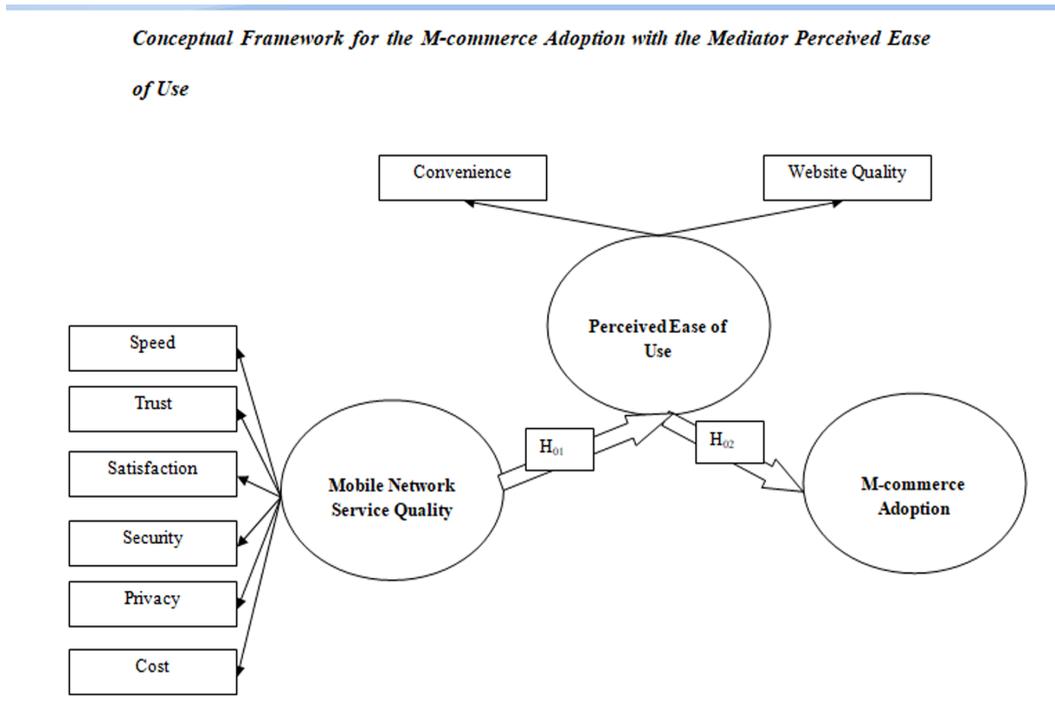


Table 4. Table showing reliability statistics

Cronbach's Alpha	Number of Items
.944	35

4. RESULTS

Descriptive Demographic Details

Intrinsic Results

Data were gathered and analysed using structural equation modeling (SEM), a multivariate second-generation method for investigating causal models that comprised an estimate of the two causal model components: the measurement and the structural models, to test the proposed hypotheses. In recent years, such analysis methods have been widely used. AMOS Graphics software was used in our research to test the measurement and the structural models (Hsu & Lin, 2020). In CFA, we are analysing how reliable the observed variables are about the latent constructs, which is represented by squared multiple correlations (SMC), and SEM model is used for determining how much of the variance is accounted for by endogenous variables (Schreiber et al., 2006).

Measurement Model

Before testing the structural model, the measurement model analysis is used to ensure that the scales used accurately represent the latent constructs. The scales were tested for three latent constructs

Table 5. Demographic Details of Respondents

Measure	Items	Frequency
Gender	Male	317
	Female	299
Age	16 to 25	239
	26 to 35	285
	36 to 45	54
	More than 45	38
Educational Qualification	Intermediate	77
	Graduate	168
	Post-Graduate	305
	Others	66
M-commerce Platform Users	Flipkart	252
	Amazon	225
	Myntra	78
	Snapdeal	31
	Meesho	14
	LimeRoad	16

to ensure that they were reliable and that the hypotheses test results could be supported by valid measurements (Xiao, 2016). The measurement model was shown as follows:

The fitness measures of the measurement model are shown in the following table:

The resulting χ^2 fit statistic of the three constructs model was 1,924.760 with 484 degrees of freedom ($p < .05$). The CFI, GFI, AGFI, NFI, AMSEA and RMR were .902, .829, .802, .874, .070, and .079 respectively. All factors were highly significant ($p < .05$). All fitness measurements were acceptable. As a result, all of the measures indicated that the model fits the data as all the values are under the acceptable range of fitness (Byrne., 2016).

Assessing the Convergent Validity

Convergent validity refers to the degree to which responses to a test or instrument have a close correlation with responses to other tests or instruments that are conceptually identical. To determine convergent validity, we need to know the Average Variance Extracted (AVE) value. It is a measure of the amount of variance reported by a construct in comparison to the amount of variance due to measurement error. An AVE value must be 0.5 or greater than 0.5 (Hair et al, 2019).

Structural Model

This SEM model investigates that the mobile network service quality and PEOU have an immense impact on M-commerce service adoption. Their factor loadings are seen in the figure above, which demonstrates that they have a positive impact on M-commerce adoption as most of the factor loadings demonstrates a good correlation. Let's take a look at the following figure for a brief view of the direct and indirect values of the path.

When we calculate the value of the direct path coefficient, it is .44 and if we see the indirect path coefficient, it is (.77*.91), i.e., .70. It demonstrates that the mediator (perceived ease of use) has an important role in the relationship between the mobile network service quality and the adoption of M-commerce services. The researchers used the full mediation model (their proposed model) in this study because a buyer is unlikely to adopt M-commerce services unless they demonstrate an acceptable level of perceived ease of use in online transactions (e.g., convenience and website quality). As a result, perceived ease of use completely mediates the effects of mobile network service quality components on M-commerce adoption. The mediation is used because the inference of mediation in

Figure 2. Measurement Model of the Study

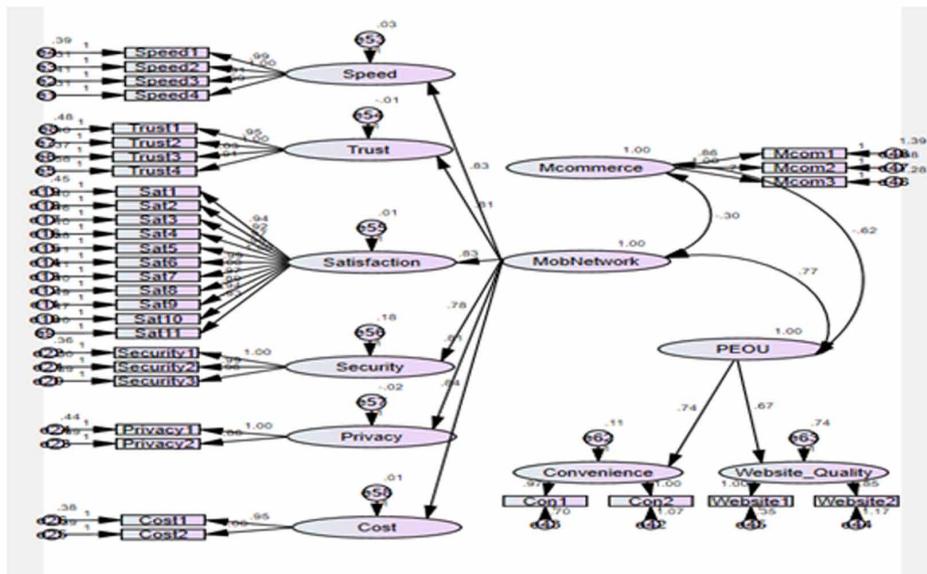


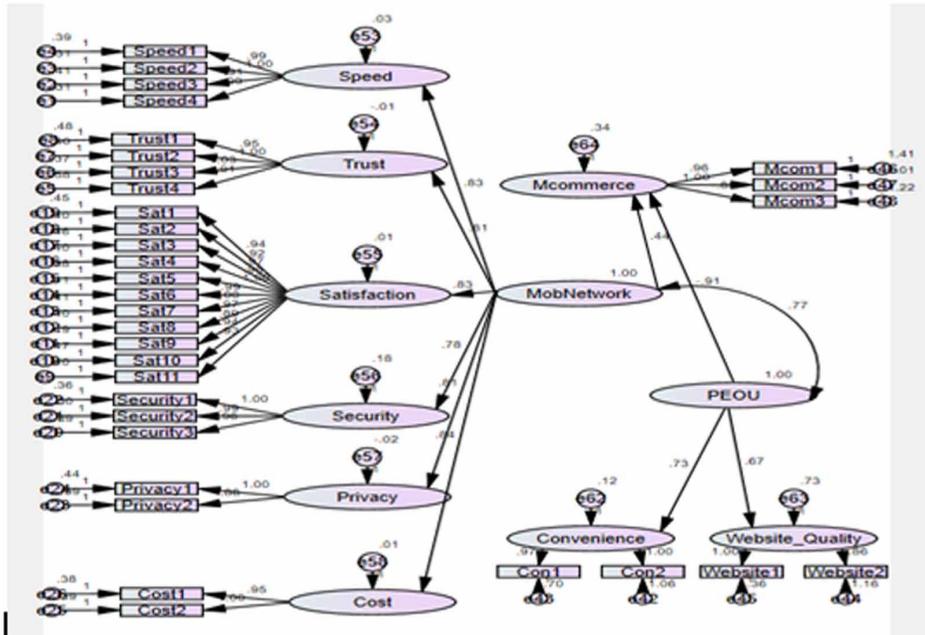
Table 6. Model fit statistics of measurement model

Measures	Recommended Criteria	Obtained Value	Suggested by Authors
CMIN/df	<3 good; <5 acceptable	3.947	Barbara M. Byrne., (2016); Hair et al., (1998)
GFI	Value close to 1	.829	
AGFI	Value near to 1	.802	
NFI	Value near to 1	.874	
CFI	Value close to 1	.902	
RMR	Less than .08	.079	
RMSEA	.05-.08 good	.070	

Table 7. Table showing AVE values

Latent Variables	Average Variance Extracted Value
Mobile Network Service Quality	0.68676
Perceived Ease of Use	0.5198
M-commerce Adoption	0.580209

Figure 3. SEM Model of the Study



SCM is known as causal mediation analysis. It is based on the mediation formula which was given by Pearl (2014) that it enables the interaction between the causal and the mediator variable. Secondly, he defines mediation consistently for linear and nonlinear models, as well as for continuous versus binary mediators or outcomes (Klien, 2016).

The values of their SEM models are illustrated in the following table:

Regression Weights

The above table depicts that p-values of both the hypotheses are significant as both are less than .005, which interprets that mobile network service quality positively influences perceived ease of use and perceived ease of use also positively influences the adoption of M-commerce services. It means that H_{01} and H_{02} both are rejected.

5. CONCLUSION

This study was conducted to provide a deep understanding of the key factors that could form the intention of customers to accept M-commerce. One of the main determinants of online business success is the perceived online shopping comfort of consumers. If customers feel convenient to use any M-commerce portal and if the website is user-friendly, then customers are inclined towards those m-portals.

Mobile technology is increasingly appealing because it provides versatile, ubiquitous access to the Internet, transforming conventional electronic commerce (e-commerce) into M-commerce. M-commerce has unique characteristics that provide customers with values that are not available in conventional wired e-commerce, including usability, customization, identity, and perceived enjoyment. Mobile devices have become a marketing tool with great advertising potential, encouraging user interactivity and conducting via purchases. The spread of mobile telephony worldwide, the steady

Figure 4. Direct and Indirect Path Coefficient Value of the Variables

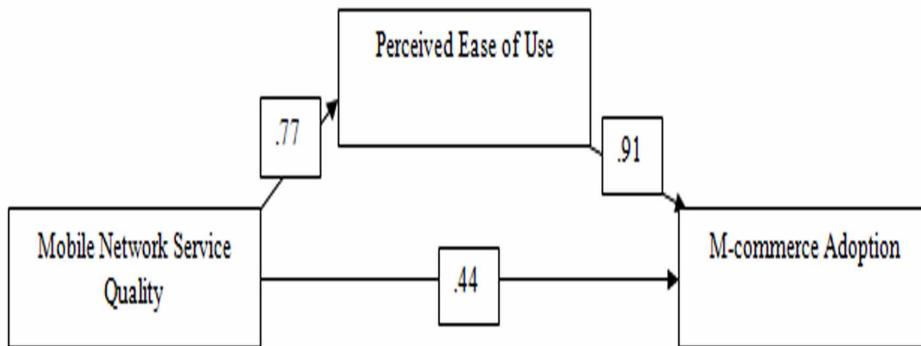


Table 8. Model fit statistics values of the structural model

Measures	Recommended Criteria	Obtained Value	Suggested by Authors
CMIN/df	<3 good; <5 acceptable	3.977	Barbara M. Byrne., (2016); Hair et al., (1998)
GFI	Value close to 1	.830	
AGFI	Value near to 1	.803	
NFI	Value near to 1	.874	
CFI	Value close to 1	.903	
RMR	Less than .08	.077	
RMSEA	.05-.08 good	.070	

The CMIN/df value is 3.977. The CFI, GFI, AGFI, NFI, RMSEA and RMR values were .903, .830, .803, .874, .070, and .077 respectively. All factors were highly significant ($p < .05$). All values are within the appropriate range that interprets the SEM results as acceptable for the model or good results indicator (Byrne., 2016).

Table 9. Regression weights table showing p-values

	Estimate SE C.R. P
MobileNetworkServiceQuality to PerceivedEaseofUse	.772 .037 20.770 ***
PerceivedEaseofUse to Mcommerce	-.625 .054 -11.650 ***

*** $p < 0.001$; S.E means Standard Error; whereas C.R means Critical Ratio

rise in the number of mobile users worldwide, and a projection for the future of m-commerce are evidence of its marketing appeal in both academic and business contexts.

To meet revenue targets, managers of M-service providers are constantly under pressure to distinguish their offerings from those of their rivals as today customers are more up-to-date towards new technology and the service quality aspects. The companies who give better services at low cost

will be inclined towards those companies as today they have lots of options. Most of the customers prefer Flipkart and Amazon M-commerce portal for doing their online transactions.

6. IMPLICATIONS FOR RESEARCH

The rapid expansion of global e-commerce initiatives reflects its appealing benefits, which include improved government performance, lower cost structure, greater flexibility and range of services, greater transparency, greater accountability, and faster transactions. In developing countries, the growth of information and communication technologies, or e-commerce, is significant.

There is substantial growth in information and technology, or rather, in e-commerce. For the success of e-commerce, technological efficiency is essential. Human, economic, and other problems, however, also need to be taken into account. In most nations, the current e-commerce situation happens to be “stay organized for the situation.” Evaluating the current situation reveals opportunities for organizations to take seriously to survive the effects of globalization and market opening.

Today’s financial firms can earn a fair living by embracing the pioneered practices by themselves or others in electronic commerce. They should, just as importantly, provide innovative value-added services to promote electronic commerce, just as their predecessors did in the emergence of modern commerce some centuries ago. They need to get out of their rent looking for attitude, speculative habit, and the mind-set of doing more of the same to do so, i.e., less of imaginary rocket science mathematics, but more of an in-depth understanding of how the supply chain functions Internet.

7. PRACTICAL IMPLICATIONS

The results are useful for M-commerce providers designing marketing campaigns that emphasize promoting the mobility aspect of M-commerce, particularly its use for consumers and its security. M’s business needs to be developed and modernised to meet customers’ specific needs and requirements better. Marketers need to focus on key factors such as social impact, perceived enjoyment, perceived risk, and anticipated efforts to increase the adoption of M-commerce services to target groups of young and innovative customers.

Data reflects the perception and expectations of customers when using mobile devices. Services are used for quality assurance to identify areas that required improvements. Mobile communications should focus on providing greater trustworthiness, accuracy, and stability in mobile services. An extended focus on the objects of mobile network dimensions like transmission quality and network coverage is also useful for improving the perceived quality of mobile services for their customers.

8. MANAGERIAL IMPLICATIONS

Modern models of technology adoption are based on theoretical differences, like innovation Diffusion Theory (Rogers 1983), which may be expected to influence the customer’s adoption of latest technologies. Researchers have investigated several connection between the Diffusion model (Roger theory and Bass model) and acceptance model. This study presents an outline of the various theoretical perspectives through which we came to know that previous studies had addressed individual acceptance of information communication technology.

To make shopping more convenient, e-commerce sellers should have to work on various aspects of service delivery, such as delivering goods, timeliness of the order, tracking facility, and orderly accuracy (Collier & Bienstock, 2006). To achieve these objectives of providing good quality of services, (1) The supplier must meet the expectations of buyers. (2) Online retailers should deliver the product to the buyer’s preferred address. (3) Deliver the products on or before the promised date. (4) To assure the buyer that the product was matched with the description that was posted on the online portal. All of these factors have an impact on the perceived transaction value of purchasers, which further enhance the satisfaction of customers (Xiao., 2016).

9. LIMITATION AND FUTURE RESEARCH

Only those customers who transact from their mobile devices have been included in this study. The study excludes individuals who do not carry out some form of the online transaction. Furthermore, the technological aspect of the advanced network is not included in this study. Researchers have only used the service quality element of mobile networks, which affects the adoption of M-commerce services.

For future research, attempts should be made to understand whether or not customers' reactions to adopting new technologies shift over time and to check their way of shopping over various periods. Furthermore, in various contexts and fields, this research can evaluate and validate some additional constructs with some mediating and moderating effects for different M-commerce services. Additionally, instead of taking the TAM model, researchers can also take the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

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