

Analysis of it Infrastructure As A Factor Affecting E-commerce and its Impact on Consumer Satisfaction

Dr. Shailendra Kumar*
Vikalp**
Shubham Arya**
Shreyash Bharadwaj**

Abstract

The economic reforms of 1991 have completely changed the scenario in which business is being done in India. The reform policies include opening-up for international trade and investment, deregulation, initiation of privatization, tax reforms, and inflation-controlling measures. This has been done to integrate the Indian economy with the world economy. The rise of business over the internet is one of the outcomes of such economic reforms. The advancement in Information Technology (IT) also helps the e-commerce to grow rapidly. This paper extends the research on e-commerce in India. We try to analyze how IT infrastructure acts as a barrier to e-commerce. The paper uses a survey based approach to draw the conclusions. Using data from 300 respondents, we came to the conclusion that Internet unavailability, slow access of internet, security concerns and the transaction process are the major concerns exist. The paper shows the impact of these factors on consumer satisfaction on e-commerce. Finally, we try to give some suggestions to improve the IT infrastructure so that e-commerce business can achieve their potential.

Keywords: E-commerce, IT Infrastructure, India, Internet.

Introduction

With the advancement in the Information Technology and the explosive increase of Internet users, companies all around the globe saw this development as an opportunity to reach to their customers. They have been shifting from the traditional offline mode of transaction to the latest new online mode of transaction. The concept of online transaction relates to e-commerce as a practice of buying and selling products over the internet (Lee, 2008). In the present era of Globalization and the dot-com burst, E-commerce business has grown significantly. The geographical distance between buyer and seller offers no problem in doing business.

According to a survey the India's e-commerce market is of \$16 billion in year 2013 and is expected to reach Rs 1,07,800 crores (US\$ 24 billion) by the year 2015 and

further expected to reach \$56 billion in year 2023 as per survey conducted by industry body ASSOCHAM [W1]. So the e-commerce industry in India is growing day by day on a rapid rate. India is currently third largest internet user in the world and expected to become the second with 243 million internet user by June, 2014 as per report of I-Cube 2013 report [W2] (Internet and Mobile Association of India (IAMAI) and IMRB International). With the technological advancement in the Mobile telephony the 3G and 4G services which provide a fast access to the internet is also going to increase and also going to increase the users day by day. By 2015 India 4G services is projected to be 28 million source AVENDUS [W3]. More is the users on Internet; more is the opportunity for e-commerce.

E-commerce provides ease and convenience to the users. Consumers can enjoy benefits such as availability

*Assistant Professor, MSCLIS Divison, Indian Institute of Information Technology, Allahabad, UP.
E-mail: shailendrak@iitaa.ac.in

**Students, MBA, Indian Institute of Information Technology, Allahabad, UP.

E-mail: vikalp.gangwar@gmail.com, shubham.dce@gmail.com, imb2012065@iitaa.ac.in

of goods at lower cost, wider choice and more important time safety. People can buy goods with a click of mouse button without going to shops physically. Various online services such as banking, ticketing (including airlines, bus, railways), bill payments, hotel booking etc. also provides tremendous benefit to the customers. E-commerce also includes electronic advertising, electronic payment system, electronic marketing, electronic customer support service and electronic order and delivery.

Customer satisfaction must be the main focus of any business now days. If the customer is not satisfied with the interaction, he/she may lose faith and confidence on e-commerce. They start avoiding visiting such websites. Success of e-commerce business depends on how easily the website can be accessed; how much reliable is the server on which website is hosted; how much security related issues are being taken care of; and most important how much secure the transaction process is. Absence of reliability and security make the websites vulnerable to various e-attacks. Customer may feel shy to visit these e-commerce websites and hence, the business gets affected; the essence of e-commerce can never be realized for both consumer and businessman. The interaction with the websites according to a user prospective relate to EES i.e. Effectiveness, Efficiency and Satisfaction.

E-commerce and India

There are basically two types of e-commerce market which can be classified as a) Business-to-Business (B2B) and b) Business to-Consumer (B2C).

Business-to-Business (B2B):

In this type of market, the transactions happen between organizations or businesses such as transaction between manufacturer and wholesaler or between wholesaler and retailer. It includes purchasing, procurement, retail management, inventory management, payment management, services and support etc. India's largest B2B portal Tradeindia, maintained by Infocom Network Ltd, stated that e-commerce transactions in India show a growth rate of 30 percent to 40 percent and will soon reach the \$100 billion mark. Seeing the growing Indian market, many foreign branded companies are willing to enter the market to take full advantage. Some of B2B exchanges in India are tradeindia.com, Alibaba.com,

AuctionIndia.com, Indiamart.com, TeaAuction.com, MetalJunction.com, Chemdex (www.chemdex.com), Fastparts (www.fastparts.com), and FreeMarkets (www.freemarkets.com) etc. [P1]

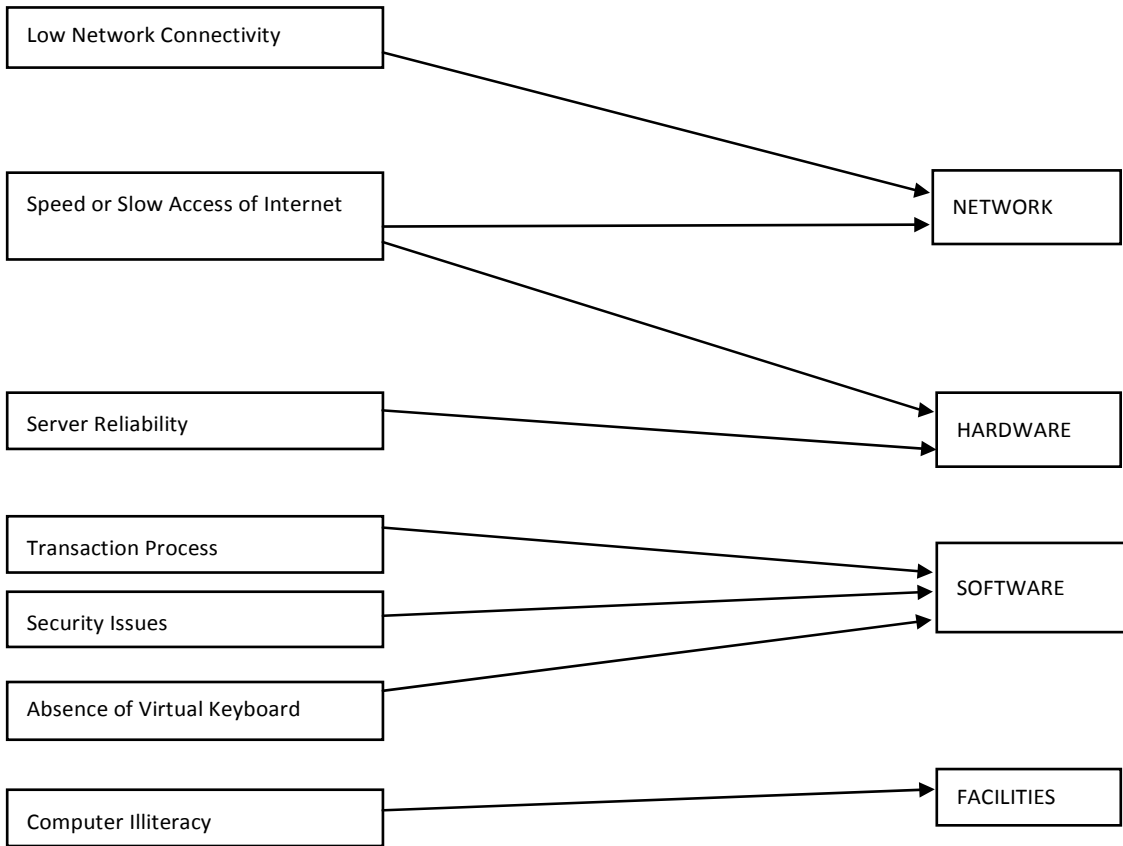
Business to-Consumer (B2C):

In this type of market, the transactions happen between business and customer. The products are sold to the end customer. It includes business such as e-retailing, banking, tax payment, bill payment, hotel room booking, entertainment, matrimonial sites, job sites, etc. Some of B2C businesses in India are flipkart.com, jabong.com, irctc.co.in, shaadi.com, makemytrip.com etc. [P1]

Customers are the backbone for the success of any business. Any type of industry whether manufacturing or service requires customers to sell their products or utilizes their services in order to achieve the desired profit target. India, the second fastest growing economy is also the second most populous country in the world. Hence, India offers a great opportunity for the e-commerce market to grow and help in reviving the Indian economy. The role of government is to provide a legal framework for E Commerce so that basic rights such as privacy, intellectual property, Prevention of fraud, consumer protections etc are all taken care of. [P2]

Literature Review

The term IT INFRASTRUCTURE is defined in a standard called Information Technology Infrastructure Library (ITIL) v3 as a combined set of hardware, software, networks, facilities, etc. (including all of the information technology), in order to develop, test, deliver, monitor, control or support IT services. Associated people, processes and documentation are not part of IT Infrastructure. [W4] Thus for our research, we link IT infrastructure as follows:



Tagrul U. Daim (2011) describes how IT infrastructure refreshing can provide larger return on investment over time.

Elizabeth Goldsmith and Sue L.T. McGregor (2000) analyzed the impact of e-commerce on consumers, public policy, business and education.

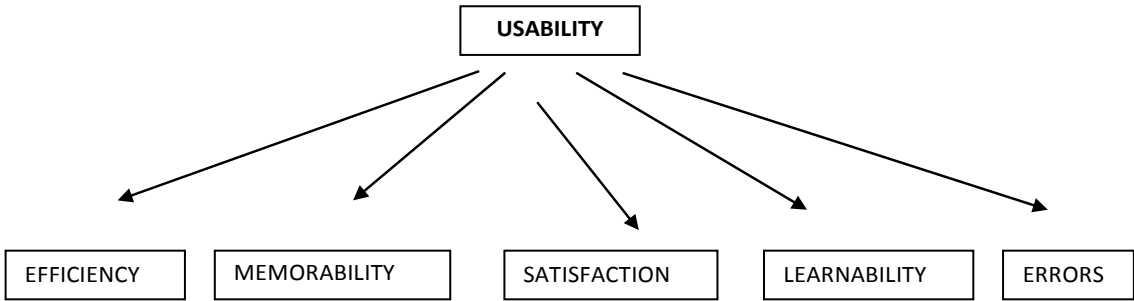
Arvind panagariya (1999) describes the opportunities offered by e-commerce for the WTO and developing countries.

Nir B.kshetri (2001) use three categories of feedback systems—economic, sociopolitical and cognitive—to offer a simple model of e-commerce barriers in the developing world.

Mustafa I Eid (2011) examines the determinants of customer satisfaction, trust and loyalty towards e-commerce.

Expectation-Confirmation Theory (ECT) was proposed by Oliver [1980] to study consumer satisfaction and repurchase behavior. The ECT theory states that consumers firstly form an initial expectation about any product/service before purchasing. After some period of consumption, they start building perceptions about the performance of the consumed product/service. Next, the consumers start deciding on their level of satisfaction. The level of satisfaction is obtained by comparing the actual performance of the product/service against their initial expectation of the performance. Consequently, satisfied consumers will form repurchasing intentions.

Jakob Nielsen [W5] the famous web usability consultant finds satisfaction as one of the quality attribute of the usability of websites for e-commerce:



Research Methodology

A descriptive research design is used for the study. The paper uses a survey based approach to draw the conclusions. Random sampling has been done to collect the data. Questionnaire was the instrument used for data collection in order to understand the status of the subject under study. The questionnaire consisted of 16 questions being prepared in such a way that they enhance the validity of responses. A five-point Likert-type scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree) was used to reach the conclusion.

Firstly, we conducted an online survey through the questionnaire in order to get responses from the population. The questionnaire consisted of various questions relevant to the subject under study.

Then we code the variables for performing Regression analysis and Correlation analysis. The various variables are coded as:

- 1) How was the interaction between you and online shopping website As **INTER_SHOP**
- 2) "Speed or Slow Access of Internet" plays a vital role in online shopping As **SPEED_ROLE**
- 3) "Low Network Connectivity" restrains the consumer from online shopping As **LOW_NETWORK**
- 4) "Transactions process" should be very smooth and transparent As **TRANSAC_PROCESS**
- 5) "Security issues" should be give higher priority than any other feature As **SECURITY**
- 6) Does absence of "Virtual keyboard" makes you feel unsecure while payments As **VIRTUAL_KEYWORD**
- 7) Number of feedbacks given by the consumer makes the website trustable As **FEEDBACK**

Among the above variables **INTER_SHOP** that relates to the **customer satisfaction** as how was the interaction between customers and online shopping website is the dependent variable.

While the other variables i. e. **SPEED_ROLE**, **LOW_NETWORK**, **TRANSAC_PROCESS**, **SECURITY**, **VIRTUAL_KEYWORD** and **FEEDBACK** that relates to the IT infrastructure acts as an independent variables.

To assess the degree of correctness of the results, questionnaire Reliability Analysis is done. Cronbach's Alpha is the most common measure to determine the reliability. It is used when the survey/questionnaire has multiple Likert scale type questions and we want to determine if the scale is reliable or not.

After performing the Reliability analysis we find that Cronbach's alpha is **0.805**, which indicates a high level of internal consistency for our scale.

Secondly, we took an insight on how closely these variables are associated with each other. Correlation analysis is being performed on these variables to determine the association between them. The Value of the correlation coefficient is always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear sense, as variable X increases, variable Y increases. A correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense, as variable X decreases, variable Y decreases and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables.

Finally, we performed Regression analysis to analyze the impact of these independent variables on the dependent

variable. Regression analysis is used to identify the relationship between a dependent variable and one or more independent variables. The results are interpreted through the values of R squared (Coefficient of

determination), coefficients and the p-value obtained from regression analysis.

Results and Interpretation

CORRELATION

	Inter_shop	Speed_role	Low_network	Transac_process	Security	Virtual_keyword	Feedback
Inter_shop	1						
Speed_role	0.105526145	1					
Low_network	0.1211690	0.393929275	1				
Transac_process	0.106287193	0.278562589	0.469044623	1			
Security	0.121207779	0.318894617	0.738276985	0.73598141	1		
Virtual_keyword	-0.02987376	0.19058036	0.224715213	0.173430293	0.1945515	1	
Feedback	-0.00835337	0.204421236	0.062177255	0.062847007	0.0380863	0.029740042	1

REGRESSION

Impact of speed and slow access of internet on customer satisfaction

SUMMARY OUTPUT

Regression Statistics	
R Square	0.011136
Standard Error	0.656716
Observations	282

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.359867	1.359867	3.153127	0.076868*
Residual	280	120.7572	0.431276		
Total	281	122.117			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.337694	0.238417	13.99937	4.05E-34	2.868376	3.807012	2.868376	3.807012
Speed_role	0.100572*	0.056638	1.775705	0.076868	-0.01092	0.212063	-0.01092	0.212063

*Significant at 90% level of confidence

From the above analysis we find that our result is reliable. The value of F is .076868 which is less than .10 at 90% level of confidence.

R Square is .011136 means that 1.136% of customer satisfaction can be obtained by improving the speed and slow access of internet.

The p-value is 0.076868 which is less than .1 means that the speed and slow access of internet definitely has impact on the customer satisfaction.

From the coefficients, it is clear that for every percent increase in speed of internet, customer satisfaction increases by 10.05 %.

Impact of low network connectivity on customer satisfaction

SUMMARY OUTPUT

<i>Regression Statistics</i>	
R Square	0.014682
Standard Error	0.655537
Observations	282

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1.792915815	1.792916	4.172202	0.04202882*
Residual	280	120.3241055	0.429729		
Total	281	122.1170213			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.406591	0.17513367	19.45138	6.53E-54	3.061845534	3.75	3.0618	3.751337
Low_network	0.089077*	0.043609788	2.042597	0.042029	0.003232547	0.17	0.0032	0.174922

*Significant at 90% level of confidence

From the above analysis we find that our result is reliable. The value of F is .04202 which is less than .10 at 90% level of confidence.

R Square is .014682 means that 1.46 % of customer satisfaction can be obtained by improving the network connectivity.

The p-value is 0.042029 which is less than .1 means that the low network connectivity definitely has impact on the customer satisfaction.

From the coefficients, it is clear that for every percent improvement in network connectivity, customer satisfaction increases by 8.9 %.

Impact of Transaction Process on customer satisfaction

SUMMARY OUTPUT

<i>Regression Statistics</i>	
R Square	0.011297
Standard Error	0.656662
Observations	282

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1.379552	1.379552	3.199293	0.07475*
Residual	280	120.7375	0.431205		
Total	281	122.117			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.359986	0.224455	14.96953	1.27E-37	2.918152	3.801819	2.918152	3.801819
Transac_process	0.09282*	0.051897	1.788657	0.074751	-0.00933	0.194984	-0.00933	0.194984

*Significant at 90% level of confidence

From the above analysis we find that our result is reliable. The value of F is .07475 which is less than .10 at 90% level of confidence.

R Square is .011297 means that 1.129% of customer satisfaction can be obtained by improving the transaction process.

The p-value is 0.074751 which is less than .1 means that the transaction process definitely has impact on the customer satisfaction.

From the coefficients, it is clear that for every percent improvement in the transaction process, customer satisfaction increases by 9.28%.

Impact of Security issues on customer satisfaction

SUMMARY OUTPUT

Regression Statistics	
R Square	0.014691
Standard Error	0.655534
Observations	282

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.794061	1.794061	4.174906	0.04196*
Residual	280	120.323	0.429725		
Total	281	122.117			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.38572	0.185051	18.29613	9.84E-50	3.021452	3.749988	3.021452	3.749988
Security	0.08946*	0.043786	2.043259	0.041963	0.003275	0.175656	0.003275	0.175656

*Significant at 90% level of confidence

From the above analysis we find that our result is reliable. The value of F is .004196 which is less than .10 at 90% level of confidence.

R Square is .014691 means that 1.46% of customer satisfaction can be obtained by improving upon the transaction process.

The p-value is 0.041963 which is less than .1 means that the security issues definitely have impact on the customer satisfaction.

From the coefficients, it is clear that for every percent improvement in the security issues, customer satisfaction increases by 8.94%.

Impact of absence of virtual keyboard on customer satisfaction

SUMMARY OUTPUT

Regression Statistics	
R Square	0.000892
Standard Error	0.660108
Observations	282

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.108982	0.108982	0.250107	0.61739*
Residual	280	122.008	0.435743		
Total	281	122.117			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.813817	0.123398	30.90657	3.1E-92	3.570911	4.056723	3.570911	4.056723
Virtual_keyword	-0.01699*	0.033971	-0.50011	0.617393	-0.08386	0.049881	-0.08386	0.049881

*Significant at 90% level of confidence

From the above analysis we find that the result is not reliable. The value of F is .61739 which is greater than .10 at 90% level of confidence.

Hence we can say that the absence of virtual keyboard does not pose any impact on the customer satisfaction while transacting with the e-commerce websites.

Impact of customer feedback on customer satisfaction

SUMMARY OUTPUT

<i>Regression Statistics</i>	
R Square	6.98E-05
Standard Error	0.66038
Observations	282

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.008521	0.008521	0.019539	0.88893*
Residual	280	122.1085	0.436102		
Total	281	122.117			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.779773	0.179307	21.07984	9.81E-60	3.426811	4.132735	3.426811	4.132734984
Feedback	-0.00626*	0.044767	-0.13978	0.888932	-0.09438	0.081866	-0.09438	0.081865609

*Significant at 90% level of confidence

From the above analysis we find that the result is not reliable. The value of F is .88893 which is greater than .10 at 90% level of confidence.

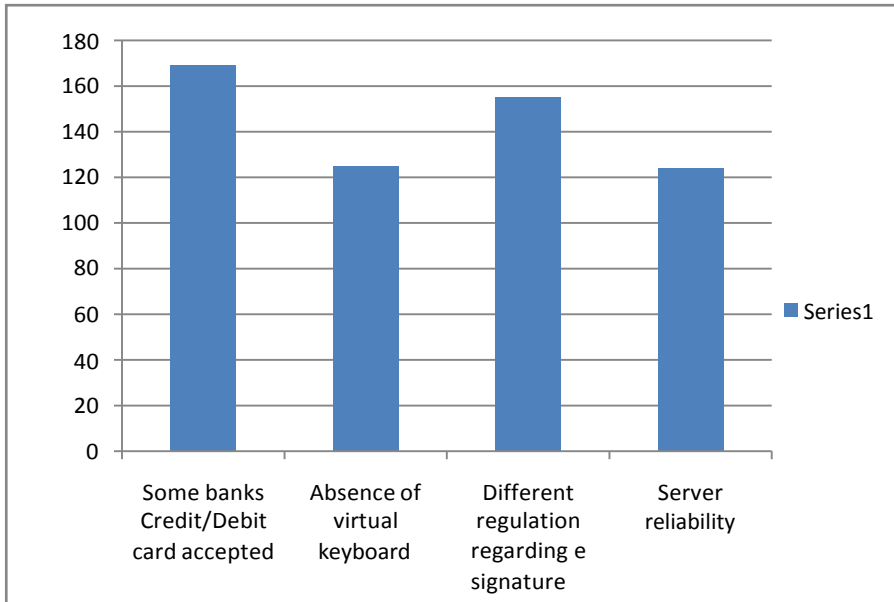
Hence we can say that the feedbacks provided by the users on the e-commerce websites do not pose any impact on the customer satisfaction while interacting with the e-commerce websites.

transact from any e-commerce website, companies must focus on the problems the customer faced. The main problem of the customer is regarding the payment. Hence we try to find out the various problems regarding payment in our research work.

From the data collected, the following are some of the problems:

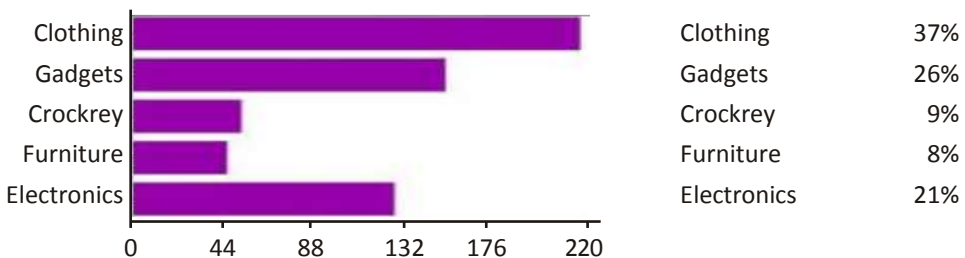
Findings

If we don't know the problem, we can't find the solution. In order to satisfy the customer after they visit and



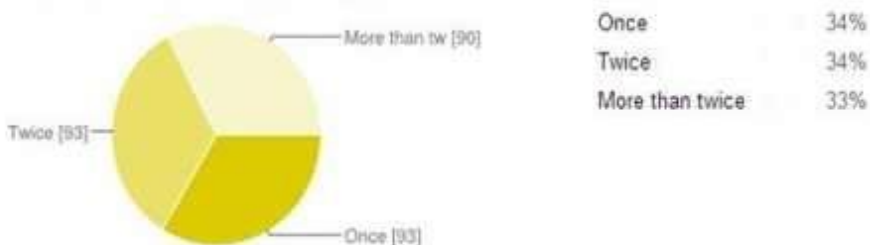
What are the problems customer face regarding payment?

It is essential for e-commerce companies to know about the customers visit and buying pattern. Also they must focus on the products which the customer usually buys. In the discussion of customer satisfaction these things should be keep in mind.

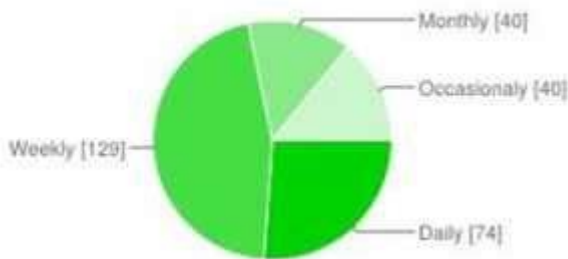


What do you usually buy from online stores?

How many times you have done shopping since last month?



How frequent do you visit online stores?



Daily	26%
Weekly	46%
Monthly	14%
Occasionaly	14%

Recommendations

The customer satisfaction is required for e-commerce business to cherish. A satisfied customer would surely visit the e-commerce website again. To satisfy the customer:

- 1) E-commerce companies must refresh their IT infrastructure.
- 2) Companies must focus on improving the Transaction process on their websites.
- 3) Companies must have to choose the server which is reliable and trustable.
- 4) E-commerce websites must be secured. A vulnerable website may be attacked and can be hacked easily.

The role of government can prove to be very crucial in the success of e-commerce in India. From the research it is clear that low network connectivity and speed or slow accesses of internet are among the crucial factors behind the customer satisfaction. The government should focus on the following areas:

- 1) Must aim to provide access of faster internet through broadband and wi-fi channels.
- 2) Improving the mobile telephony services like 3G etc.
- 3) Improving the network connectivity in remote areas.
- 4) Investment in maintaining the network towers throughout the country.

According to the 2011 Census data, only 3.1 percent of total houses have Internet access in India. Chandigarh (U/T) has the highest 18.8% of total households Internet users, followed by NCT of Delhi (U/T) 17.6% and Goa 12.7%. Bihar has below 1% of total households Internet users which is the lowest in India. Other states like

Maharashtra have 5.8%, Uttar Pradesh has 1.9% and West Bengal has 2.2% of total households Internet density only. [W6]

The government must target to increase the percent of total houses that have internet access in India. For this a lot of investment is needed in the IT field in improving the IT infrastructure.

Conclusion

As per the research performed, Low network connectivity, speed or slow accesses of internet, transaction process and security issues relates to the satisfaction of the customer. By improving on these factors, more customer satisfaction can be achieved. Efforts from both the e-commerce companies and the government are required to work on these factors. IT infrastructure refreshing is required. The e-commerce business which is expected to reach Rs 1, 07,800 crores (US\$ 24 billion) by the year 2015 is one of the important contributor to the economy of the nation. The focus of the government must be to improve internet connectivity and availability of network. They must also focus on improving the IT education in our country. The U.P government free laptop scheme can be seen as a step towards making the state IT centric state and improving the IT infrastructure in the state. It is essential for our country to find the impact of e-commerce on their economies and hence try to create a policy and environment that favors the growth and development of e-commerce.

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