# ICT Factors Influencing Consumer Adoption of E-Commerce Offerings for Education

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## Abstract

Background/Objectives: Learning is getting transformed into digital and digital coursework is evidently seen to have increased adoption. Major consumer base for e-commerce companies is India wherein learners and instructors form a major part. So, many e-commerce companies are well positioned to service this need having an eye on education market. The rapidly growing internet and smartphone penetration in the country is expected to further fuel this growth. India's leading e-commerce companies are in a competitive environment offering e-learning material for formal education, certificate courses, E-books, coaching materials for competitive exams, online tests etc. Some e-commerce companies also offer hobby courses. The study investigated the Information Control Technology (ICT) related factors that decide the adoption of various online offerings from e-commerce companies for the purpose of education. Method/Statistical Analytics: Simple random sampling has been applied for the research to collect the required sample. A structured questionnaire was distributed to collect the data from about 100 consumers including learners and instructors. A conceptual framework was developed to analyze the ICT factors impacting adoption of e-commerce offerings for education. Application/Improvements: This study provides valuable guidance to policy makers and providers of e-commerce in education in understanding the ICT factors influencing consumer adoption. Findings: ICT infrastructure has a significant impact on the perceived satisfaction of the stakeholders (Learners and Instructors) followed by ICT skills and then the ICT Support. Also consumers view insufficient ICT skills to take advantage of new technology as a significant challenge. Thereby they see a need for continuous technical training. Other major concerns from respondents on the ICT infrastructure is about the unavailability of up-to-date antivirus protection in their systems, unavailability high-speed internet connection and multi-media incompatibility issues.

**Keywords:** Consumers, E-commerce, Instructors, Infrastructure, Information Control Technology (ICT), Learners, Skills, Support

# 1. Introduction

Internet coupled with developments in Information Control Technology (ICT) has become a significant business platform. This drastic growth has leveraged E-commerce to altogether a new level. India has got 65% of its population below 35 years of age. The demand-supply mismatch for quality education has reached massive proportions and eventually the use of ICT has become inevitable to address the demand for quality education. Thereby in recent times, online courses and other study materials offered online tend to be the attraction of learner and instructor community.

The primary objective of this research paper is to review the use of E-commerce offerings for Education and training purposes. Being aware that learners and instructors as consumers play a major role in the growth of e-commerce business, the second goal is to analyze the impact of Information Control Technology (ICT) on adoption of the E-commerce offerings by Learner and instructor community. Consumer's opinion about e-commerce offerings were elicited from the perspective of learners and instructors. To develop a suitable model, Structural Equation Modeling (SEM) technique was applied for analyzing the data. All the measures used in structural equation modeling fit the recommended values thereby indicating a good fit for the data collected.

## 1.1 Research Objectives

The objectives of this study are as listed below:

- 1. To identify the ICT factors influencing the consumer adoption of e-commerce offerings
- 2. To examine the fit of the estimated model using SEM model fit.

# 1.2 Consumer Oriented E-Commerce Applications

Based on their services, e-commerce applications can be broadly classified <sup>1</sup>into:-

- Entertainment: There are many e-commerce applications in market today which stream movies on demand, host video games either free or at cost.
- **Financial services**: E-commerce applications to pay household bills like electricity bills, telephone bills etc. Banking services for fund transfer, cash deposit also come under this category.
- Essential services: Several key e-commerce players in market today who are into e-retailing either in the form of generalized stores or specialized stores for essential services like grocery, apparels, food orders, medicine etc.
- Educational and training: Digital education offered in terms of e-learning, e-books, video assignments, online enrollment modules etc.

# 1.3 E-Commerce in Education

Prior reviews have discussed the role of e-commerce in Educational sector in various views discussed in detail as below.

1. E-commerce is in itself is a very well established industry now with several e-commerce websites prevalent on the cyberspace. This has necessitated the need among learners and instructors that they need be equipped with knowledge on ICT. The global education sector is no longer restricted to just classrooms. The online learning space in Indian educational sector is also growing dramatically. Some of the e-commerce applications offered by Educational institutions for their student body:

- a. Pursue a degree, taking internet-based courses only.
- b. Take a complete web-based course for certification purposes
- c. Purchase textbooks (e-books, Smart books) from on campus bookstore and from various E-commerce providers
- d. Online research databases
- e. Conducting assessments and assignments through online mode
- f. Online Surveys to understand the enrollment demographics
- g. E-recruitment
- h. Online directory of university services
- i. Student services like Fee payment
- j. Academic performance maintained online
- 2. E-commerce providers in market generate student prospects online in terms of various online offerings like e-learning modules, e-books and deliver several education web sites to pursue a degree.

## 1.4 Consumers of Online Education

Non-traditional students<sup>2</sup> can prove successful in their higher education leveraging the online education capabilities and offerings by various institutions. As per the definition by National Center for Education Statistics, learners meeting one of the below criteria fall under category of *nontraditional student* 

- Older students seeking a second degree or those delayed college
- Positioned abroad without any access to higher education.
- Serving in varied time zones that don't align with traditional course timings.
- Lifestyle is highly disposed to unexpected transfers to different states/countries.
- Living on a geography where there are no institutions of preference

# 1.5 E-commerce Offerings for Education

Various online offerings by leading e-commerce companies of Indi.<sup>3</sup>

- Professional certificate courses
- Training courses without any certification
- Test preparation tools
- Conducting assessments for certification

- Obtain student feedback through e-surveys to improve the courses offered online
- Coaching materials

# 1.6 ICT Factors impacting adoption of Online Education

ICT facilitates anytime, anywhere learning providing access to remote learning resources and thus helps expand access to education. Research likewise suggests that use of ICT increases learner motivation and engagement in the learning process provided with adequate ICT support and training on ICT skills. ICT infrastructure cost is discussed in detail as fixed cost and Variable cost. Retrofitting of physical facilities, hardware and software upgrades and replacement are some of the fixed cost involved. Internet connectivity and other maintenance support cost are some of the recurrent or Variable cost involved. ICT infrastructure cost, changes to instructional design owing to ICT developments, ICT skills, equity of access to ICT are some of the challenges discussed in this article. As outlined in this article, technological literacy covers the below listed aspects<sup>4</sup>:

- Fundamental technical skills and concepts
- Usage of the electronic devices and accessories
- Usage of productivity tools like word processing, spreadsheets etc.
- Usage of collaboration tools like emails, blogs etc.
- · Elementary knowledge in accessing web applications

# 2. Methods

# 2.1 Data Collection and Sample

In this study, consumer (learners and instructors) perceptions were gathered using a structured questionnaire circulated in the form of electronic survey. Five-point scale was used to increase the sensitivity of the measure. Data on learners' and instructors' perception about the three ICT factors – ICT skills, ICT Infrastructure and ICT support were collected.

# 2.2 Data Analysis

Data collected from 100 consumers which includes 16 full-time learners, 56 Part-time learners and 28 instructors were analyzed using the Statistical Package for Social Sciences (SPSS). Statistical techniques like reliability analysis, was used to evaluate the quality of the questionnaire.

Friedman test was used to test for differences between groups. Structural equation modeling (SEM) was used for analyzing the association between factors used in the model.

# 2.3 Research Methodology

### 2.3.1 Sample

The sample comprises of online users which includes full-time, part-time, distance education learners and instructors. The research design is descriptive in nature for the study. The sampling technique that is used for the study is simple random sampling. A group of respondents were selected through simple random to avoid any sort of bias in the research and then the questionnaire was circulated to them in the form of electronic survey for which response was collected. Survey method of primary data collection using questionnaire adopted for collection of primary data.

### 2.3.2 Data Analysis and Interpretation

SEM was used to analyze the collected data and evaluate the suitability of the model. Cronbach's alpha scores were calculated to test the reliability and consistency of each ICT factor. The findings show that the overall reliability score is 0.9867 as shown in table1 which is above the minimum acceptable level of 0.8.

# 3. Results and Discussion

# 3.1 Structural equation modeling (SEM): Model fit assessment

Structural equation modeling (Figure 1) was used to analyze the model fit based upon the primary data that was collected. This model is held as the most useful for assessment of causal relationship between variables and for verifying the suitability of the estimated model. For evaluating the model fitness, emphasis was given to chi-square value, Probability value, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit index (CFI), RMR and Root mean square error of approximation (RMSEA) (Table 2).

Table 1. Reliability Statistics

Cronbach`s alpha	No of items
0.9867	62

As per the result shown in table 3, Chi square statistics with p value of 0.358 which is greater than 0.05 shows good fit of the model. The GFI and AGFI of this study was 0.984 which is more than the recommended value of 0.90 representing a good fit. The CFI value of 0.999 also means a good fit. And the RMR = 0.069 and RMSEA=0.031 indicate an absolute fit of the model. Goodness of fit indices support the estimated model fit and these emphasized indices indicate the acceptability of this structural model.

# The variables used in the structural equation model are

### I. Observed, endogenous variables

- 1. Information Control Technology (ICT)
- II. Observed, exogenous variables
  - 1. Skills
  - 2. Infrastructure
  - 3. Support
  - 4. Perceived Satisfaction
  - 5. Adoption

#### III. Unobserved, exogenous variables

e1, e2, e3, e4 and e5: Error terms for Skills, Infrastructure, Support, Perceived satisfaction and adoption respectively.

# 3.2 Significance Tests of Individual Parameters

Table 4 reports the unstandardized regression coefficients and connected test statistics. The unstandardized regression coefficient is the amount of change in the dependent

Total variables in this model	11
Total observed variables	6
Total unobserved variables	5
Total exogenous variables	10
Total endogenous variables	1

 Table 2.
 Number of variables in the SEM





Table 3.	Model fit summary of Structural Equation
Model	

Fit Indices	Results	Suggested values <sup>5-9</sup>
Chi-square value	4.374	-
Probability value	0.358	>0.05
Goodness of Fit Index (GFI)	0.984	>0.90
Adjusted Goodness of Fit Index (AGFI)	0.940	>0.90
Comparative Fit index (CFI)	0.999	> 0.90
RMR	0.069	< 0.08
Root mean square error of approximation (RMSEA)	0.031	< 0.08

variables for every metric unit change in the independent variable. The coefficient of perceived satisfaction is 0.775 represents the partial effect of perceived satisfaction on adoption, holding the other variables as constant. Table3 reports the unstandardized estimate, its standard error (S.E.), and the critical ratio (C.R.).

# 3.3 Level of Significance for Regression Weight

As per table 4, the probability of getting a critical ratio as large as 19.473 in absolute value is less than 0.001. In other words, the regression weight for perceived satisfaction in the prediction of adoption is significantly different from zero at the 0.001 level (two-tailed).

# 3.4 Correlation Analysis on factors of ICT on Adoption

The correlation coefficient between skills and infrastructure is 0.711. This indicates 71.1 percentage positive relationships between skills and infrastructure on infrastructure at 1% level. The correlation coefficient between skills and support is 0.565. This indicates 56.5 percentage positive relationships between skills and support and is significant at 1% level. The correlation coefficient between skills and support is 0.686. This indicates 68.6 percentage positive relationships between skills and support and is significant at 1% level and similarly the other factors are positively correlated with each other (Table 5).

# 3.5 Finding and Suggestions

Among the three factors of ICT i.e. support, skills and infrastructure, the factor most significantly impacting

the perceived satisfaction of consumers is the ICT infrastructure followed by ICT skills and then the ICT Support (Table9). ICT Support is provided by part-time staffs but the consumers do not seem to have concerns on the support timings (Table 6). As far as ICT Skills are concerned, consumers strongly feel that insufficient skills to take advantage of new technology is significant challenge. The research findings show that estimated model has an

acceptable fit. Lack of knowledge about technology stands out as the next significant challenge. Thereby there is a demand from end users on need for continuous technical training (Table 7). Major concern from respondents on the ICT infrastructure is about the anti-virus protection in their systems. High-speed internet connection and multi-media incompatibility issues rank the next top challenges (Table 8).

		1	/				
Variables			Unstandardized Estimate	S.E.	Standardized Estimate	C.R.	Р
Skills	<	ICT	5.671	.674	.735	8.420	***
Infrastructure	<	ICT	6.174	.482	.963	12.819	***
Support	<	ICT	6.823	.708	.808	9.635	***
Perceived Satisfaction	<	ICT	10.988	.943	.912	11.649	***
Adoption	<	Perceived Satisfaction	.775	.040	.950	19.473	***

 Table 4.
 Variables in the Structural Equation Model Analysis

#### Table 5. Correlation coefficients between ICT and Adoption

	Skills	Infrastructure	Support	Perceived Satisfaction	Adoption
Skills	1.000	0.711(**)	0.565(**)	0.686(**)	0.611(**)
Infrastructure		1.000	0.780(**)	0.874(**)	0.840(**)
Support			1.000	0.746(**)	0.686(**)
Perceived Satisfaction				1.000	0.904(**)
Adoption					1.000

\*\* Correlation is significant at the 0.01 level (2-tailed).

#### Table 6.Friedman test summary for Support

How the IT support staff is organized to provide technical support?	Mean Rank
Support is provided by part time staffs	4.55
Support is provided by dedicated staffs	4.54
Separate departments support online learning and other online services	4.16
IT support available 24*7 (All days in a week and round the clock support)	3.98
IT support available from 9 to 5; Weekdays only	3.79
IT support available 9 to 5; All days in a week	3.80
IT support available round the clock support; But weekdays only	3.21

#### Table 7. Friedman test summary for Skills

How significant a challenge is it for IT to support learners in the following areas?	Mean Rank
Lack of knowledge about technology	4.49
Rapidly changing technology	4.17
Need for continuous technical training	4.32
Insufficient skills to take advantage of new technologies	4.57
Utilizing online course applications/tools	3.74
Not user friendly	3.25
Security of equipment	3.48

Rate the following key challenges that you	
face towards use of technology	Mean Rank
High-Speed bandwidth /Connection available within campus	5.90
I am connected to the Internet with a reasonably fast, reliable connection	5.55
I have headphones/ speakers and a microphone to make a remote connect if a class has a videoconference	5.30
My computer runs reliably on the operating system and my browser is compatible with several common multimedia formats	5.84
I have virus protection software running on my computer	6.18
My institution offers orientation module before the learners are exposed to first online course	4.38
My institution encourages teachers/trainers to develop their own online teaching content	4.34
My institution encourages instructors to incorporate technology into instruction	5.90
My institution offers easy-to-use tools to decrease IT support requirements	5.82
My institution constants upgrades the infrastructure to enable latest technology use	5.81

#### Table 8. Friedman test summary for Infrastructure

# Table 9.Friedman testsummary for ICT factors

	Mean Rank
Skills	2.02
Infrastructure	2.25
Support	1.74

# 4. Conclusion

Conclusively, the article points out that ICT support, skills and infrastructure majorly impact the perceived satisfaction of consumer's i.e. learners, instructors. As the current state of ICT stands, as far as the in-campus support is concerned, seems to be provided by staff who are involved in part-time support for ICT. From the study, we get to understand that there is a huge demand from the consumers on a continuous need for training on the rapidly changing technologies. Security aspect is known to cause serious concern among consumers which prevents them from adopting the e-commerce offerings. Overall, lack of ICT skills, stands out as the major barrier impacting the perceived satisfaction of the learners and instructors thereby significantly impacting the adoption levels of the e-commerce offerings. The article explained about all the e-commerce offerings for the purpose of academics. At the same time the article handled how the ICT developments impact the adoption of the various offerings by consumers.

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