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Barriers to E-Commerce Adoption: An exploratory study of MSEs in selected districts of Punjab

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Abstract
It has been found in research that e-commerce offers a favorable ways to organizations to face the challenges of dynamic environment. To get the maximum benefit from e-commerce business, a large number of enterprises in India are adopting different innovative ideas and operating models including partnering with online marketplaces or setting up their own online stores. While Ludhiana and Jalandhar have become leading cities of Punjab in consuming products through online marketing, the local industry has been slow in adoption of e-commerce for its own market expansion. The study was conducted on 150 Micro and Small-sized Enterprises (MSEs) in Ludhiana and Jalandhar. Based on earlier studies, fifteen variables were identified as potential barriers in e-commerce adoption by small enterprises. Factor analysis was conducted to identify underlying structures among the variables in the analysis. Through this procedure three factors were identified which explained the skepticism of these two cities' small industrialists in e-commerce adoption. Later, regression analysis was applied on these factors to study the impact that they can make on the likelihood of e-commerce adoption in the future. The results showed that these factors were significant and while, some of the problems could be resolved intrinsically by the organizations themselves; others were external barriers for which government's intervention and collaborative efforts amongst MSEs would be required.

Keywords: e-commerce, business, MSEs

Introduction
E-Commerce is a relatively new phenomenon, especially when compared with the markets in US and China. Though in early stages of development in India, it had grown to become a USD 13.5 billion flourishing industry in 2014 and is expected to be USD 80 billion market by 2020. Increasing internet penetration, growing adoption of smart phones and increased market awareness have put e-commerce on an unprecedented growth trajectory. At the national level, e-commerce is already changing the way businesses operate and business owners operating across the industries are looking for breakthroughs to embed digital sales into traditional businesses to gain competitive advantage. At the local level also, e-commerce brings in significant opportunities and growth models for the Micro and Small-sized Enterprises (MSEs) sector. Notwithstanding the contribution to the Indian economy, only a miniscule percentage of local enterprises in this sector are present on the web and have actively adopted e-commerce. With retail trade and services accounting for a major portion of the overall MSE market in India, there is huge potential for the local sector to benefit from e-commerce adoption. This also aligns with the initiatives of Indian Government and Regulatory Bodies in enabling the growth of MSEs with the help of projects of "Make in India" and "Digital India".

Understanding the adoption challenges
The MSE sector is a progressively growing sector. Recent years have observed a progressive change in the mind-set of MSE business owners towards the adoption of e-commerce. Despite its high potential and a number of benefits like increased revenues and profit margins, improved geographic reach and accessibility, improved customer experience, etc., a large number of MSEs are still not ready to move away from the traditional business models. The slow growth of e-commerce adoption in MSEs has been attributed to several adoption barriers which have been listed down in the subsequent section.

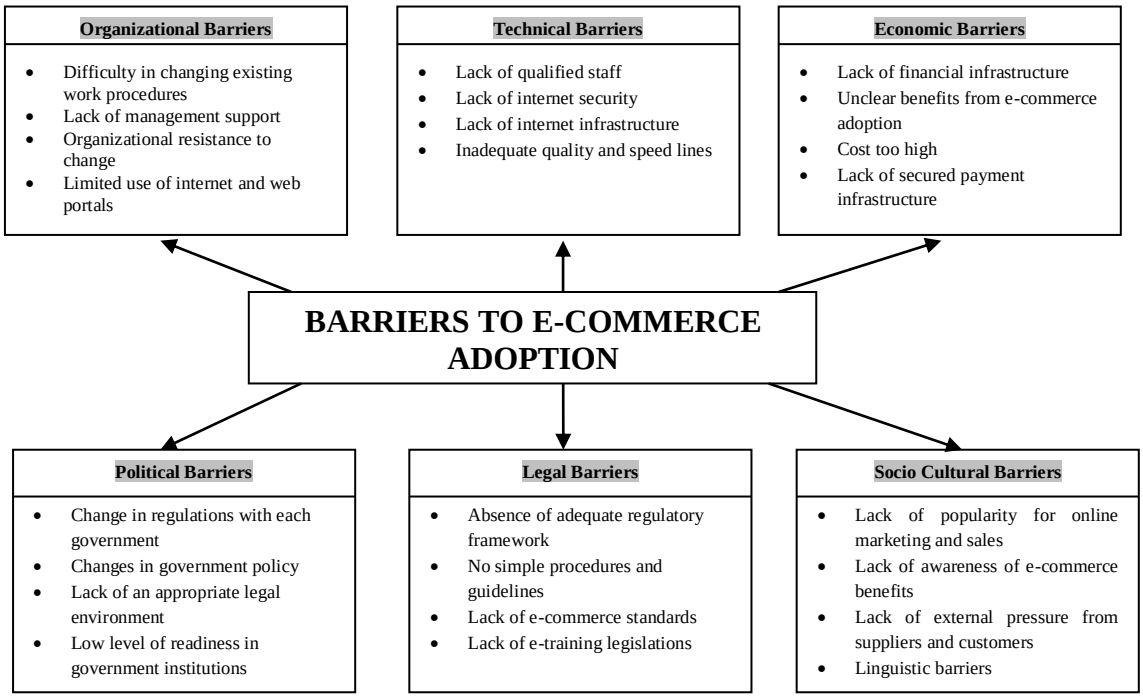

Fig 1: Conceptual framework for e-commerce adoption barriers in MSEs

Literature review

Literature reveals that many studies have been carried out in developing countries to investigate the factors inhibiting adoption of ICT and e-commerce in small businesses. Predominantly these studies have examined the technological, organizational, physical and socio-economical environmental factors that hinder the adoption of ICT and e-commerce.

El-Nawawy, M.A. & Ismail, M.M. (1999) [3] in their study of e-commerce adoption by Egyptian businesses found that the main factors contributing to the non-adoption werelack of awareness, size of the market, lack of infrastructural support, government and legal support, pricing structures, and social and psychological factors.

Cloete, E., Courtney, S. & Fintz, J. (2002) [1] in their study on small businesses acceptance and adoption of e-commerce in South-Africa, found that adoption was mostly influenced by the internal factors of the organization like owner's perception, lack of skills, concerns for security and legal issues and unclear benefits from e-commerce.

Tsikriktsis, N., Lanzolla, G. & Frohlich, M. (2004) [4] investigated antecedents of the adoption of web- based processes by service providers.The findings revealed that only the internal barriers have a negative impact on adoption of e-processes, while barriers related to customers do not have a significant impact.

Kapurubandara, M. & Lawson, R. (2006) [6] conducted an exploratory research in Sri Lanka to identify barriers to e-commerce and ICT adoption. The study reveals that while the business houses are aware of the fact that in today's dynamic business environment, the adoption of e-commerce is essential; they are hindered from adoption, as they are plagued with many constraints, lack of awareness and know how being the foremost.

March, L.TO. & Ngai, E.W.T. (2006) [8] in their study on predicting the organizational adoption of B2C e-commerce established and empirically tested the prediction model of the major determinants of online retailing adoption namely relative advantage, competitive pressure and technical resources.

Lawrence, J.E. & Tar, U.A. (2010) [10] established in their research that extent of adoption is hampered by a range of obstacles including unavailability of infrastructure, absence of government policy frameworks, lack of banking facilities and ignorance on the part of possible users about the enormously beneficial potential of e-commerce.

Zaied, ANH. (2012) [15] in his study on barriers to e-commerce adoption in Egypt Small and Medium Enterprises, identified technical barriers as the most significant barriers followed by legal and regulatory barriers.

Daviy, A.O. &Rebiazina, V.A. (2015) [2] analyzed in their study, the barriers and drivers for e-commerce market development in Russia and revealed barriers which act as hurdles arerelated to market, infrastructure and institutional issues.

Objectives of the study

The objectives of this research are:

(1) To explore factors which have been barriers in e-commerce adoption in micro and small enterprises in leading industrial cities of Punjab.
(2) To study the impact that identified factors can make on the likelihood of e-commerce adoption in the future.

Research methodology

An exploratory study was conducted to identify factors that have acted as barriers in e-commerce adoption in Punjab. Two leading industrial districts of Punjab were selected for the purpose of research. 150 micro and small enterprises engaged in manufacturing and trading sectors of Ludhiana and Jalandhar were selected for the purpose of the study. The

primary data collection was conducted through a structured questionnaire. The existing literature on developing countries revealed many significant reasons contributing towards reluctance in e-commerce adoption. Based on these studies, fifteen variables were identified as potential barriers in e-commerce adoption by small enterprises. All variables were measured on a five- point Likert Scale, ranging from 1 = 'strongly disagree' to 5 = 'strongly agree'. In order to effectively capture the main factors, the sample size was ten times of the variables identified. The sampling method used was convenience and judgment so that all industries of Ludhiana and Jalandhar city can be represented. The data was collected from industrialists manufacturing cycle parts (13%), auto parts (7%), hand tools (5%), fasteners (10%), electronic items (6%), sewing machines (7%), yarn and textiles (39%) and sports goods (13%). The data analysis techniques used in the study were descriptive statistics, reliability tests, correlation, factor analysis and regression. The mean and standard deviation of responses can be seen in Table 1. Factor analysis was conducted to identify underlying structures among the variables in the analysis. Through this procedure three factors were identified which explained the skepticism of Ludhiana and Jalandhar's small industrialists in e-commerce adoption. Later, regression analysis was applied on these factors to study the impact that they can make on the likelihood of e-commerce adoption in the future. These tests were applied using PASW Statistics software version 18.

Table 1: Barriers to e-commerce adoption

Sr.	Perception Items	Mean	Standard Deviation
1	Lack of required skills by employees	4.26	.820
2	E-commerce not suitable for products or services	3.18	.956
3	Resistance to change the existing work procedures	4.18	.920
4	Inadequate information on ICT and e-commerce set up	4.23	.896
5	Inadequate knowledge on relavant hardware and software	4.01	.824
6	Security issues with payments over the Internet	4.04	.926
7	Lack of awareness for online marketing and sales	3.10	1.096
8	Inadequate information on e-commerce benefits	3.05	.924
9	Low internet penetration in the state	3.05	1.075
10	Lack of adequate infrastructure	3.45	.890
11	Insufficient credit card and online banking system with clients	3.72	1.036
12	Ineffective legal framework for businesses using e-commerce	3.27	.826
13	Less support and policies for SMEs from government	3.91	.821
14	High Cost of E-Commerce adoption and maintenance	4.26	.927
15	Inadequate financial assistance/ credit facilities	3.27	1.031

Data analysis and interpretation

Assessing the reliability of the scale is important for analysis and without a reliable, valid scale the analysis will lead to incorrect and misleading inferences. Reliability is concerned with the extent to which any measuring procedure yields the same results on repeated trials. Internal consistency method for reliability estimation was used. Cronbach Alpha coefficient computes internal consistency reliability among a group of items combined to form a single scale. Nunnally (1978) [12] suggested that constructs can be accepted with Cronbach's alpha coefficient of more than 0.60, otherwise 0.70 should be the threshold. Cronbach's Alpha of 0.80 or more is considered significant and highly reliable. Cronbach's Alpha coefficient of overall constructs in the study was 0.878 suggesting that the scale used was reliable.

Next a correlation matrix was generated to rule out multicollinearity issues. After dropping one variable the correlation matrix (see Table 2) showed relatively low levels of correlation between variables thereby ruling out any multicollinearity.

Table 2: Correlation matrix

	V1	V2	V3	V4	V5	V6	V7	V9	V10	V11	V12	V13	V14	V15
V1	1.00	.494	.257	.524	.441	.303	.389	.276	.272	.205	.397	.422	.374	.283
V2	.494	1.00	.475	.414	.334	.348	.557	.145	.492	.221	.423	.248	.417	.184
V3	.257	.475	1.00	.652	.567	.276	.432	-.084	.184	.176	.112	.029	.334	.311
V4	.524	.414	.652	1.00	.654	.312	.381	-.084	.272	.253	.491	.271	.296	.323
V5	.441	.334	.567	.654	1.00	.441	.481	.255	.176	.128	.362	.195	.189	.393
V6	.303	.348	.276	.312	.441	1.00	.414	.365	.288	.355	.472	.333	.425	.303
V7	.389	.557	.432	.381	.481	.414	1.00	.165	.246	.039	.493	.279	.271	.017
V9	.276	.145	-.084	-.084	.255	.365	.165	1.00	.434	.376	.136	.443	.118	.217
V10	.272	.492	.184	.272	.176	.288	.246	.434	1.00	.521	.362	.435	.315	.345
V 11	.205	.221	.176	.253	.128	.355	.039	.376	.521	1.00	.353	.171	.458	.553
V12	.397	.423	.112	.491	.362	.472	.493	.136	.362	.353	1.00	.394	.212	.169
V13	.422	.248	.029	.271	.195	.333	.279	.443	.435	.171	.394	1.00	.431	.227
V14	.374	.417	.334	.296	.189	.425	.271	.118	.315	.458	.212	.431	1.00	.671
V15	.283	.184	311	.323	.393	.303	.017	.217	.345	.553	.169	.227	.671	1.00

KMO & Bartlett's Test of Sphericity, a measure of sampling adequacy is recommended to check the case to variable ratio for the analysis being conducted. In most academic and business studies, KMO & Bartlett's test play an important role for accepting the sample adequacy. While the KMO ranges from 0 to 1, the world-over accepted index is over 0.6. The Bartlett's Test of Sphericity relates to the significance of the study and thereby shows the validity and suitability of the responses collected to the problem being addressed through the study. For Factor Analysis to be recommended suitable, the Bartlett's Test of Sphericity must be less than 0.05. Results of KMO and Bartlett's Tests are shown in Table 3. KMO of 0.789 and a highly significant Bartlett's Test indicate that factor analysis can be suitably applied for further analysis.

Table 3: KMO and bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.789**
Bartlett's Test of Sphericity	Approx. Chi-Square	956.671
	df	91
	Sig.	.000

To identify factors explaining barriers in e-commerce adoption, the Principal Components Analysis was undertaken. The scree plots as well as extraction of sum of squared loadings showed three factors with Eigen value more than 1. From the rotated sum of squared loadings shown in the table below, the total percentage of variance explained by these three factors can be seen. The total variance explained is 62.558%. An orthogonal rotation conducted through Varimax method with Kaiser Normalization procedures and suppression of loadings less than 0.5 clearly shows variables being loaded on three factors. Table 4 shows the output of the rotated component matrix. The common themes identified through the Principal Component Analysis in this study are as follows:

(1) Resistance to change and innovation
(2) Lack of Technical, Infrastructural and Business Support
(3) Financial Issues

Table 4: Principal component analysis with varimax rotation for extracting factors

Statement	**Component**			**Communalities**
	Factor -1	**Factor -2**	**Factor -3**	
V4	.853	.199	.137	0.752
V3	.817	.121	.107	0.850
V5	.739	.022	.002	0.740
V7	.632	.198	.013	0.704
V2	.558	.322	.079	0.761
V1	.572	.241	.227	0.757
V13	.017	.717	.126	0.790
V9	.142	.667	.035	0.635
V10	.007	.621	.052	0.569
V12	.447	.529	.025	0.740
V6	.002	.521	.125	0.777
V15	.257	.018	.864	0.591
V11	.318	.246	.783	0.623
V14	.395	.157	.710	0.673
Eigen Value	5.265	1.947	1.463	
Variance (%)	38.213	14.620	9.725	
Cumulative Variance (%)	38.213	52.833	62.558	
Cronbach's alpha	.740	.756	.691	

- Extraction Method: Principal Component Analysis
- Rotation Method: Varimax with Kaiser Normalization
- Rotation converged in 13 iterations
- Cumulative variance was 62.558
- Communalities were more than 0.50 to as high as 0.850
- Eigen values ranged from 5.265 to 1.463

Lastly, we applied regression analysis to know if the three factors identified had a significant impact on the likelihood of e-commerce adoption in the future. The results of the regression analysis can be seen in Table 5, 6 and 7. The three factors 'resistance to change and innovation', 'lack of technical, infrastructural and business support' and 'financial issues' taken together explained significant reluctance for e-commerce adoption in the future with R^2 = .0.362, Adjusted R^2 = .0.353, $F(3, 147)$ = 28.558, MSE= 37.004, p< .001. The barriers 'resistance to change and innovation' (b= -0.498; t (147) = -5.214; p<0.001) and 'lack of technical, infrastructural and business support' (b= -0.751; t (147)= -.7.714; p<0.001) significantly predicted the skepticism for e-commerce adoption in the future. Financial issues (b= -0.037; t (147) = -0.312; p>0.001) was insignificant indicating that cost was not a constraining factor in e-commerce adoption. The Durbin-Watson statistic was computed to evaluate independence of errors and was found to be 1.624, which is considered

acceptable.

Table 5: model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	0.611	0.362	0.353	1.141	1.624

Table 6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	113.503	3	37.004	28.558	.000[a]
	Residual	192.701	147	1.320		
	Total	306.204	150			

Table 7: coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.178	.093		34.333	.000
Resistance to change and innovation	-.498	.093	-.343	-5.214	.000
Lack of Technical, Infrastructural and Business Support	-.751	.093	-.502	-7.714	.000
Financial Issues	-.037	.093	-.022	-.312	.740

Findings

The results of factor analysis confirmed that resistance to change and innovation, lack of technical, infrastructural and business support and financial issues were barriers in e-commerce adoption for Ludhiana's and Jalandhar's industrialists. While resistance to change and inability to innovate reflect an intrinsic problem which can be controlled by the industrialists themselves, the lack of technical, infrastructural and business support reveals an extrinsic problem for which the government's assistance would be necessitated. Employees lacking requisite skills, lack of information on ICT/ e-commerce set up and lack of knowledge of hardware/ software and difficulty in changing existing work procedures show entrepreneurial innovativeness lacking in Ludhiana's and Jalandhar's micro and small industrialists. This can cause loss of business opportunities considering that online marketing and sales are otherwise growing at a fast pace in India. A pertinent finding of this study is that though cost and financing issues were important factors for e-commerce adoption, they were not significant constraining factors for adoption in the future. This shows that Ludhiana's and Jalandhar's industrialists realize that the benefits of e-commerce adoption outweigh the costs and thus organizational scaling and up gradation must be given strategic importance to transform and modernize traditional ways of doing business.

The lack of logistical-infrastructural support, low internet penetration in the state, cyber security issues, inadequate legal framework for e-commerce and in general less support for MSEs press for increased business support required from the state government. The current business support is not adequately incentivizing the local industry. The journey towards digital business transformation will require more liberal support from the government to build the digital infrastructure first.

Limitations of the study

Like other empirical studies, this study is also subject to potential limitations. The data used for this study has been drawn from 150 MSEs established in Ludhiana and Jalandhar city. As is apparent, while the conclusions can be made, the study precludes generalization to MSEs in other locations. Also, the data for the study has been collected from various industrial sectors and it is not possible to make sector specific conclusions. Another limitation is the 'single response' which was collected for each organization, thus leading to the possibility of response bias. Besides, the study is conducted on the basis of set questionnaire and thus, some of the other issues in e-commerce adoption like consultancy, perceived risk, etc. may not have been taken into account. Finally, this is a quantitative study, and further qualitative research is required to gain a better understanding of the key issues.

Suggestions for overcoming barriers

As indicated in the previous section, the MSEs established in Ludhiana and Jalandhar are not fully utilizing e-commerce to create efficiencies, save cost and improve their bottom line. This section of the study is an attempt to recommend suggestions to overcome the obstacles in the path of e-commerce adoption.

1. Government needs to establish an encouraging environment for the adoption of e-commerce like facilitating transporter data flows between businesses, establishing new means for engaging in contracts (such as digital signature authentication and certification) and improving the reliability of infrastructure.
2. Lack of awareness of the potential benefits of e-commerce among MSEs suggests that government needs to be more proactive in taking an educational role.
3. The lack of adequate skills needed to implement and maintain the IT system is another major concern which can be addressed by incorporating baseline technology training into small business training courses. Also course-driven training programmes under a multi-stakeholder approach, in which the Government, industry and training organisations collaborate to design certifiable curriculums,

and to pool the necessary resources including trainers and infrastructure will be most effective.
4. Cost issue though not very significant can be addressed by making a concerted effort to help small business owners understand the specific and measurable Return on Investment (ROI) in technology.
5. Subsidy programmes, either from the Government, NGOs or other organisations can be a driving factor of technology adoption among MSEs. Affordable alternatives, such as easy instalments, credit options, etc. should be designed and implemented as a sustainable way to address cost concerns.

Conclusion

MSEs are the life blood of the financial capital of Punjab. Recognizing the significance of this sector in the growth strategy, the Government has designed and executed forward-looking and impactful programmes and schemes to help small businesses succeed in an increasingly competitive global economy. Nevertheless, there remain a number of challenges that stand in the way of the growth of this sector; barriers to e-commerce adoption being the most critical of all. It is recognized that in order to identify and implement impactful solutions for overcoming the various impediments in the adoption of e-commerce, a collaborative approach with dedicated drivers and contributors is needed. Ultimately, it is believed that a multi-stakeholder approach – a collective effort between the government, banking sector, training organizations and MSEs themselves – is the most effective way to tackle the significant barriers identified through the research. Indeed, only through this concerted approach, the gap in e-commerce adoption can be bridged and Ludhiana and Jalandhar, the industrial cities of the country can contribute significantly in making it a global brand.

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