MSMEs in Emerging Markets : An Exploration of the Stage Model of E-Commerce Adoption

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Abstract

Purpose : This paper aimed to develop a holistic e-commerce adoption model and explore the significant factors at various stages of e-commerce adoption in emerging markets in micro, small, and medium enterprises (MSMEs).

Design/Methodology/Approach : A research model was developed by combining the diffusion of innovation and technological-organizational-environmental models with a staged model. A purposive sampling method was followed, and 384 MSME units were selected. A quantitative approach was used with a structured questionnaire as a research instrument.

Findings : The factors that influence the adoption of e-commerce were observed in two ways; one is a sequential way where an enterprise starts with primary e-mail and, step by step, reaches the most advanced stage, which included not only online ordering but also online payment capabilities. Furthermore, while moving to advanced stages of e-commerce adoption, enterprises follow a nonsequential way, where an enterprise could skip some stages while moving to complex stages of e-commerce adoption.

Research Implications : Various stakeholders would understand the barriers faced by the MSMEs in emerging markets so that necessary steps could be initiated to tackle this issue.

Originality/Value : The study proposed a novel, holistic e-commerce adoption model and addressed the research gap by seeking to understand how MSMEs in India were adopting e-commerce by exploring their level and sequence of adoption.

Keywords : **micro, small, and medium enterprises, electronic commerce, information and communication technology, diffusion of innovation**

JEL Classification Codes : L81, M31, O14

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A report by the UN and World Bank has argued that micro, small, and medium enterprises (MSMEs) would be the main contributors to employment and income, particularly for poor and marginalized people of the world, and hence, act as essential tools in realizing the 17 sustainable development goals (SDGs) (UN-DESA, 2020). MSMEs are the backbone of an economy because of their significant contribution to GDP, employment, the balanced growth of rural and urban areas, etc. Where liberalization and globalization have slowed down the development of these units, it has also allowed these enterprises to grow beyond geographical

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boundaries through e-commerce. Unprecedented opportunities can be explored through e-commerce, strengthening the enterprise (Al-Tit, 2020; Tomar, 2017; Villa et al., 2018; Yadav & Mahara, 2018). There are millions of success stories in developed nations where enterprises have earned and are earning a lot through e-commerce, but there are some hesitations in developing nations in the adoption of e-commerce (Al-Tit, 2020; Dahbi & Benmoussa, 2019; Kurup & Jain, 2018). There is a need to review various theories and models of technology adoption framed by multiple researchers from time to time. But, as per some authors, these theories and models were prepared based on situations prevailing in developed nations, so they lose their applicability in developing nations. So, as a handful of such studies have been done in developing nations, time demands more studies in developing economies also (Dahbi & Benmoussa, 2019; Herzallah & Mukhtar, 2016).

Moreover, technology adoption is not a single-step action. There are stages of e-commerce adoption, from simple e-mailing to the fully advanced stage of integrated websites. An enterprise may start either sequentially from simple emailing or nonsequentially, i.e., skipping in-between stages. It was also observed that sometimes, an enterprise cannot proceed to the next stage of e-commerce adoption (Al-Somali et al., 2015). So, this paper focuses on finding out various factors that hinder the adoption of e-commerce and its progression to different stages, either sequentially or non-sequentially, till it reaches the most advanced stage.

As one of the leading emerging markets, India has huge prospects to grow with e-commerce due to increasing digital transactions, an enormous proliferation of smartphones, a swelling rate of internet subscribers, etc. India stands in the second place after China with its 833 million internet users, with China in the first place with 1,010 million internet users and the United States in the third place with 534 million internet users (Internet World Stats, 2022). To grow further, Indian MSMEs must explore this opportunity to enter new markets and add new customers with new products and services. But it has been found that there is low enthusiasm in these enterprises to adopt e-commerce, as the study done by KPMG and Google showed that 68% of Indian MSMEs were using traditional ways of conducting business and were utterly offline, 15% were using the internet only for communication and gathering information, 15% had their websites, and only 2% were transacting online (KPMG & Google, 2017).

The study focuses on Punjab's industry, which is a Northern state of India. MSMEs dominate the industry of Punjab, with 99% of the sector being constituted by these enterprises (Economic and Statistical Organisation, Department of Planning, Government of Punjab, 2020). These enterprises are crucial for the growth and development of Punjab. Punjab has 206,095 MSME units (Economic and Statistical Organisation, Department of Planning, Government of Punjab, 2020). Punjab is named the granary of India as it contributes around 40% to the central pool of wheat and 24% to rice. It is India's second-largest producer of cotton and blended yarn. It is a significant exporter of spinning apparel and hosiery products. State-of-the-art infrastructure is available in the state. It has been ranked as the number one state in India by the World Bank for showing progress in solar energy. Moreover, it is the second most preferred state in North India for holidays and recreation (Department of Industries & Commerce, Government of Punjab, 2021).

Punjab has a vast scope to grow with e-commerce as the state stands second in India after Delhi for its internet subscribers, 76.96 per 100 people, compared to Delhi with 163.65 (IAMAI, 2019). Moreover, it has a robust telecom infrastructure with almost 100% coverage and high-speed 5G connections ("Punjab: Jio launches 5G services in tricity," 2022). So, there is a need to study the determinants of e-commerce adoption in the context of Punjab's MSMEs to help the adoption process progress.

Literature Review

Theoretical and Empirical Review of Literature

When an innovation is introduced, it is either accepted or rejected by its users. Various reasons have influenced the

adoption decisions of the users. Scholars and researchers have framed multiple theories and models from time to time that assist in understanding the determinants of e-commerce adoption. Some of the essential and well-known theories and models include diffusion of innovation (DOI), theory of reasoned actions (TRA), theory of planned behavior (TPB), technology acceptance model (TAM), technological-organizational-environmental (TOE) model, and unified theory of acceptance and use of technology (UTAUT) model. Individually, the DOI model is more powerful than the TRA, TPB, and TAM models, but it fails to determine how to measure innovation adoption. But this limitation of DOI can be addressed by collaborating with the TOE model (Ochola, 2013). The combination of DOI and TOE models has been widely used in studies concerning website adoption, ERP systems, collaborative commerce, E-business, software applications, telemedicine, and e-commerce adoption by SMEs (Rahayu & Day, 2015).

The literature concerning the factors of adoption influencing e-commerce was also reviewed. Various factors have been identified that influence the adoption of e-commerce. These factors are related to the combination of DOI and TOE models. The technological aspects of the DOI model, like relative advantage, complexity, compatibility, trialability, and observability, have been added to the organizational and environmental factors of the TOE model.

Relative Advantage

The scale of perception makes an innovation advantageous to an enterprise. The more the perception of relative advantage, the greater the pace of innovation adoption (Rogers, 2010). A firm can enjoy multiple benefits by embracing technology, including improved satisfaction, convenience, cost reduction, time-saving, and efficiency (Al-Tit, 2020). Different researchers have explored this factor with measures like perceived benefits (Rahayu & Day, 2015), perceived usefulness of technology (Makame et al., 2014), new business opportunities (Osorio-Gallego et al., 2016), and improved job performance (Dlodlo & Dhurup, 2013). Various researchers that have found this factor to be a significant factor in the adoption of technology include Dlodlo and Dhurup (2013), Al-Somali et al. (2015), Rahayu and Day (2015), Sin et al. (2016), and Herzallah and Mukhtar (2016). But other authors have found it insignificant (Chee et al., 2016). The differences in the findings of different researchers regarding the perception of the relative advantage of innovation as a significant or insignificant factor create a research gap to be explored further in this study. Hence, it is hypothesized :

↳ **Ha1 :** The perception of the relative advantage of e-commerce is positively and significantly related to the decision to adopt it.

Compatibility

Compatibility is the degree to which an innovation is comparable to the existing morals, values, work practices, customs of the users, and the IT infrastructure (Al-Somali et al., 2015). There are high chances of rejection when a new technology is incompatible with the current system (Rogers, 2010). Various items for measuring this variable have been adopted, like compatibility with a type of business, compatibility with existing IT structure (Dahbi & Benmoussa, 2019), and compatibility with the organization's culture (Ahmad et al., 2015). Various researchers have found compatibility to be a significant factor in adopting e-commerce (Dlodlo & Dhurup, 2013; Herzallah & Mukhtar, 2016). But some authors have opposite findings (Rahayu & Day, 2015). As the compatibility of an existing system with innovation is generally assumed to support its adoption, the following hypothesis of the research is:

↳ **Ha2 :** The perception of the compatibility of e-commerce significantly influences the decision to adopt it.

Complexity

Complexity is the perception of innovation as difficult and challenging to understand by its users (Rogers, 2010). Some innovations are easy to learn and use, while others require specific skills and are difficult to understand. The more complexity of innovation, the lower will be its rate of adoption (Dlodlo & Dhurup, 2013; Herzallah & Mukhtar, 2016). But Kilangi (2012) found the opposite results. So, the following hypothesis is:

↳ **Ha3 :** The perception of the complexity of e-commerce has a statistically significant relation with its adoption.

Trialability

It is the degree to which an innovation can be tried and tested before its adoption (Rogers, 2010). The chances of adoption of an innovation improve if it can be experimented with as the user gets familiar with it, which enhances his/her confidence to adopt it (Qashou & Saleh, 2018). But some authors found the opposite results, stating that it was an insignificant factor in innovation adoption. So, the following hypothesis is proposed:

↳ **Ha4 :** Trialability has a significant influence on the decision to adopt e-commerce.

Observability

It is the scale to which innovation results can be observed and communicated to other potential adopters. There are greater chances of adopting an innovation when others can see its benefits. The greater the degree of observability, the higher the adoption rate (Qashou & Saleh, 2018). So, the following hypothesis is proposed :

↳ **Ha5 :** Observability is significantly related to the adoption of e-commerce.

Cost

The cost consists of expenditures on the installation and maintenance of an innovation. Generally, the cost of an innovation is compared with the expected benefits before its adoption. The higher the cost of investment in technology, the lower its adoption (Socrates Kwadwo et al., 2016). The higher cost is an obstacle that hinders the adoption of the technology (Al-Tit, 2020; Oluyinka et al., 2014; Osorio-Gallego et al., 2016). So, the cost of technology has a negative and statistically significant relationship with the adoption of technology. Hence, it is hypothesized that :

↳ **Ha6 :** The perception of cost has a significant relationship with adopting e-commerce.

Security

Security is the degree to which a user feels insecure when performing digital transactions. It is a more significant issue for MSMEs when a decision regarding adopting e-commerce is taken. There is a risk of data hacking, virus attacks, etc., due to which online transactions are considered highly untrustworthy (Al-Tit, 2020; Osorio-Gallego et al., 2016). But some researchers found security concerns insignificant (Al-Somali et al., 2015). Hence, it is hypothesized that :

↳ **Ha7 :** Security concerns significantly influence the decision to adopt e-commerce.

Owner's Characteristics

The decision-making power concerning an enterprise is vested in its owner. The characteristics of the owner have been measured in various ways in the literature, like owner's gender, owner's age, owner's or manager's support (Arora & Rathi, 2019), owner's innovativeness and capability (Rahayu & Day, 2015), owner's level of education, owner's attitude and intention to growth (Makame et al., 2014). Hence, it is hypothesized that :

- **Ha8 :** Owner's characteristics contribute significantly to the decision to adopt e-commerce adoption.

Organization's E-Readiness

The e-readiness of an organization promotes the adoption of e-commerce. The organization's e-readiness includes the availability of financial resources (Kusumaningtyas & Suwarto, 2015), employee's technical skills (Hassen & Svensson, 2014), and the availability of IT resources (Dahbi & Benmoussa, 2019).

- **Ha9 :** Organizational e-readiness significantly contributes to the decision to adopt e-commerce.

Market Force Influence

Market force is a wider term and includes the pressure of trading partners, buyers, and suppliers (Al-Somali et al., 2015). It consists of various items like trading partners' pressure on the adoption of e-commerce (Dahbi & Benmoussa, 2019), the culture of trading, the tradition of "touch and feel" before buying a product, the culture of bargaining (Kabanda & Brown, 2015), and trust in digital transactions (Madhava Priya et al., 2019; Makame et al., 2014). However, this factor was insignificant, as per the findings of some researchers (Rahayu & Day, 2015). Hence, it is hypothesized that :

- **Ha10 :** Market forces significantly influence the decision to adopt e-commerce.

Technology Vendor Support

It includes the people who provide counseling and support in adopting the technology. They assess the business needs, suggest appropriate infrastructure, and also help in its implementation. Experienced and qualified technology vendors help the users implement the technology with timely advice and quick solutions (Socrates Kwadwo et al., 2016). Hence, it is hypothesized that :

- **Ha11 :** Technology vendor support has a significant relationship with adopting e-commerce.

Competitive Pressure

The pressure created by competition improves the potential of e-commerce adoption. So, more competition implies a huge rate of e-commerce adoption (Al-Tit, 2020; Sin et al., 2016). But some researchers found it insignificant (Rahayu & Day, 2015). Hence, it is hypothesized that :

- **Ha12 :** Competitive pressure significantly influences the decision to adopt e-commerce.

National E-Readiness

It comprises government support and sound national infrastructure (Osorio-Gallego et al., 2016). The strong

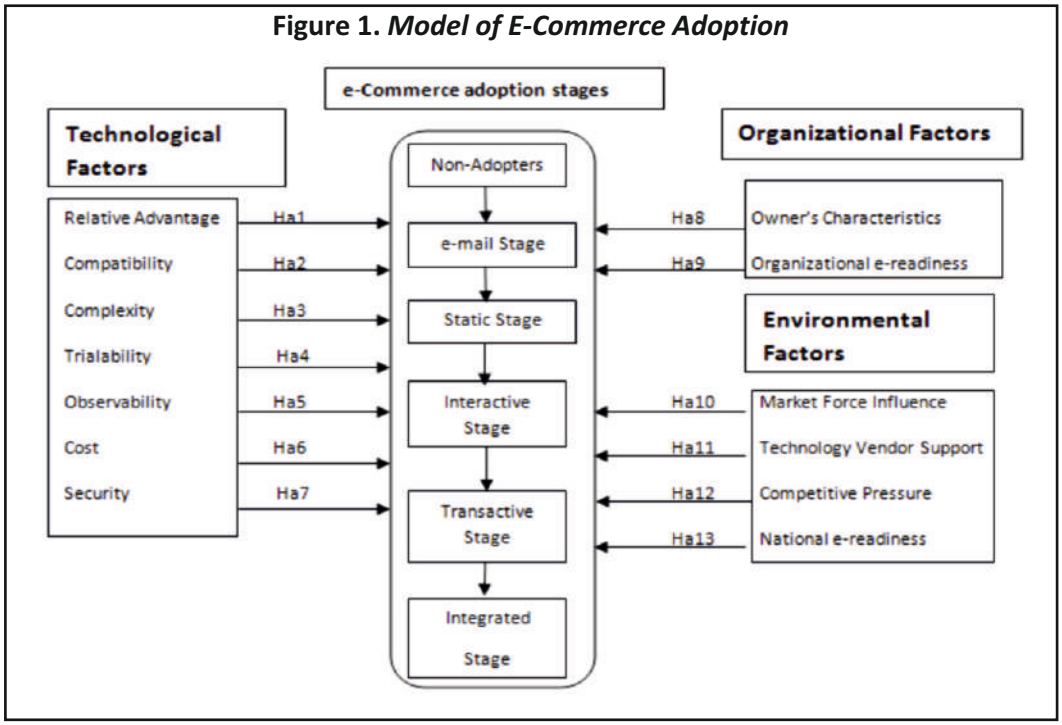
infrastructure boosts the users' confidence in accepting an innovation. It includes good internet connections, the required speed of the internet, the availability of sufficient internet service providers, sufficient power (Dahbi & Benmoussa, 2019), good and reliable telecommunication infrastructure (Kabanda & Brown, 2015), adequate infrastructure for efficient transport and delivery, and reliable e-financial facilities (Chauhan et al., 2016). Hence, it is hypothesized that :

↳ **Ha13 :** National e-readiness significantly contributes to the decision to adopt e-commerce.

Staged Model of E-Commerce Adoption

Earlier, most studies concerning e-commerce adoption viewed technology adoption from two broader angles, i.e., adopters or non-adopters. But technology adoption is not a single-stage phenomenon. A firm generally progresses through various stages in adopting technology, from simple applications to more complex ones. So, the staged models provide better insights into the determinants of e-commerce adoption at multiple stages of adoption. From time to time, different researchers have contributed different staged models of e-commerce adoption (Al-Somali et al., 2015). It is observed that most of the researchers suggested a standard sequence, starting from the simple one to more complex stages. So, based on these suggestions, a model (Figure 1) has been framed with six stages, starting from non-adopters to the integrated stage. Stage zero is for non-adopters, stage one consists of enterprises at the e-mail stage, and stage two is static, where an organization has a website for advertising goods and services only (Al-Somali et al., 2015). Stage three is interactive, where a firm uses the website for advertising, receiving online inquiries, and customer and supplier feedback. Stage four is transactive, where online buying and selling can be done, including through third-party e-marketplaces, and the fifth stage is integrated, where the business processes are integrated with the stakeholders of the business and handle processes such as customer relationship management and supply chain management.

Figure 1. ***Model of E-Commerce Adoption***



Research Methodology

In this empirical research, a purposive sampling method has been used, and three main industrial districts of Punjab, i.e., Ludhiana, Jalandhar, and Amritsar, were selected out of a total of 22 districts in Punjab. These three districts have 59,432, 19,650, and 24,855 units, respectively, which comprise around half of the industrial units of Punjab (Economic and Statistical Organisation, Department of Planning, Government of Punjab, 2020). A total of 384 MSMEs from the manufacturing and services sectors were selected from February 2021 to January 2022. Data analysis was done with SPSS software version 22, and multiple logistic regression was applied. For verifying the discriminant and convergent validity of the constructs, IBM SPSS Amos 26 Graphics was used. CEOs/managers of the enterprises were the respondents of the study. Likert scale questions were assigned to 13 constructs related to technological, organizational, and environmental factors. Each construct had three to seven items from the survey supported by the authors in their earlier empirical studies.

Analysis and Results

Preliminary Analysis

Before moving further, it was ensured that the data was fit for the test. Various tests were applied for primary research, like data screening, multicollinearity check, and confirmatory factor analysis. To ensure construct validity, convergent validity, composite reliability, and discriminant validity were observed. All the statistics were within the recommended range. So, it is assumed that the data was fit for further analysis.

Findings

As per some authors, e-commerce adoption takes place in stages in a sequential manner. A firm progresses through

Table 1. ***Level of Significance Between Sequential Stages of Adoption of E-Commerce***

Variables/ E-Commerce Adoption Stages	Non-Adopter vs. E-mail Stage		E-mail Stage vs. Static Stage		Static vs. Interactive Stage		Interactive vs. Transactive Stage	
	β	***p*-value**	β	***p*-value**	β	***p*-value**	β	***p*-value**
Relative Advantage	.113	0.462	.094	0.634	.209	0.354	**1.010**	**0.024**
Compatibility	.359	0.088	.362	0.105	.006	0.978	**1.281**	**0.005**
Complexity	**–.390**	**0.014**	–.014	0.947	–.266	0.294	–.509	0.145
Trialability	.243	0.211	–.449	0.074	.362	0.134	.090	0.761
Observability	–.031	0.863	**.647**	**0.008**	–.304	0.223	.089	0.709
Cost	.193	0.245	–.233	0.300	–.241	0.369	.136	0.696
Security	**–.434**	**0.005**	–.228	0.245	–.048	0.823	–.137	0.642
Owner's Characteristics	–.168	0.280	.064	0.749	.198	0.386	.041	0.889
Organization E-Readiness	.284	0.262	.253	0.339	.235	0.272	.193	0.410
Market Force Influence	–.192	0.330	**.457**	**0.050**	.170	0.426	.209	0.335
Technology Vendor Support	.366	0.164	**.900**	**0.008**	–.205	0.556	–.317	0.415
Competitive Pressure	.275	0.202	–.398	0.126	**.474**	**0.050**	.204	0.457
National E-Readiness	–.217	0.225	.185	0.431	.395	0.174	–.534	0.231

a particular sequence in the adoption of the technology. Multiple logistic regression was applied to understand the significant influencing factors within different sequential stages of e-commerce adoption. Table 1 shows the various e-commerce adoption factors for sequential stages, i.e., from non-adopters to e-mail, e-mail to static, static to interactive, and interactive to transactive stage.

It can be observed from Table 1 that significant factors are different at different stages of the adoption of e-commerce. So, enterprises at different levels of technology adoption perceive the elements differently. Significant factors within the sequential stages are relative advantage, complexity, compatibility, security, observability, technology vendor support, market force influence, and competitive pressure. The other factors are found to be insignificant.

Direction of Association

The (+/–) sign of the beta coefficient signifies the direction of correlation between the predictor and outcome variables. The positive sign suggests that with an increase in the predictor variable, there are positive odds of being in the higher stages of e-commerce adoption. Similarly, the negative beta coefficient states that with an increase in the predictor variable, there are negative odds of being present in the higher stages of technology acceptance.

Odds Ratio

The odds ratios (exponent β) of these factors are inspected to understand the effect of significant factors within the sequential stages. Odds ratios indicate the change in odds of the outcome variable with a unit change in the predictor variable. The odds ratio above one signifies a positive relationship, and the below one specifies a negative relationship. In the first column, complexity and security have odds ratios below one that show the negative relationship of complexity and security with the e-commerce adoption levels. Hence, a unit increase in complexity and security concerns leads to negative odds of 0.677 times and 0.648 times (respectively) for a company to be at the higher stage than in the non-adopters stage, which means that the more complex and insecure the adoption process, the more chances are that the enterprises will be at the non-adopters stage. So, these two factors are a barrier for non-adopters to move to higher stages. A comparison of e-mail and the static stage (Table 2) shows that with every unit rise in observability, market force influence, and technology vendor support, there are 1.910, 1.579, and 2.459, respectively, times higher odds of being in the static stage as compared to the e-mail stage, which means that when MSMEs observe others earning profits through e-commerce, they are more likely to adopt e-commerce and its allied processes.

Table 2. ***Odds Ratios for Sequential E-Commerce Adoption Stages***

Factors	Non-Adopters-E-mail Stage	E-mail-Static Stage	Static-Interactive Stage	Interactive-Transactive Stage
Relative Advantage	–	–	–	2.747
Compatibility	–	–	–	3.601
Complexity	0.677		–	–
Observability	–	1.910	–	
Security	0.648		–	–
Market Force Influence	–	1.579	–	–
Technology Vendor Support	–	2.459	–	–
Competitive Pressure	–	–	1.607	–

Table 3. ***Influencing Factors at Nonsequential Stages of E-Commerce Adoption***

Variables/ Stages of E-Commerce Adoption	Non-Adopters to Static Stage		Non-Adopters to Interactive Stage		Non-Adopter to Transactive Stage		E-mail Stage to Interactive Stage		E-mail to Transactive Stage		Static to Transactive Stage	
	β	**Sig.**	β	**Sig.**	β	**Sig.**	β	**Sig.**	β	**Sig.**	β	**Sig**
Relative Advantage	.207	.281	.416	.071	1.427	**.003**	.303	.192	1.31	**.006**	1.22	**.009**
Compatibility	.721	**.002**	.727	**.004**	2.008	**.000**	.368	.123	1.64	**.001**	1.28	**.006**
Complexity	–.405	.056	–.671	**.009**	–1.18	**.002**	–.280	.278	–.789	**.042**	–.775	**.040**
Trialability	–.206	.396	.156	.571	.246	.499	–.087	.756	.004	.992	.452	.172
Observability	0.616	**.010**	.312	.245	.401	.219	.343	.201	.432	.184	–.215	.478
Cost	–.041	.854	–.281	.301	–.146	.705	–.474	.081	–.338	.377	–.105	.779
Security	–.663	**.001**	–.711	**.002**	–.847	**.011**	–.276	.214	–.413	.210	–.185	.563
Owner's Characteristics	–.104	.598	.094	.690	.135	.687	.262	.266	.303	.365	.239	.461
Organizational E-Readiness	.537	.061	.772	**.008**	.966	**.006**	.489	.066	.682	**.036**	.429	.122
Market Force Influence	.265	.252	.435	.083	.644	**.033**	.627	**.011**	.836	**.005**	.379	.152
Technology Vendor Support	1.26	**.000**	1.06	**.004**	.744	.126	.695	.057	.378	.431	–.522	.252
Competitive Pressure	–.123	.634	.351	.120	.555	.113	.076	.782	.280	.416	.678	**.030**
National E-Readiness	–.032	.888	.363	.219	–.170	.721	.580	**.050**	.046	.923	–.138	.767

Similarly, the more is the technology vendors' support and the pressure of trading partners, etc., the greater are the chances that the organization will progress to the upper adoption stages. In the third column, with every unit increase in competitive pressure, the odds of being in the interactive stage are 1.607 times higher than in the static stage. Hence, it can be inferred that when an organization perceives more competitive pressure, it pressurizes these enterprises to move to advanced stages of the adoption to face the competition. Lastly, with every unit increase in relative advantage and compatibility, there are 2.74 and 3.60 (respectively) times higher odds of being in the transactive stage than being in the interactive stage, which means that the higher the relative advantage of technology and its compatibility with the existing circumstances of the company, the higher are the chances to move to higher stages of adoption.

A firm benefits the most at the highest level of adoption as compared to the lower levels (KPMG & Google, 2017). Another thing observed in the literature shows that an enterprise may not follow a particular sequence while moving to advanced stages of e-commerce adoption. An enterprise can skip some stages without passing through them. So, to understand the significant factors of e-commerce adoption within the nonsequential stages of e-commerce, different non-sequential combinations of various stages were made, and the results are shown in Table 3.

Table 3 shows that the number of influencing factors between the non-adopters and the transactive staged MSMEs is the highest as the gap between these levels of e-commerce adoption is the maximum. Here, various factors like perception of the low relative advantage of technology, complexity, low compatibility, security concerns, low market force influence, and organizational e-readiness are the significant determinants for moving to the transactive stage. Observability, compatibility, technology vendor support, and security are significant between non-adopters and static stage. The comparison of non-adopters to the interactive stage shows significant factors in complexity, compatibility, organizational e-readiness, security, and technology vendor support. The assessment of the e-mail stage with the interactive stage reveals that the factors: market force influence and

national e-readiness are significant factors. When the e-mail stage is compared to the transactive stage, relative advantage, complexity, compatibility, market force influence, and organizational e-readiness are found to be significant. Technological variables such as relative advantage, compatibility, and complexity impact the static stage. One more environmental factor of competitive pressure is added at this stage, which shows that the MSMEs at the static stage feel low competitive pressure compared to the MSMEs at the transactive stage, which keeps them at the lower stage.

Odds Ratios

Odds ratios (exponent β) for various nonsequential e-commerce adoption levels are also examined. The comparison of non-adopters with the static stage reveals security, compatibility, observability, and technology vendor support as significant factors. The odds ratios of these factors are .516, 2.056, 1.851, and 3.545, respectively (Table 4). Odds ratios of compatibility, observability, and technology vendor support are more significant than one. In contrast, the value is less than one for security depicting a negative relationship with the outcome variable. So, it can be interpreted that with a one-unit increase in compatibility, there will be 2.056 times higher odds of being in the static stage than in the non-adopters stage, keeping all other factors constant. Similar interpretations are for observability and technology vendor support. For security, it can be stated that with each unit increase in security concerns, there will be a.516 decreasing odds of being in the static stage. Hence, security concerns are barriers to growth in the use of e-commerce. For non-adopters and the transactive stage, the strongest factor discriminating between the two is compatibility, relative advantage, and so on. For the e-mail and interactive stages, market force influence and national e-readiness are significant, which shows that with every unit increase in market force influence, there are 1.872 times higher odds of being in the interactive stage than in the e-mail stage, keeping all other factors constant.

Similarly, with every unit increase in national e-readiness, there are 1.786 times (Table 4) the odds of being in the interactive stage than in the e-mail stage, keeping all other factors constant. It means that the greater the market force influence and the stronger the national infrastructure, the higher the probability of higher e-commerce adoption levels. Again, in the e-mail stage, the compatibility factor has more influence than the relative advantage, although both are found to be significant. It means the greater the compatibility of e-commerce with culture, work

Table 4. ***Odds Ratio for Nonsequential Stages of E-Commerce Adoption***

Variables	Non-Adopters-Static Stage	Non-Adopters-Interactive Stage	Non-Adopters-Transactive Stage	E-mail-Interactive Stage	E-mail-Transactive Stage	Static-Transactive Stage
Relative Advantage	–	–	4.165		3.719	3.386
Compatibility	2.056	2.068	7.447	–	5.201	3.622
Complexity		.511	.307	–	0.454	0.461
Observability	1.851	–	–	–	–	–
Security	0.516	0.491	0.429	–	–	–
Organizational E-readiness	–	2.165	2.62	–	1.978	–
Market Force Influence	–	–	1.90	1.872	2.307	–
Technology Vendor Support	3.545	2.889	–	–	–	–
Competitive Pressure	–	–	–	–	–	1.970
National E-readiness		–	–	1.786	–	–

practices, type of business, etc., the greater the possibility of reaching advanced e-commerce adoption levels. Lastly, the static stage is compared with the transactive stage, and the results show that compatibility, competitive pressure, and relative advantage are the positive factors. In contrast, complexity is a deterrent to technology adoption.

Discussion

The study results can be concluded from Table 5 and Table 6. The results of the hypotheses are shown in two ways, i.e., sequential as well as nonsequential. It can be inferred from Table 5 that technological factors affect non-adopters in the e-mail stage, e-mail-static stage, and interactive–transactive stage. It has no significant effect between the static and interactive stages. Organizational factors are not significant in the sequential stages of e-commerce adoption. Environmental factors are substantial between the e-mail-static stage and the static-interactive stage. For nonsequential stages of e-commerce adoption, as shown in Table 6, it can be seen that the technological factors have a significant influence within all the nonsequential stages except the e-mail-interactive stage. Organizational factors influence the non-adopters-interactive stage, non-adopters-transactive stage, and e-mail-transactive stage. Environmental factors significantly influence all the nonsequential stages of e-commerce adoption.

Table 5. ***Results of Hypotheses for Sequential Stages of E-Commerce Adoption***

Factors/Stages	Non-Adopters-E-mail Stage	E-mail Stage-Static Stage	Static Stage-Interactive Stage	Interactive Stage-Transactive Stage
Ha1	Rejected	Rejected	Rejected	**Accepted**
Ha2	Rejected	Rejected	Rejected	**Accepted**
Ha3	**Accepted**	Rejected	Rejected	Rejected
Ha4	Rejected	Rejected	Rejected	Rejected
Ha5	Rejected	**Accepted**	Rejected	Rejected
Ha6	Rejected	Rejected	Rejected	Rejected
Ha7	**Accepted**	Rejected	Rejected	Rejected
Ha8	Rejected	Rejected	Rejected	Rejected
Ha9	Rejected	Rejected	Rejected	Rejected
Ha10	Rejected	**Accepted**	Rejected	Rejected
Ha11	Rejected	**Accepted**	Rejected	Rejected
Ha12	Rejected	Rejected	**Accepted**	Rejected
Ha13	Rejected	Rejected	Rejected	Rejected

Table 6. ***Results of Hypotheses for Nonconsecutive Stages of E-Commerce Adoption***

Factors/Stages	Non-Adopters-Static Stage	Non-Adopters-Interactive Stage	Non-Adopters-Transactive Stage	E-mail-Interactive Stage	E-mail-Transactive Stage	Static-Transactive Stage
Ha1	Rejected	Rejected	**Accepted**	Rejected	**Accepted**	**Accepted**
Ha2	**Accepted**	**Accepted**	**Accepted**	Rejected	**Accepted**	**Accepted**
Ha3	Rejected	**Accepted**	**Accepted**	Rejected	**Accepted**	**Accepted**

Ha4	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
Ha5	**Accepted**	Rejected	Rejected	Rejected	Rejected	Rejected
Ha6	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
Ha7	**Accepted**	**Accepted**	**Accepted**	Rejected	Rejected	Rejected
Ha8	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected
Ha9	Rejected	**Accepted**	**Accepted**	Rejected	**Accepted**	Rejected
Ha10	Rejected	Rejected	**Accepted**	**Accepted**	**Accepted**	Rejected
Ha11	**Accepted**	**Accepted**	Rejected	Rejected	Rejected	Rejected
Ha12	Rejected	Rejected	Rejected	Rejected	Rejected	**Accepted**
Ha13	Rejected	Rejected	Rejected	**Accepted**	Rejected	Rejected

Theoretical and Managerial Implications

Theoretically, this study develops an integrated model to better explain e-commerce adoption in MSMEs. This research can be helpful to policymakers to evade the innovative predisposition while considering the present status of e-commerce adoption and advancement in the SME universe and, subsequently, help plan the activities expected to help the SMEs build up a carefully arranged business. At long last, as an additional progression, it very well may be fascinating to research how the degrees of advanced interactions such as artificial intelligence are identified with factors such as, for example, the business where the MSMEs work and the firm size. Some of the findings from the model's application in the Indian context are surprising as many findings are similar to those in Western developed nations. However, one prominent factor that makes a difference is the rapidly growing government encouragement for MSMEs to uptake and financially support e-commerce growth. The factors that influence the adoption of e-commerce and its different adoption stages, such as sequential and nonsequential paths, have been discussed above with respect to stages of adoption and factor types; without the new stage-oriented model, these might not have been revealed in such detail. Thus, the findings from this study have important implications for managers involved in introducing e-commerce to MSMEs in emerging markets.

Conclusion

The purpose of the study is to find out the various factors that affect the adoption of e-commerce by MSMEs in emerging markets. Punjab, which has huge prospects to grow with e-commerce, was chosen for the study. The factors that influence the adoption of e-commerce are observed in two ways, one is sequential, assuming that enterprises follow a sequential path while moving to advanced stages of e-commerce adoption, and another is nonsequential, where an enterprise can skip some stages while moving to complex stages of e-commerce adoption. So, in this research, significant factors for adopting e-commerce at different stages have been found. This study will help various stakeholders understand the barriers MSMEs face in emerging markets so that necessary steps can be initiated to tackle this issue.

Limitations of the Study and Scope for Future Research

The limitation of the study is that the variables were derived from existing literature. There may be some other unexplored variables that may affect e-commerce adoption. Qualitative or longitudinal research may be conducted on the subject. Moreover, other channels, like social media, mobile commerce, etc., may be considered by researchers in future research.

Authors' Contribution

Dr. Pawan Kumar conceived the idea, extracted all the relevant research papers from journals of high repute, and came up with the research gap. Dr. Gursimranjit Singh framed the questionnaire and did face validity and content validity checks. Dr. Harpreet Kaur helped in collecting the primary data and performing various analyses. She also wrote the manuscript in consultation with Dr. Pawan Kumar and Dr. Gursimranjit Singh.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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