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Level of e-commerce application by micro, small and medium enterprises (MSMEs) in San Jose, Occidental Mindoro

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Abstract

This study identifies the level of e-commerce application by micro, small and medium enterprises in San Jose, Occidental Mindoro. It establishes the scope of their e-commerce application in terms of technology, organization and environment (TOE). The hybrid exploratory-sequential methodology was employed. For the qualitative part, the thirty owners of registered MSMEs assisted by the Department of Trade and Industry (DTI) for the calendar year 2022 were tapped. Thematic analysis was used to evaluate the qualitative data and the descriptive correlational method was used to analyze the quantitative data. A self-made questionnaire that had been expertly validated and had its reliability tested using the split-half method served as the research instrument. It had a very high level of reliability. It was administered to two hundred twenty-three (223) respondents. Frequency, percentage, mean and ranking were used for the descriptive statistics, and to test the relationship, the Partial Least Square-Structural Equation Modeling (PLS-SEM) was employed. MSMEs' decision to adopt e-commerce was influenced by technological, organizational and environmental factors. It was then concluded that there is a significant relationship between the MSMEs' level of e-commerce application and their profile. A significant relationship between the MSMEs' level of e-commerce application and the extent of e-commerce was also established. Henceforth, the researcher recommends a more structured program and strategies considering all the technological, organizational and environmental factors, as well as the individual characteristics of the owners, which could possibly influence the MSMEs' decision to adopt and further utilize e-commerce.

Keywords: E-commerce, Micro, Small and Medium Enterprises (MSMEs), TOE factors, hybrid exploratory-sequential, partial least square-structural equation modeling

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1. Introduction

The Internet has drastically transformed the way we live. It is so powerful that it can change the world and has managed to erase the borders between countries and societies and take civilization to a different level altogether. Today, no facet of our lives is not interfaced with the internet in one way or the other. In 2020, the number of internet users in the Philippines grew to approximately 79.7 million people, accounting for more than half of the total population (Statista,2021). Moreover, the Digital 2022 report of social media management firm *Hootsuite* and creative agency *We Are Social* reported that Filipinos spent an average of 10 hours per day using the internet (Baclig, 2022). As more Filipino consumers are engrossed in a very digital lifestyle, the Electronic Commerce (E-commerce) industry in the Philippines holds much potential.

The rise of technology, particularly the Internet, has changed the way goods and services are sold, purchased, and advertised. Instead of a physical marketplace, transactions are now conducted remotely via the Internet and computer networks, which is much faster and cheaper. By leveraging connectivity and technology, e-commerce enables businesses to grow and share opportunities (https://ecommerce.dti.gov.ph). In addition to acting as a new channel to serve new customers, e-commerce can replace the high cost of leasing and training staff for brick-and-mortar stores. It also allows the flexibility to process orders outside of normal store hours and allows businesses to continue operating when their physical locations are inaccessible or closed (https:/www.sunstar.com.ph). Ultimately, e-commerce contributes significantly to the country by resolving regional imbalances and disparities, enabling micro-enterprises to participate in the digital economy even in remote and underdeveloped parts of the country (https://ecommerce.dti.gov.ph). In the aftermath of the Covid-19 pandemic, the Philippines continues to rely on e-commerce and the digital economy to manage its economic recovery (Hani et al., 2021).

As the backbone of the Philippine economy, the government recognizes the importance of ensuring that MSMEs can effectively leverage e-commerce to support regional and national economic development. As a result, the Electronic Commerce Act (Republic Act No. 8792) was enacted in the year 2000. To facilitate electronic transactions and to make the online environment safer for consumers and businesses, several policies, programs, and initiatives have been developed. The creation of the Philippine E-Commerce Roadmap 2016-2020, which outlines the nation's strategic plans, policies, and other support measures to take advantage of e-commerce, gave the E-Commerce Law a significant boost. To sustain the Philippines' impressive growth in e-commerce, the Department of Trade and Industry (DTI) launched the updated E-Commerce Roadmap in 2022 with a focus on implementing programs and projects for the use of e-commerce in government, business, and private transactions (https://ecommerce.dti.gov.ph/).

The Philippine e-commerce market has been registering growth during the last few years driven by growing consumers' preferences for online shopping and increasing internet penetration. This trend has been hastened even more by the COVID-19 pandemic. Consequently, it is anticipated that the value of e-commerce will increase between 2021 and 2025 at a solid 17% compound annual growth rate (GlobalData, 2021). However, based on a survey conducted by the DTI in 2021, 69.8 % of MSMEs have not taken advantage of the opportunities offered by e-commerce. The survey covered 15,434 MSMEs, 93% of which are micro-enterprises (Desiderio, 2021). Furthermore, the DTI-commissioned Baseline Survey on the Digitalization of MSMEs in the Philippines in 2020 revealed that MSMEs barely use ICT tools in their business operations. The results showed that 51% of the respondents were only at Level 1, or those who use basic digital tools such as Microsoft Office, email, and personal computers, while 23% did not use any ICT tools at all. Moreover, only a small percentage use advanced digital tools, with 6% having purely online businesses (https://ecommerce.dti.gov.ph/). Since the

creation of the first E-commerce Roadmap in 2016, DTI has conducted several pieces of training, workshops, and consultations on the use and implementation of e-commerce in business operations. However, based on DTI-Occidental Mindoro Provincial Office's E-Commerce Database Monitoring System, out of 1,426 MSMEs assisted by the agency in the province from the period of January to September 2022, only 339 MSMEs utilize email and social media on their business transactions. Meanwhile, 215 MSMEs have merchant accounts such as Gcash and Paymaya, and only 7 are enrolled in e-commerce platforms such as Lazada and Shopee. The rests are only static adopters or those who have email or social media accounts but are not utilized on busin 4 transactions.

This study, therefore, sought to unveil the extent to which MSMEs have adopted the use of e-commerce in their business operations in San Jose, Occidental Mindoro, and the factors that influence their e-commerce application. This study can be a big help in the crafting and implementation of e-commerce transformation programs to upgrade, upskill and upsize MSMEs so that they can survive and thrive in the digital economy. Furthermore, this study can be an eye-opener for various stakeholders since the research of this nature has never been conducted not only in the locality of San Jose but also in the province of Occidental Mindoro.

Statement of the Problem - The purpose of this paper is to identify the factors that affect the decision of micro, small, and medium enterprises (MSMEs) to adopt e-commerce and the extent of their E-commerce application. Specifically, it sought answers to the following questions: (1) What are the factors that influence the adoption of e-commerce by MSMEs in San Jose, Occidental Mindoro? (2) What is the profile of the MSME owners in terms of age, sex, and educational attainment? (3) What is the extent of e-commerce application by MSMEs as assessed by the owners in terms of; technology, organization, and environment? (4) What is the level of e-commerce application by MSMEs in San Jose, Occidental Mindoro? (5) Is there a significant relationship between the profile of the respondents and their level of e-commerce application? (6) Is there a significant relationship between the MSMEs' level of an e-commerce application and the extent of the e-commerce application in terms of; technology, organization, and environment?

Significance of the Study - The results of this study will be of great benefit to the following: First, to the concerned government agencies, this study aims to contribute to crafting new strategies by providing background information on the status and performance of e-commerce among MSMEs in San Jose, Occidental Mindoro. The Local Government Units as well as the Department of Trade and Industry (DTI), Department of Information and Communications Technology (DICT), Department of Interior and Local Government (DILG), and other national government agencies can use the findings of this study to better understand the factors that influence MSMEs' adoption of e-commerce and their level of e-commerce application. As a result, concerned government agencies will be able to identify policy bottlenecks, devise new strategies, and develop appropriate government interventions to help MSMEs succeed in the digital economy. Second, the Micro, Small, and Medium Enterprises (MSMEs), the MSMEs will be the target beneficiaries of the development programs that will be crafted based on the findings of this study. It is hoped that this endeavor can enhance knowledge of e-commerce in the business community and contribute to the advancement of business practices. Business owners and managers who have not yet implemented e-commerce systems can learn from the experiences and strategies of other firms that have successfully implemented e-commerce, and obtain best practices and tactics to replicate in their organizations. Third, to the consumers, the development programs that will be implemented based on this study will not only benefit the MSMEs but also the online consumers by providing them with an improved e-commerce ecosystem where transactions are secure and reliable. Lastly, this study will also provide significant baseline information for future researchers who will undertake a study similar to this research.

Scope and Delimitation of the Study - The scope of e-commerce in this study constitutes the definition used by the Philippine Statistics Authority (PSA) which is "The sale or purchase of goods and services conducted over computer-mediated networks. The goods and services are ordered over those networks, but the payment and the ultimate delivery of the good or service may be conducted on or offline." However, the study is limited to Business-to-Business and Business-to-Consumer types of e-commerce. This study encompassed the profile of

the MSME owners but only covered their age, sex, and educational attainment. Moreover, this undertaking focused only on the factors within the Technology-Organization-Environment framework that affect the MSMEs' adoption of e-commerce and the extent of their application. In the context of technological factors, the dimensions being considered in this study are relative advantage, compatibility, complexity, and security. On the other hand, organizational factors include top management support and organizational readiness. Under the environmental factors, only external pressure and government support are covered. The respondents of this study are the owners of MSMEs in San Jose, Occidental Mindoro. Furthermore, this study was limited to registering MSMEs assisted by the Department of Trade and Industry in San Jose, Occidental Mindoro for the calendar year 2022.

2. Methodology

Research Design **-** This study used exploratory-sequential mixed-method. The researcher applied the qualitative method first to discover the important variables underlying a phenomenon. Results of the qualitative phase gave directions to the quantitative method and quantitative results were used to validate the qualitative findings (Creswell, 2013, Fraenkel et al., 2013). In the quantitative phase, a descriptive correlation design was used to determine the relationship between the independent and the dependent variables**.**

Respondents of the Study **-** The respondents of the study are the owners of registered MSMEs assisted by the Department of Trade and Industry for the fiscal year 2022. The total statistical population is 581. For the qualitative phase, thirty participants were considered sufficient to explore a range of opinions On the other hand, a sample size of 223 for the quantitative phase was obtained using the Raosoft formula with a 5% margin of error and 95% confidence level for computing the sample size for a population of less than 1000.

The profile of the two hundred twenty-three respondents who were the owners of various MSMEs in San Jose, Occidental Mindoro. The majority of them (90 or 40.4%) are aged 28-37 years while 30 or 13.5% are aged 18-27 years. Moreover, 42, or 18.8% belong to 38-47 years of age; 58, or 26% are 48-67 years old and only 1.3% are aged above 67 years. The findings show that most of the respondents are fairly young. As shown in the study by Nair et al. (2019), the owner's age is a significant factor for IT adoption in SMEs in India. Correspondingly, Yusgiantoro et al. (2019) opined that MSMEs with older owners tend to detain the adoption of e-commerce. This was also concurred by Amornkitvikai et al. (2022) who concluded that the owner's age can significantly affect MSMEs' adoption of IT and e-commerce. They also posited that older owners are less likely to adopt e-commerce than younger ones because of their limitations in implementing new technologies for their companies. Furthermore, DTI highlighted that the Philippines' young, digital native population, which is adaptable to anything mobile, is the number one factor that can make the Philippines competitive in regional e-commerce (https://ecommerce.dti.gov.ph/).

The sex of MSME owners was determined in this study based on the assumption that there is a relationship between e-commerce adoption and sex. The female population dominates the group comprising 163 or 73.1%. On the other hand, males are only 60 or 26.9 %. The result implies that the majority of the enterprises in San Jose are owned by women. Many studies have been conducted to investigate the impact of gender on the management of small businesses. For instance, Orser and Riding (2018) established that gender influences IT adoption and that women are more likely to adopt IT than men. Similarly, Alam et al. (2021) found a significant difference in how female- and male-led businesses perceived digital transformation. In addition, a significant percentage of the respondents have a high level of educational attainment. The result implies the importance of the owner's level of education in conducting business. Along with age and sex, many studies highlight the effect of education on technology adoption. For Barroga et al. (2019), the higher the educational attainment of the owner, the more likely he/she will adopt more technological innovations. This is consistent with the study of Ochola (2013) which revealed that if the firm owner/manager has an appropriate level of education, he or she is more likely to appreciate the innovation which may lead to adoption.

Sampling Procedure **-** The researcher used a simple random sampling technique in identifying the respondents because each member of the population had an equal chance of being selected. A sequential number was assigned to each member of the population. A random number generator was used to select the sample.

Research Instrument **-** For the qualitative phase, one open-ended question was utilized in this study. For the quantitative phase, the research instrument was a survey questionnaire. The first part established the profile of the respondents by identifying their age, sex, and educational attainment. The second part pertained to factors influencing their e-commerce application in terms of technology, organization, and environment. For the last part, the respondents were asked to select their level of e-commerce application. The data collection tool for each variable was derived from previous relevant literature and studies. Questions from the second part of the instrument were adapted from the previous studies of Ochola (2013) and Abdulkarem & Hou (2022). The content was modified congruent to the needs of the study. The scale for measuring the level of e-commerce application was based on the indicators used by the Department of Trade and Industry in their E-commerce Database Monitoring System. The scale was revised for easier comprehension.

Expert validity was used to test the validity of the questionnaire. The researcher sought assistance from five graduate school professors of the Divine Word College of San Jose and the Provincial Director of the Department of Trade and Industry to assess the applicability and appropriateness of the items in question about the topic under study. The inter-item reliability of the instrument was tested using the split-half method. Since the instrument was administered once, a correction formula was applied using the Spearman-Brown coefficient of equal length. The questionnaire which was administered to micro, small, and medium entrepreneurs covers three components for the reliability test, namely: technology, organization, and environment, with 12 items each. The three indicators under the level of e-commerce are technology, organization, and environment underwent a pilot test using the test-retest method and the computed Cronbach's alpha value results were 0.911, 0.914, and 0.966 respectively. The reliability coefficients ranging from 0.911 to 0.966 registered a generally very high consistency of the items in the instrument and therefore can be administered to the final set of entrepreneur-respondents.

Data Gathering Procedure **-** With an approved request, the list of MSMEs was obtained from DTI-Occidental Mindoro Provincial Office. For the qualitative phases, a series of semi-structured interviews (face-to-face, and via mobile phone) were conducted with 30 owners/managers to discover the important variables for the study. The researcher employed the coding technique where all interviews were transcribed into text files. Then, thematic analysis was used. For the quantitative phase, a mixed-mode survey that utilizes both printed form and an online survey was used. The results were tabulated, analyzed, and interpreted by the researcher with the guidance of her adviser and statistician.

Statistical Treatment of the Data **-** The data describing the profile and the extent of e-Commerce application by MSMEs have been processed by the statistical software, SPSS version 26. In providing the result of the tests of hypotheses for the inferential problems, the Partial Least Square-Structural Equation Modeling (PLS-SEM) was used generated by WarpPLS version 7.0. The respondents' profiles and the level of e-Commerce application were described using the frequency, percent distribution, and ranking. The weighted means were computed in describing the extent of the e-commerce application.

3. Results and Discussions

Figure 1. Developed a Thematic Map of E-Commerce Adoption

The discussions during the interview sessions showed the factors that influence e-commerce adoption or non-adoption by MSMEs. The summarized views were reported in verbatim, indirect, and direct quotations. Qualitative data were summarized into shorter phrases that captured the overall views of different respondents. It was then coded into subthemes as presented in Figure 1. Interviewees who adopt e-commerce stated that e-commerce makes their business more efficient which was then coded as a relative advantage or the perceived benefits of e-commerce adoption as compared to traditional commerce. Organizations are more likely to adopt a new system after seeing its benefits. As Ahmad et al. (2015) emphasized, firms' adoption decisions are primarily motivated by the perceived benefits that technology brings to the firms. Managers in small and medium-sized businesses are more likely to advocate for such a change if they believe it will result in strategic and operational gains (Ramayah et al., 2016). One interviewee highlighted that his decision to adopt e-commerce was because he finds it compatible with the type of business he has. On the other hand, one respondent claimed that e-commerce does not apply to his business. E-commerce must be compatible with the organization's infrastructure, employee competencies, and business stakeholders to be implemented effectively (Aljowaidi, 2015). Therefore, if SMEs feel that e-commerce is suitable for their business, they are more likely to continue using it, thereby improving their business performance. After reviewing the subthemes, a thematic map was finalized which listed three major factors that influence the adoption of e-commerce by MSMEs

Table 1

Mean Extent of E-Commerce Application by MSMEs in Terms of Technology, Organization, and Environment

E-Commerce Application	Overall Mean	Verbal Description
Technology	3.23	Moderate Extent
Organization	3.14	Moderate Extent
Environment	3.13	Moderate Extent

Legend: 3.25-4.00 High Extent; 2.50-3.24 Moderate Extent; 1.75-2.49 Low Extent; 1.00-1.74 Least Extent

Table 1 shows the moderate perception of the respondents on the extent of e-commerce application by MSMEs in terms of technology, organization, and environment which are indicated by the overall mean of 3.23, 3.14, and 3.13 respectively. The result implies that MSMEs are already acquainted with the various benefits of e-commerce. This is a very good indication since to stimulate e-commerce adoption, SME owners must be aware first of its advantages as compared to traditional commerce. This is further affirmed in the study of Sin et al. (2016) which revealed that SMEs and CEOs who implement e-commerce significantly believe it can increase sales, expand market share, cut down costs, exploit new business prospects as well as improve relationships with trading partners. The result also revealed that MSMEs have doubts about the safety and confidentiality of transacting business online. This is congruent with the findings of the study of Quimba and Calizo (2019) which listed security and privacy concerns as one of the major obstacles to e-commerce adoption by Philippine businesses. This was also agreed by Bacasmas et al. (2022) who concluded that perceptions of safety and security are critical considerations for e-commerce adoption. Any system running on the Internet is vulnerable to unauthorized access, which can lead to intellectual property theft and data breaches. As highlighted by Jahanshahi et al. (2013), “doubts about security and privacy” is the most significant barrier to SMEs’ e-commerce adoption.

The results imply that MSMEs will have a positive intention to utilize e-commerce in their business operations when the support from the top management is substantial. Because decisions made at the top management level are more likely to have an impact on organizational strategy, Bhattacharya & Wamba (2018) contend that top management support is crucial for adoption decisions. Moreover, the findings indicate that MSME respondents lack the resources to adopt e-commerce. MSMEs often do not have sufficient resources to adopt innovation even when owner-managers feel that adopting new technologies is important. Moreover, MSMEs may be hesitant to implement innovations if they believe they lack the financial and technological resources to do so. This issue is one of the most significant barriers to integrating new technologies in MSMEs. It can be gleaned that e-commerce already exists in the business environment where MSMEs operate despite the challenges in infrastructure and adoption. This is a good indication since external pressure from customers, competitors, and suppliers could influence SMEs' adoption of e-commerce. Competitive pressure has a

significant impact on firms' intentions to adopt new technology (Abassi, et al., 2022). Furthermore, according to Nwosu (2017), the fear of losing business opportunities with trading partners and market share to competitors may push MSMEs to adopt e-commerce. Moreover, SMEs are more likely to implement technology within an organization if their users are already using it or if it has the potential to solve their customers' problems (Matikiti et al., 2010).

Findings also suggest that the Philippine government must hasten its efforts to address the barriers to e-commerce participation. These findings were proven parallel to the study of Quimba and Calizo (2019) which enumerated five policy recommendations to achieve the Philippine E-Commerce Roadmap's target of 100,000 MSMEs using e-commerce by 2020.

Table 2
Frequency and Percent Distribution of MSMEs' Level of e-Commerce Application

Level	Description	f	%	Rank
0	Has no internet connection or does not use the internet for business purposes	25	11.2	4
1	With existing and active email addresses and social media accounts used as a contact point for customers and other stakeholders with no business transactions	70	31.4	2
2	With an existing and active business webpage, email addresses, and social media accounts used for business transactions	28	12.6	3
3	Undertaking all the activities indicated in stage 2 and utilizing Digital Payment System	82	36.8	1
4	Undertaking all the activities indicated in stages 1 and 2 and utilizing online marketplaces (e.g. Lazada, Shopee) and/or PhilGEPS	17	7.6	5
5	Subscribed or developed an e-commerce platform or an in-house system for Point-of-Sale (POS), data management, monitoring, and measurement of operational performance and utilizes smart devices and/or software-based real-time integrated control	1	.4	6
	Total	223	100.0	

Table 2 shows that the majority of the MSME respondents are on the third level of e-commerce application. Eighty-two or 36.8% of the respondents have an existing and active business webpage, email address, and social media accounts and use digital payment in their business transactions. Only 1 MSME is on level 5 or has subscribed or developed an e-commerce platform or an in-house system for Point-of-Sale (POS), data management, monitoring, and measurement of operational performance and utilizes smart devices and/or software-based real-time integrated control. The results show that most MSMEs have already started to adopt e-commerce in their business. This suggests a positive attitude toward e-commerce, but this should translate into higher levels of e-commerce application among MSMEs. The breadth of e-commerce use in business activities reflects the level of e-commerce application where the wider the use of e-commerce, the higher the level of e-commerce application. The wider the use of e-commerce in a business, the more likely it is to achieve greater business benefits (Rahayu and Day, 2015).

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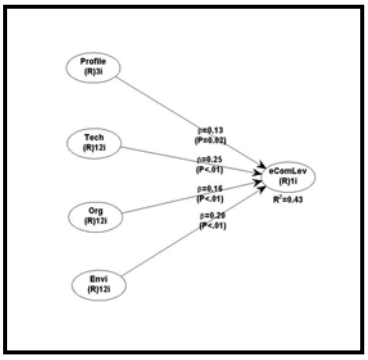

Figure 2. Structural Model

Figure 2 illustrates the hypothesized connection between the exogenous variables, the profile, and the extent of e-commerce in terms of technology (Tech), organization (Org), and environment (Envi) and the endogenous variable, level of e-commerce application (eComLev). The three latent variables comprise 12 indicators each

while the MSMEs-owners' profile is represented by three variables. Also shown in the structural model are the *Beta*-coefficients (β) expressed in two decimal places and the *p*-values as the result of the structural equation modeling using the partial least squares method and which are all set at the 0.05 level. These will signify the strength of the direct and significant correlation between the variables. The structural model also reflects the coefficient of determination (R^2). This means that approximately 43% (R^2=0.43) of the variability in the level of e-commerce application can be attributed to the percentage of variability in the MSME owners' profile and extent of e-commerce application in terms of technology, organization, and environment. The rest of the variability, 57% can be accounted for by other factors not included in the study. No emerging model is constructed since all latent variables were found to have a direct connection to the endogenous variable.

Table 3
Path Coefficients and P-values

Paths	β Coefficients	*p*-values	Effect Size	Standard Error	Interpretation*
Profile→eComLev	0.131	0.023	0.058	0.065	Significant
Tech→eComLev	0.251	<0.001	0.156	0.064	Significant
Org→eComLev	0.162	0.007	0.101	0.065	Significant
Envi→eComLev	0.204	<0.001	0.120	0.065	Significant

***Significant at p< 0.05*

The results of testing the two hypotheses are disclosed in Table 3 with the corresponding path coefficients, p-values, effect sizes, and standard error of the estimates. It can be gleaned from the table that all variables were found to have a direct connection to the level of e-commerce application. While the Beta coefficients registered low values from 0.131 to 0.251, still, this denotes a significant relationship to the level of e-commerce application. The significance is well supported by the p-values from <0.001 to 0.023 which are way below 0.05. This leads to the rejection of the first and second hypotheses of no significant relationship between the MSMEs' level of an e-commerce application and their owners' profile; and of no significant relationship between the MSMEs' level of an e-commerce application and the extent of e-commerce. The result of the study is consistent with the findings of Ismail et al. (2017) and Bayona-Oré & Estrada (2021) who both concluded that technological, organizational, environmental, and individual factors are positively associated with the adoption of e-commerce. Same to the findings of the study, technological, organizational, and environmental factors though registered low values, still denote a significant relationship to the level of e-commerce application. On the other hand, it contradicts the previous research done by Oktora et al. (2020) who found that the adoption of e-commerce by SMEs was influenced positively only by organizational factors.

4. Conclusions

Based on the findings, the following conclusions are generated: Technological, organizational, and environmental factors influence the adoption of e-commerce by MSMEs. The majority of the MSME respondents are fairly young. The female population dominates the respondents. Most of the respondents have high educational attainment. The moderate perception of the respondents on the extent of e-commerce application in terms of technology showed that MSMEs have positive regard for the characteristics of e-commerce as an innovation. The moderate perception of the respondents on the extent of e-commerce application in terms of organization uncovered that MSMEs consider e-commerce as a business strategy but the firms' resources affect their decision to adopt and implement it. The moderate perception of the respondents on the extent of e-commerce application in terms of environment revealed that the arena surrounding the firm inhibits or encourages their utilization of e-commerce in their business operations. It can be implied that the majority of the respondents have adopted e-commerce, however, their application is still low. There is a significant relationship between the profile of the MSMEs and their level of e-commerce application. There is a significant relationship between the level of an e-commerce application and the extent of its e-commerce application in terms of technology, organization, and environment.

4.1 Recommendations

Based on the aforementioned findings and conclusions, the following recommendations are therefore presented; To encourage the MSMEs to adopt e-commerce, the researcher recommends the crafting of more structured programs and strategies based on the technological, organizational, and environmental factors which can influence their adoption. Since most of the MSMEs are fairly young and with high educational attainment, MSMEs must take advantage of their digital native characteristics and utilize ICT tools and social media to improve business operations. Since most of the MSMEs still lack trust in the security and safety of transacting business online, the researcher recommends the conduct of cyber literacy seminars for MSMEs as well as consumers. Another intervention is by supporting MSMEs' capability to protect their e-commerce platform by equipping them with knowledge and skills on digital security measures and cybersecurity toolkits. To scale up the application of e-commerce, the government must focus first on the digitalization of micro, small, and medium enterprises (MSMEs). Considering the limited resources of MSMEs, it is recommended that the government shall assist the digital transformation of MSMEs through the provision of grants, subsidies, and other incentives to facilitate access to devices such as mobile phones, tablets, and computers as well as purchases of software to upgrade system. To increase the number of MSMEs doing e-commerce and facilitate a wider e-commerce application, the creation of enabling environment is recommended by providing necessary infrastructure specifically reliable, fast, secured, and affordable internet, stable power supply, improved logistics, policy reforms and full implementation of pertinent laws regarding e-commerce especially the e-Government which will massively improve the service delivery of LGUs and other government agencies, while cultivating a good climate for e-commerce to grow. Although the results revealed a high adoption rate of e-commerce among MSMEs, there are still MSMEs who do not adopt, therefore awareness and advocacy campaigns must be continuously made by the government to increase the e-commerce uptake of MSMEs. To further increase the e-commerce application by MSMEs, the implementation of the proposed development program is recommended. Approximately 43% of the variability in the level of e-commerce application can be attributed to the percentage of variability in the MSME owners; profile and extent of e-commerce application in terms of technology, organization, and environment. In this regard, it is recommended that more researchers be encouraged to conduct further studies relative to this undertaking to find out the other possible variables that may constitute the remaining 57% that can influence MSMEs' level of e-commerce application.

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