

# Business Development Through E-Commerce Adoption: A Case Study of an Entrepreneurship Expo at Makerere University

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## ABSTRACT

This study examined students' e-commerce adoption factors using data from an entrepreneurship expo at the College of Business and Management Sciences in 2018. A cross-sectional survey involving 774 students revealed significant predictors of e-commerce adoption. Smartphone ownership and regular internet usage increased adoption (OR = 1.7307,  $p = 0.043$ ), while exhibitors offering food and beverages saw higher adoption rates (OR = 3.6558,  $p = 0.047$ ). However, post-purchase reviews, entrepreneurship support participation, and e-commerce application use were associated with lower adoption odds. The findings underscore the shift towards digital models, with smartphones enhancing sales and profitability among university students. This study sheds light on e-commerce adoption drivers among students, emphasizing marketing strategies, internet engagement, and technology accessibility.

## 1. Introduction

Electronic commerce, or e-commerce, denotes the buying and selling of goods and services facilitated through electronic systems, including the Internet and other computer networks. As a prominent manifestation of globalization, e-commerce is experiencing rapid growth. Its widespread adoption presents significant opportunities for the development of internal and international trade in emerging economies. E-commerce facilitates advancements in various areas such as electronic fund transfer, supply chain management, internet marketing, online transaction processing, electronic data exchange, automated inventory management systems, and automated data gathering systems (Mohiuddin, 2014). In the twenty-first century, e-commerce is increasingly permeating daily life. It is imperative for both academics and practitioners to comprehend the operational intricacies of electronic systems to identify challenges and enact improvements. With more consumers and organizations turning to electronic channels for purchases and business transactions, a comprehensive understanding of e-commerce operations becomes indispensable (Munox, Holsapple & Sasidharan, 2023).

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The global e-commerce market revenue was forecasted to reach 5.545 trillion US dollars in 2022, with projections indicating a surge to 7.385 trillion US dollars by 2025, marking a 2.2-fold increase over 2019 figures. Data from the Insight Research Agency indicates that the e-commerce sector in Russia is poised to reach 7.2 trillion rubles in 2024. This figure surpasses previous predictions by 1.6 trillion rubles, reflecting the significant impact of the COVID-19 pandemic on e-commerce trends (Zenkina, 2022).

China's e-commerce sector has witnessed consistent growth in recent years, propelled by its vast internet user base of 668 million individuals. In the first half of 2015 alone, online shopping sales in China reached a remarkable \$253 billion, equivalent to 10% of the country's total consumer retail sales during that period (Millward, 2015). Chinese retailers have played a pivotal role in instilling confidence among consumers in online shopping (Olsen, 2010). Moreover, e-commerce transactions between China and other countries saw a remarkable 32% increase in 2012, amounting to 2.3 trillion yuan (\$375.8 billion) and representing 9.6% of China's total international trade (Tong, 2014). Notably, Alibaba dominated the Chinese e-commerce landscape in 2013, holding an 80% market share (Millward, 2014).

In Brazil, the e-commerce sector experienced rapid expansion in 2013, with expectations of continued double-digit growth in retail e-commerce sales into 2014. By 2016, eMarketer projected that retail e-commerce sales in Brazil would soar to \$17.3 billion (eMarketer, 2016). Additionally, India boasted a substantial internet user base of approximately 460 million as of December 2017 (NA et al., 2021).

India ranks as the third-largest global user base, yet its internet penetration rate lags behind countries like the United States, United Kingdom, or France. Nonetheless, India's growth rate surpasses these nations, with approximately 6 million new internet users joining every month (NA et al., 2021). Notably, cash on delivery emerged as the preferred payment method for e-retail activities in India, constituting 75% of transactions (Bhaskar & Kumar, 2017). Projections suggested that the Indian retail market would expand from 2.5% in 2016 to 5% by 2020 (NA et al., 2021).

In Uganda, The World Bank projected that the country's actual GDP growth in 2020 would hover around 2%, a decrease from the approximately 5.6% recorded in 2019, primarily attributed to the impact of the COVID-19 pandemic (World\_Bank, 2020). Responding to the economic challenges precipitated by the pandemic, the Ugandan government spearheaded initiatives to promote e-commerce and digital innovations as a means of expediting recovery from the crisis (UNCTAD, 2020). Notably, collaborative efforts with mobile phone providers were undertaken to lower the cost of digital services and offer additional internet data packages to customers, thereby facilitating cashless transactions. Additionally, to equip students with the necessary skills for launching businesses utilizing e-commerce, this study leveraged a student expo.

The primary objective was to assess the adoption and utilization of e-commerce at the entrepreneurship expo, aiming to enhance the delivery of goods and services, promote international trade, and facilitate the online export of locally produced goods and services. The overarching goals included boosting corporate productivity and profitability, creating employment opportunities, and bolstering Uganda's economy in terms of efficiency and wealth generation. The research delineates measures outlined in the study aimed at achieving these objectives. Makerere University was selected as a suitable case study owing to its esteemed status as a leading institution of higher learning, recognized for excellence both within Africa and globally. Renowned as a regional center of knowledge, the university boasts a diverse student population encompassing various abilities and talents. Consequently,

it is expected that the findings from this study can be reasonably extrapolated to the entire country.

## **2. Literature**

Karime (2013) and Alrousan and Jones (2016) found that perceived beliefs and internet diffusion significantly impact e-commerce adoption among young entrepreneurs in Nakuru Town and SMEs in Jordan, respectively while Nantembelele and Gopal (2018) identified budget constraints, poor internet penetration, low computer literacy, and lack of skills and training as barriers to e-commerce adoption in Tanzania.

Also, cultural factors, including age, gender, and computer proficiency, were highlighted as key influencers of e-commerce adoption in Saudi Arabia by Alqahtani et al. (2018), while Lule and Tusiime (2019) demonstrated the positive impact of e-commerce adoption on SME growth in Uganda. Ariansyah et al. (2021) emphasized the importance of perceived advantages, compatibility with individuals' needs, digital skills, and supporting infrastructures in driving e-commerce adoption in Indonesia.

Furthermore, Alsajjan and Dennis (2010) and Baladhandayutham and Venkatesh (2012) underscored the significance of perceived benefits, security concerns, technical expertise, government support, and infrastructure availability in driving or hindering e-commerce adoption in Kuwait. Perceived usefulness, perceived ease of use, competitive pressure, organizational readiness, and government support were identified as drivers of e-commerce adoption among SMEs by Teo et al. (2004), Wijaya and Kuncoro (2021), and Rahayu and Day (2017).

Again, Sheikh and Basti (2015) found no substantial differences in factors influencing customer satisfaction in e-commerce between Turkey and Pakistan. Bartholomew et al. (2009) highlighted the potential of e-commerce technology to eliminate intermediary actors from supply chains in Nigeria, particularly in the agricultural sector while Ocloo et al. (2018) emphasized the role of relative advantage and intensity of competition in influencing e-commerce adoption among manufacturing SMEs in Ghana.

These studies collectively demonstrate the complex interplay of various factors, including cultural, technological, organizational, and competitive factors, in shaping the adoption of e-commerce in different regions and industries.

## **3. Methods**

### **3.1. Study Design**

This research employed a cross-sectional survey design to gather data from students participating in the entrepreneurship expo at Makerere University. The study aimed to investigate the drivers of e-commerce adoption among these students.

### **3.2. Sample Selection**

The target population consisted of all students exhibiting their entrepreneurial ventures at the entrepreneurship expo. The study participants were selected by the purposive sampling technique. Purposive sampling entails the identification and deliberate selection of individuals or groups who possess expertise and substantial knowledge regarding a specific phenomenon of interest (Creswell, 2014). Through the analysis of project lists submitted by students, researchers successfully identified projects linked to e-commerce, resulting in a

total of 774 exhibitors comprising both individuals and groups. After identifying the projects, these students were followed up and asked to participate in this study with an emphasis on understanding their applicability of e-commerce. The sample size used in this study was 774 calculated from a total of 1320 students using the Yamane Taro formulae (Yamane, 1967). The sample size was determined based on a desired level of statistical power of 80% and a margin of error of 5%.

### 3.3. Data Collection

Data was gathered utilizing a structured questionnaire comprising five distinct sections. The initial section inquired about respondents' demographic characteristics, including gender (male/female), age (open-ended), tribe (open-ended), residency (off-campus/on-campus), marital status (single/married), degree program (B.COM (INT), B.COM(EXT), BBA, BA.ECONOMICS, B.DEC, or MBA), other tertiary qualifications (yes/no), current engagement in gainful work (yes/no), type of work (self-employed/employee), and business sector (manufacturing, science and technology, food and beverages, agriculture, or services).

The second section focused on the drivers of e-commerce, such as the devices utilized in business operations (smartphone, tablet/iPad, laptop, desktop, or none), internet accessibility (yes/no), type of internet connection (mobile internet, Wi-Fi, fixed internet), frequency of internet usage in business operations (almost every day, at least once a week, at least once a month, more than a month, or never).

The third section delved into respondents' experiences with e-commerce during the 2018 Entrepreneurship Students' Expo, while the fifth section explored feasible strategies to enhance e-commerce adoption among university students. For instance, it inquired whether the entrepreneurship course content supported e-commerce (yes/no), among other factors. A comprehensive questionnaire can be found in the supplementary files.

### 3.4. Data Analysis

Binary logistic regression analysis was conducted to predict the likelihood of adoption of e-commerce based on the independent variables as detailed in the Section 3.3.

$$\log \frac{p}{1-p} = \beta_0 + \beta_i x_i + \varepsilon_i \quad (1)$$

where  $\beta_0$  and  $\beta_i$  are regression coefficients,  $p$  is the probability of e-commerce adoption,  $x_i$  are the independent variables such as, demographic characteristics, drivers of e-commerce, experience with e-commerce, and feasible strategies to enhance e-commerce adoption and  $\varepsilon_i$  is the error term. The analysis focused on determining the significance and strength of the association between these factors and the likelihood of e-commerce adoption among the university students.

### 3.5. Ethical Considerations

Ethical guidelines were followed throughout the research process to ensure the privacy, confidentiality, and informed consent of the participants. The study was approved by the Institutional Review Board of Makerere University. In addition, the participants in the study had the option to participate voluntarily, and they were informed that the study was solely for academic reasons. They were also given the freedom to withdraw from the study whenever they deemed it necessary.

### **3.6. Limitations**

It is important to acknowledge some limitations of the study. Firstly, the research was limited to a specific university and may not be fully representative of the broader student population. Additionally, the cross-sectional design only provides a snapshot of e-commerce adoption at a particular point in time and may not capture the dynamics of long-term adoption patterns.

### **3.7. Implications**

The findings from this study contribute to the existing literature on e-commerce adoption among students and provide insights for policymakers and educators on how to effectively promote e-commerce as part of entrepreneurship education. The results can also inform strategies to harness the entrepreneurial experience and support the growth of student ventures through e-commerce platforms.

## **4. Results**

### **4.1. Descriptive Analysis**

In the descriptive analysis, the findings revealed that the mean age of the student population was 26 years, with a median age of 23 years. The study included a slightly higher proportion of male students compared to female students. In terms of ethnicity, the largest percentage belonged to the Baganda tribe, followed by the Banyankole, Basoga, Bakiga, and so forth. Among the students, the majority (82%;  $n = 653$ ) were non-residents, and a significant proportion of them were unmarried. The programs that the students were undertaking were Bachelor of Commerce (BCOM) (internal), Bachelor of Commerce (BCOM (external), Bachelor of Arts in Economics (BA-ECON), and Bachelor of Business Administration (BBA), with approximately 20% of students opting for post-graduate programs like Economic Policy Management (EPM) and Master of Business Administration (MBA). Furthermore, a considerable number of students were employed, providing them with convenient internet access.

### **4.2. Binary Logistic Regression**

This study assessed three models: probit regression, logistic regression, and the complementary log-log model. The evaluation was based on various statistical measures, including the likelihood ratio chi-square statistics, log-likelihood value, and pseudo-R-squared. After careful analysis, it was found that the binary logistic regression model provided superior estimates. Consequently, this model was selected to estimate the determinants of e-commerce adoption, as demonstrated by the results in Table 1.

Table 1.

*Logistic Regression Analysis of E-commerce Adoption Factors*

Term	Coeff	SE Coeff	Odds-Ratio	Z-Value	P-Value	VIF
Constant	2.417	0.881	98.0889	78.70063	0.006	
Work type (Self-employed)	0.608	0.425	1.8368	1.43	0.153	1.83
Gadgets (Smartphone)	-2.357	0.39	0.0947	-6.05	0.000	1.3
Gadgets (Tablet iPad)	0.833	0.656	2.3002	1.27	0.204	1.06
Gadgets (Laptop)	-0.44	0.254	0.6443	-1.73	0.083	1.13
Gadgets (Desktop)	-1.047	0.934	0.3509	-1.12	0.262	1.02
Frequency of Internet use						
at least once a month	0.171	0.884	1.1869	0.19	0.846	1.12
Almost everyday	1.004	0.316	1.7307	2.73	0.043	1.15
At least once a week	1.044	0.703	1.5283	1.48	0.138	1.21
Your Business Still Operating (Yes)	-0.994	0.39	0.3700	-2.55	0.011	1.12
Return of goods by customers	0.885	0.48	2.4226	1.84	0.065	1.11
Post-purchase Review	-0.546	0.252	0.5792	-2.17	0.030	1.11
Social media interviews	-1.304	0.154	0.2714	.2715	0.022	
Entrepreneurship support	-1.194	0.326	0.3029	-3.66	0.000	1.15
E-commerce Application	-3.616	0.454	0.0269	-7.96	0.000	1.05
Gainful work (Yes)	-0.676	0.34	0.5087	-1.99	0.047	1.87
Business exhibited						
Foods and beverages	1.296	0.654	3.6558	1.98	0.047	5.95
Manufacturing	0.908	0.625	2.4794	1.45	0.146	6.82
Science and technology	0.828	0.666	2.2892	1.24	0.214	4.83
Degree Programme						
B.COM (EXT)	0.187	0.435	1.2056	0	0.667	2.07
B.COM (INT)	-0.219	0.427	0.803	-0.51	0.607	2.35
BA. ECON	-0.123	0.41	0.884	-0.3	0.764	2.2
BBA	-0.092	0.444	0.9117	-0.21	0.835	1.87
Sex1						
Male	-0.147	0.362		-0.41	0.684	1.05
R <sup>2</sup> =46.24%, $\chi^2(22) = 140.92$ , p-value=0.000; covariates with significant p-values were considered for OR interpretation						

Source: Primary Data Analysis from Entrepreneurship Expo survey

According to the model, owning a smartphone was associated with a predicted decrease of approximately 0.0947 times in the odds of adopting e-commerce compared to those without smartphones, when controlling for other variables. Conversely, individuals who used the internet almost daily were expected to have 2.73 times higher odds of e-commerce adoption compared to those who used it less frequently, holding other factors constant. Moreover, engaging in post-purchase reviews was linked to a decrease of approximately 0.5792 times in the odds of e-commerce adoption compared to non-engagers, while other factors were held constant. Similarly, conducting social media interviews for product marketing was associated with 0.2714 times lower odds of e-commerce adoption compared to relying solely on smartphones for marketing, controlling for other variables.

The findings also indicated that students' perceptions significantly influenced their adoption of e-commerce. Those who disagreed that entrepreneurship content supports e-commerce were predicted to have 0.3029 times lower odds of adoption compared to those who agreed, when controlling for other factors. This underscores the impact of perception on student actions, with incorrect perceptions about entrepreneurship hindering e-commerce adoption. Additionally, utilizing e-commerce software for portfolio and business management was associated with 0.0269 times lower odds of adopting e-commerce compared to non-users, attributed partly to limited technology infrastructure for e-commerce in Africa.

Smartphones emerged as crucial tools for business among Ugandan students, facilitating market expansion and trade despite limited access to physical stores. The odds of adopting e-commerce were predicted to decrease by approximately 0.5087 times for students engaged in other gainful activities alongside e-commerce ventures compared to those solely reliant on e-commerce, when controlling for other factors. Lastly, students in the foods and beverages sector were expected to have 3.6558 times higher odds of e-commerce adoption compared to those in agriculture, holding other factors constant.

#### 4.3. Validation of the Binary Logistic Model Using the ROC Curve

After performing logistic regression, the receiver operating characteristic (ROC) curve helped to assess the performance of the model in predicting binary outcomes. The ROC curve plots the true positive rate (sensitivity) against the false positive rate (1 - specificity) for various classification thresholds as can be seen in Figure 1.

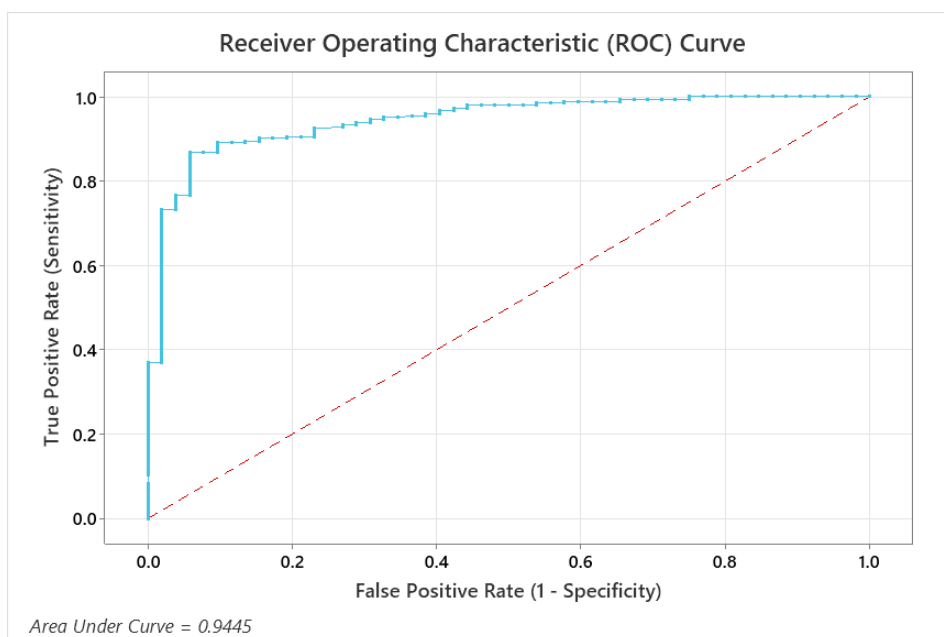


Figure 1. ROC curve predicting the performance of the model  
Source: Primary Data Analysis from Entrepreneurship Expo survey

From Figure 1, the ROC curve displays an impressive AUC value of 0.9445, indicating the logistic regression model's exceptional discriminatory power in distinguishing between the two classes. Positioned close to the top-left corner of the plot, the curve signifies robust classification performance. The AUC value of 0.9445 further solidifies the model's efficacy. AUC ranges from 0.5 to 1.0, where 0.5 denotes random guessing and 1.0 signifies perfect classification. Here, the AUC of 0.9445 underscores the model's superiority over random chance, showcasing high accuracy in predicting e-commerce adoption.

With such a high AUC, this logistic regression model demonstrates a strong capability to accurately classify both positive and negative instances, effectively capturing true positives while minimizing false positives. As a result, the model's predictions are deemed reliable and valuable for informed decision-making or predictions regarding the binary outcome. Additionally, the significant drivers identified in the analysis play a pivotal role in shaping e-commerce behavior among these students.

#### 4.4. Evaluating the Sustenance Possibility of the E-Commerce Adoption

The psgraph was used to visually represent the results of a propensity score matching (PSM) analysis. In this case, the untreated group appeared to diminish quickly compared to the treated group, resulting in the treated group being off support; it suggested that the adoption of e-commerce had a significant positive effect on the duration of business sustenance.

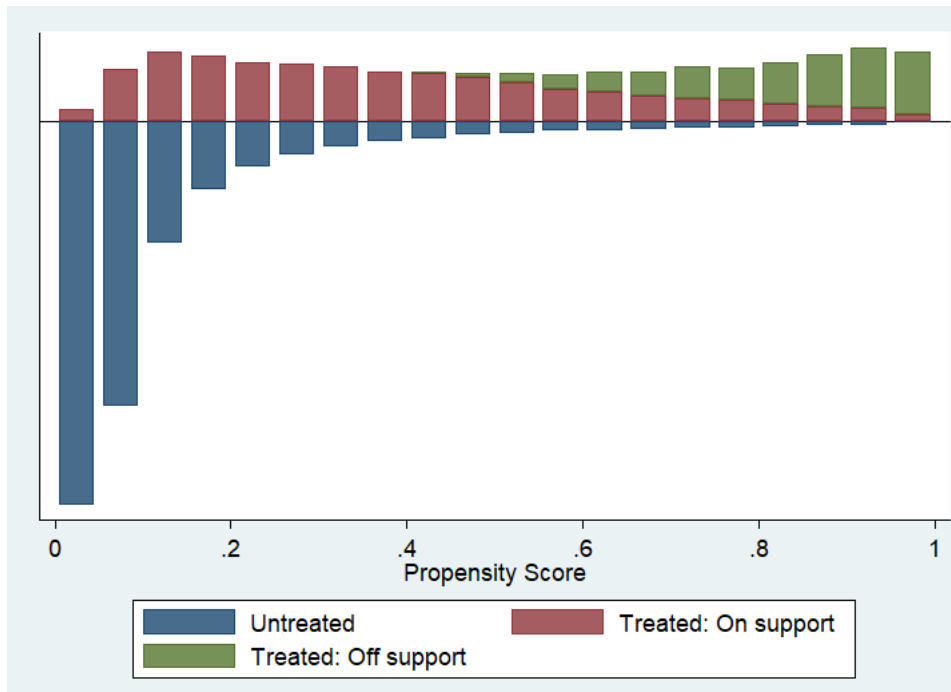


Figure 2. psgraph for evaluating the effectiveness of e-commerce among students

Source: Primary Data Analysis from Entrepreneurship Expo survey

The propensity score graph serves as compelling evidence that integrating e-commerce has a positive impact on the longevity of businesses. It suggests that students implementing e-commerce strategies could effectively capitalize on online platforms, expanding their reach to a broader customer base, improving operational efficiency, and adapting to evolving market trends. Consequently, these businesses experience prolonged success and sustainability.

## 5. Conclusions

In conclusion, our study offers valuable insights into the determinants of e-commerce adoption among students. Descriptive analysis revealed that the student demographic skewed towards a mean age of 26 years, with a slightly higher representation of male students. The predominant ethnic groups included the Baganda, Banyankole, Basoga, Bakiga, among others. Most students hailed from off-campus residences, and a significant portion were unmarried. Popular degree programs included BCOM (internal), BCOM (external), BAEcon, and BBA, with notable enrollments in post-graduate programs such as EPM and MBA. Additionally, a considerable number of students were employed, facilitating easy internet access.

Our logistic regression analysis unveiled significant findings concerning e-commerce adoption odds. Smartphone ownership was associated with a 0.0947 decrease in adoption odds compared to non-owners, while daily internet usage correlated with a 2.73 increase in adoption odds compared to less frequent usage. Conversely, conducting post-purchase reviews and social media interviews were linked to decreased adoption odds by 0.5792 and



0.2714, respectively. Students perceiving entrepreneurial content as beneficial for e-commerce experienced a 0.3029 decrease in adoption odds compared to non-believers. Furthermore, utilizing e-commerce software for business management was associated with a 0.0269 decrease in adoption odds. Engaging in additional gainful activities beyond e-commerce resulted in a 0.5087 decrease, while showcasing food and beverage products increased odds by 3.6558 compared to agriculture-related products.

These findings underscore the complex dynamics of e-commerce adoption among students. While smartphone ownership and frequent internet usage drive adoption, caution is warranted in post-purchase reviews, social media interviews, and sole reliance on e-commerce software. Moreover, students engaged in additional activities and those focusing on food and beverage products exhibit diverse adoption patterns.

This research offers valuable insights for educators, policymakers, and entrepreneurs seeking to promote e-commerce engagement among students. By comprehending the influencing factors and their implications on adoption, targeted strategies can be formulated to optimize e-commerce platform usage, benefiting both students and businesses.

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**Authors' Contributions:** PK and HN had the idea for the paper. PK and HN planned the work and performed the initial literature search analysis and interpretation of the data. PK, HN, PN, and AS critically assessed and discussed the literature search analysis, and interpretation of the data. PK and HN wrote the paper. PK, HN, PN, and AS read several draft versions of the paper and made substantive suggestions for revision. All authors approved the final submitted version. PK acts as a guarantor for the overall content.

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#### **Statement on the Ethical Clearance**

The study on the drivers of e-commerce adoption among Makerere University students was conducted by lecturers at the College of Business and Management Sciences within the university. As the study involved direct interaction with the students and did not pose any potential harm or risk to the participants, it was determined that institutional review board clearance was not required. The lecturers adhered to ethical principles throughout the research process, ensuring the confidentiality, privacy, and voluntary participation of the students. The focus of the study was to gain valuable insights into Business Development and e-commerce adoption among students, and the research team took necessary precautions to uphold the ethical standards of academic inquiry and protect the rights of the participants.

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