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ORIGINAL

Digital economy and consumer purchase decisions in retail appliance stores in Ecuador

La economía digital y las decisiones de compra de los consumidores en tiendas minoristas de electrodomésticos en Ecuador

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ABSTRACT

This study investigates how dimensions of the digital economy affect purchasing decisions in Ecuador's retail appliance sector. Using Spearman's Rank Correlation Coefficient and hierarchical clustering analysis on data from 658 participants, the study finds a strong positive correlation between digital economy factors (such as technological infrastructure and social impact) and purchasing decisions. The research highlights the need for improved digital services and infrastructure. It concludes that a comprehensive digital strategy is crucial for enhancing consumer satisfaction and economic growth.

Keywords: Digital Economy; Retail Trade; Technology; Customer Service; User Experience.

RESUMEN

Este estudio investiga cómo las dimensiones de la economía digital afectan las decisiones de compra en el sector minorista de electrodomésticos en Ecuador. Utilizando el coeficiente de correlación de rangos de Spearman y un análisis jerárquico de conglomerados sobre datos de 658 participantes, el estudio encuentra una fuerte correlación positiva entre los factores de la economía digital (como la infraestructura tecnológica y el impacto social) y las decisiones de compra. La investigación destaca la necesidad de mejorar los servicios y la infraestructura digitales. Concluye que una estrategia digital integral es fundamental para mejorar la satisfacción de los consumidores y el crecimiento económico.

Palabras clave: Economía Digital; Comercio Minorista; Tecnología; Servicio al Cliente; Experiencia del Usuario.

INTRODUCTION

Post-globalization, characterized by the digitalization of information and digital transformation, is a global phenomenon influencing business processes through the continuous use of hardware, software, and new technologies.(1) These advancements have become integral to both business and personal activities. The interaction between retail appliance stores (RAS) and technology presents a compelling area of analysis for academics and entrepreneurs, particularly considering the acceleration caused by the COVID-19 pandemic.(2)

This research focuses on retail appliance stores in Ecuador, a sector that plays a crucial role in the Ecuadorian economy. The study will examine how digital economy processes are transforming marketing strategies, managing customer and supplier relationships, communications, and consumer experiences in acquiring products or services,[3] among other activities related to the retail appliance sector. The objective of the study is to answer the following research question: How are the dimensions of the digital economy correlated with the purchasing decisions of customers in retail appliance stores in Ecuador? Investigating this context will offer a contemporary perspective on the transformations and adaptations occurring in the retail appliance sector within a highly digitized and rapidly evolving environment.

Literature Review

Digital Economy

The digital economy can be described as all economic activities that use digital means to conduct transactions inherent to business activities, including management, production, marketing, and interaction with all business environment stakeholders. It also involves the provision of services that the organization may offer to the market, based on the use of technologies.[4] The use of the internet and various technological media generates a large amount of data, known as Big Data. The management of this data, information, and knowledge are now new resorces that organizations must handle. Therefore, it can be noted that the digital economy has a direct relationship with knowledge management within business organizations.[5] Knowledge management includes everything from data collection to analysis, so companies must transform data into information and subsequently into knowledge, which will aid in making business decisions that provide value to their customers.[6]

A notable feature of the digital economy is its ability to transcend geographical boundaries, enabling instant interaction between societies or organizations and facilitating contemporary business practices in digital contexts.[7,8] This drives creativity, innovation, and the customization of business offerings to the market.[9,10] It also promotes operational efficiency by maximizing strengths and creating new opportunities through constant innovation and equitable access to technology, while also addressing regulations, security, and information privacy, which are crucial within the digital economy framework.[11,12]

Other important characteristics for the development of the digital economy include connectivity possibilities and high speeds, the use of internet-connected platforms, digitalization of processes and information, as well as the adoption of new technologies such as artificial intelligence, Big Data, and the Internet of Things.[13,14]

At this point, it is important to distinguish between the digital economy and e-commerce, concepts that are often mistakenly used interchangeably. The primary difference is that e-commerce only involves buying and selling goods and services through digital means and the internet, without physical interactions.[15] In contrast, the digital economy, as explained in previous paragraphs, has a much broader scope, encompassing aspects such as digital services, digital education, smart or digital cities, and digital governments.[16] However, it is important to recognize that e-commerce is a fundamental area for the development of the digital economy, as it offers various business models (table 1).[17,18]

The business models shown in table 1 have led to the emergence of various forms of work driven by the innovation that fuels the digital economy in the commercial environment: home deliveries for online purchases; freelance work, performed by individuals with skills that can be offered through digital platforms; telecommuting; and various digital ventures.[17] This innovation has also led to new financing methods for projects, such as crowdlending[18] and crowdfunding.[19,20]

Table 1. Business Models in E-Commerce

Model	Description
B2C (Business to Consumer)	Retail sales conducted through technological means and the internet. In this business model, companies sell directly to consumers. Examples include Amazon and eBay.[15]
B2B (Business to Business)	The purchase and sale of goods and services between businesses or organizations through digital platforms and media.[21]
C2C (Consumer to Consumer)	Online platforms that allow individuals, in this case, consumers, to sell products or offer services to other consumers.[22]
M-commerce (Mobile Commerce)	Commercial transactions conducted using mobile technological devices such as smartphones and tablets.[23]

In the current study, which analyzes retail appliance stores (RAS), the business model utilized is B2C (Business to Consumer), as it is the retail companies that sell directly to end users or customers. These transactions can be conducted through the respective brands' websites or intermediaries.[20] Payments are made online, while deliveries are handled by individuals or companies hired for this purpose. The process described is an example

of the digital economy. Although it may seem like an e-commerce activity, it is important to note that for this to function, the involved parties must have the necessary knowledge, digital platforms must exist, internet connectivity is required, and online financial institutions must support these activities. This description is much broader, making it a clear example of the development of the digital economy.

Components of the Digital Economy

Table 2 outlines he components of the digital economy mentioned by the Economic Commission for Latin America and the Caribbean (ECLAC) in its report "Digital Economy for Structural Change and Equality".[24] This includes the analysis of factors such as internet availability and connectivity, the use of hardware and software, the analysis of digital economy actors, and their impact on the economy and society.

Table 2. Components of the Digital Economy

Component	Factors	Description
Technological Infrastructure and Broadband Networks	National and International Connectivity. Access to local networks. Public access points. Mobility.	Technological infrastructure required for the development of the digital economy, enabling internet access and connectivity.
Software and Hardware	Online Business Processes Online Sales Online Purchases Online Payment Methods	Activities in e-commerce facilitated by the use of hardware and software. Includes the necessary knowledge for their use.
Knowledge Processes	Digital Skills	Development of e-commerce activities through the use of hardware and software, including the knowledge required for their use.
Individuals	Implementation of public policies through control and security regulations. Application of knowledge for transaction development, Innovation	Proposals for innovation using digital media and technologies. Must include policies and regulations to govern activities, as well as training and strengthening the skills of individuals, users, and collaborators. Additionally, actions to ensure security and trust on digital platforms.[25]

Statistics on Technology Usage in Ecuador

Considering the components proposed in table 2, the following statistics of interest are provided by the Ecuadorian Institute of Statistics and Census (INEC),[26] based on the census conducted in 2022. Table 3 shows a positive evolution in technological indicators related to the digital economy and also highlights a reduction in digital illiteracy. This indicates that there is a technological context in Ecuador conducive to the development of activities related to the digital economy and e-commerce.

Table 3. Statistics Related to Digital Economy Constructs

Indicator	Jul. 2022	Jul. 2023	Description
Internet Access in Households	60,4 %	62,2 %	Households with internet access.
Internet Use - Individuals	69,7 %	72,2 %	Population aged 5 years or older who used the internet from any location in the last 12 months.
Active Cellphone Use - Individuals	58,8 %	59,6 %	Active cellphone users, not specifying whether it is a smartphone.
Active Smartphone Use - Individuals	52,2 %	55,6 %	Population aged 5 years or older with an activated smartphone.
Digital Illiteracy	8,2 %	7,6 %	A digital illiterate individual aged 15 to 49 who: A) Does not have an activated cellphone B) Has not used a computer in the past year C) Has not used the internet in the past year.

Retail Trade of Appliances

Trade can be described as the set of activities that enable the buying and selling of services and products. This process can occur locally, nationally, and internationally, forming a cornerstone of the economy.[27] It is important to note that trade not only includes sales activities but also encompasses marketing, distribution, logistics, and business management.[28,29]

The current study focuses on retail trade, defined as the process of selling services or goods directly to consumers, i.e., individuals who consume the goods or use the services offered.[30] It is important to differentiate a retailer, who is a participant in the supply chain connecting the producing company with end consumers.[31] This form of trade can occur in various establishments such as physical retail outlets, supermarkets, and, as a current trend, through e-commerce platforms developed by retailers. This actor within the supply chain facilitates consumer access and drives economic development.[32]

Regarding retail e-commerce,[33] notes that the sector is experiencing significant growth. It reports that sales in 2023 will exceed $5 billion, and sales are expected to surpass $6 billion in 2024. These statistics indicate the sector's maturity concerning the use of technologies, e-commerce, and the digital economy in the country. Additionally, retail e-commerce participation in Latin America also shows significant growth.

In Ecuador, retail trade represents 46,53 % of economic activity in establishments. The retail sector is divided as follows: Sale of appliances, lighting, and furniture 3,0 %; Sale of stationery 3,2 %; Cosmetics and pharmacy products 4,7 %; Leather products 10,9 %; Newspapers, books, and other items 23,3 %; and the sale of cigarettes, beverages, and food 50,5 %. The Ecuadorian provinces with the highest retail trade are: Manabí 6,7 %; Pichincha 20,3 %; Guayas 25,2 %.[34]

According to the report published by INEC in April 2023, "Statistical Record of Companies 2022," there are 863,681 organizations in Ecuador. Of these, 380 600 were registered in 2021, while 293 200 organizations were registered in 2022 dedicated to offering services. In 2021, there were 293 200 companies engaged in trade, and in 2022, there were 295 400 commercial organizations. The remaining organizations are engaged in other activities such as agriculture, manufacturing, construction, and mining. It is within the trade sector that the companies to be studied in the current research are located, which is shown as the second fastest-growing sector in Ecuador.[26,35]

Classify retail businesses into two categories: department stores or supermarkets, which are retail outlets offering a wide range of products, often categorized by sections or departments, and also involve customer service and quality additional services.[36] Popular stores, which display a wide variety of products with minimal depth in their areas. For the purposes of this study, we will analyze retail supermarkets of appliances, and their activities related to the digital economy and e-commerce. With all the above, the study aims to analyze the correlation between the dimensions of the digital economy and the purchasing decisions of customers in retail appliance stores in Ecuador.

METHOD

Data

An empirical, quantitative, cross-sectional, and non-experimental research was conducted, using a survey as the data collection method, based on the constructs proposed in table 2 for the development of the questionnaire. The obtained data were analyzed using descriptive and correlational methods. The survey was administered to members of the economically active population (EAP) in Ecuador, defined by [37] as individuals aged 15 or older who are employed or willing to work, representing 66,6 % of the population, or 8,5 million Ecuadorians, which will be considered as the study population. A non-probabilistic convenience sampling method was used to form a sample of 658 firms, providing a 95 % confidence level and a 4 % margin of error.

Instrument

The survey was administered online with the condition of being an adult. The questions were categorized into three groups: 5 descriptive questions, 4 questions related to the digital economy (independent variable), and 4 questions concerning the purchasing decisions of customers in retail appliance stores (dependent variable). A Likert scale was used with the following ratings: 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree. The questions are designed to measure respondents' attitudes and perceptions regarding the constructs of the digital economy and their relationship with the purchasing decisions of customers in the retail appliance sector. Regarding questionnaire validation, it was reviewed and approved by four experts in digitalization and business management.

In terms of the instrument's reliability analysis, the Cronbach's alpha coefficient was calculated, resulting in 0,934, reflecting high internal consistency of the instrument.

Subsequently, statistical evidence was sought to determine if a positive relationship exists between the variables of the study. The primary research hypothesis proposed was:

- Null Hypothesis H0: there is no correlation between the dimensions of the digital economy and the purchase decision of customers at retail appliance stores.

- Alternative Hypothesis H1: there is a correlation between the dimensions of the digital economy and the purchase decision of customers at retail appliance stores.

RESULTS

Descriptive Results

After data collection, the sample consisted of 658 participants. To examine any potential bias among the sample participants, table 4 shows the distribution of respondents based on the intersection of age and gender variables. It can be observed that there is a bias towards younger and male participants, which may impact the generalizability of the results.

Table 4. Age Distribution by Gender

Age	Female	Male	Prefer not to say	Total
18-24 years	11,85 %	26,44 %	0,76 %	39,06 %
25-34 years	4,56 %	19,60 %	0,30 %	24,47 %
35-44 years	6,99 %	14,44 %	0,30 %	21,73 %
45-54 years	6,23 %	3,65 %	0,30 %	10,18 %
55-64 years	2,28 %	1,06 %	0,00 %	3,34 %
65 years and older	0,61 %	0,00 %	0,61 %	1,22 %
Total	32,52 %	65,20 %	2,28 %	100,00 %

Respondents indicated that they prefer to buy appliances online (figure 1). However, this result does not show a significant difference compared to the options of buying in physical stores and those with no explicit preference. In more detail, it was found that 69,23 % of men prefer to shop online, while 62,62 % of women prefer to shop in physical stores.

Figure 1. Preference for Online Shopping

In response to the question, “Do you think that options provided by digital technologies such as websites, social media, ¿and mobile apps have improved your experience of buying appliances?” it is noted that 57,60 % of respondents expressed some level of agreement. This result may be attributed to the high participation of young people in the sample. The distribution of responses is shown in table 5.

Table 5. Technology Has Improved Users’ Experience

Response	Opinion
Strongly Disagree	4,41 %
Disagree	20,82 %
Neither Agree Nor Disagree	17,17 %
Agree	39,21 %
Strongly Agree	18,39 %
Total	100,00 %

The opinions of respondents regarding “How do you think retail appliance stores in Ecuador could improve their presence in digital services?” are reflected in figure 2. From the respondents’ perspective, to enhance

their digital presence, retail appliance stores should prioritize improving user interfaces, customer support, and providing better product descriptions—activities that surpass price-based strategies.

In line with this,[13] argue that while Latin America works to address issues such as technological infrastructure, education, user protection regulations, and building trust in technology use, developed countries focus on updating their technologies, achieving benefits in dynamism and sustainability.

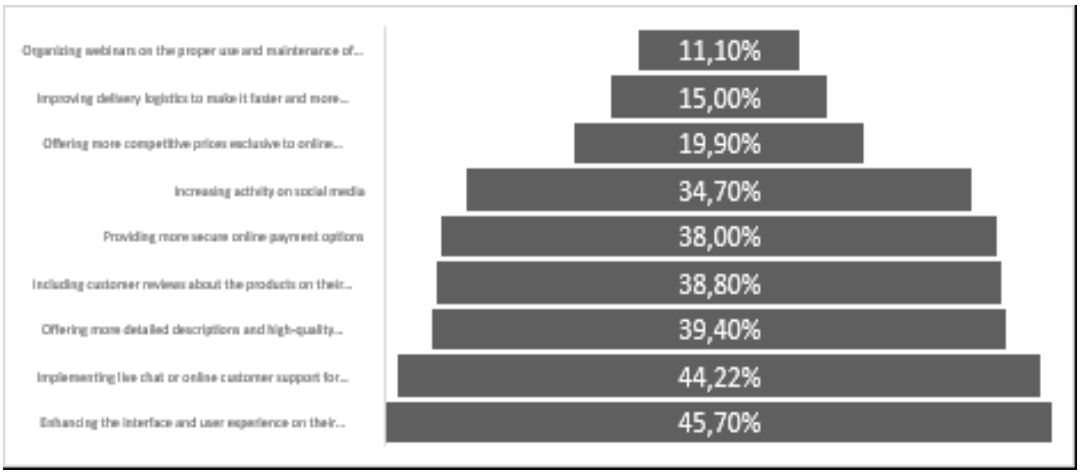


Figure 2. Activities to Improve Online Presence

Digital Economy

The following questions were answered using a Likert scale with the following levels of agreement: Strongly Disagree (1), Disagree (2), Neither Agree Nor Disagree (3), Agree (4), Strongly Agree (5). To obtain an integrated view and facilitate the interpretation of the results obtained from the responses to the independent variable, the categories of Agree and Strongly Agree were combined for the four dimensions of the Digital Economy variable. The consolidated results shown in figure 3 indicate that a high percentage of participants positively value the presence of the dimensions of the Digital Economy in Ecuador.

However, it is concerning to note the low level of satisfaction among respondents regarding high-speed internet access. In this regard,[38] recommend that Ecuador should strengthen its digital infrastructure through investments and clear public policies. This includes the involvement of both the state and the private sector to promote the development of a digital economy.

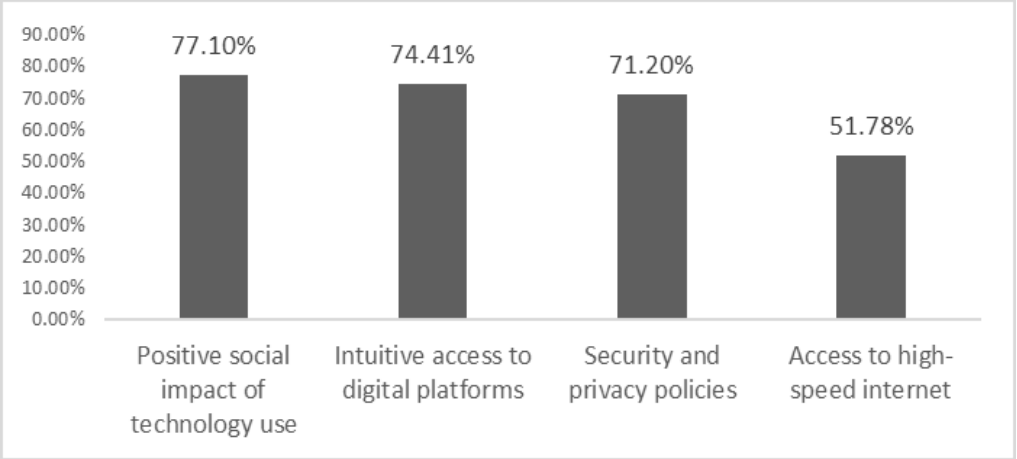


Figure 3. Favorable Opinions on the Presence of Digital Economy Dimensions in Ecuador

Purchase Decision

In the study of the dimensions of the digital economy and their influence on the Purchase Decision of Retail Appliance Stores, the information collected has been synthesized in figure 4. This figure summarizes the positive responses by combining the categories of Agree and Strongly Agree from the surveys conducted. Grouping these responses helps to identify customer priorities regarding the characteristics of the digital offerings of retail stores, which is crucial for developing market strategies and continuously improving the customer experience.

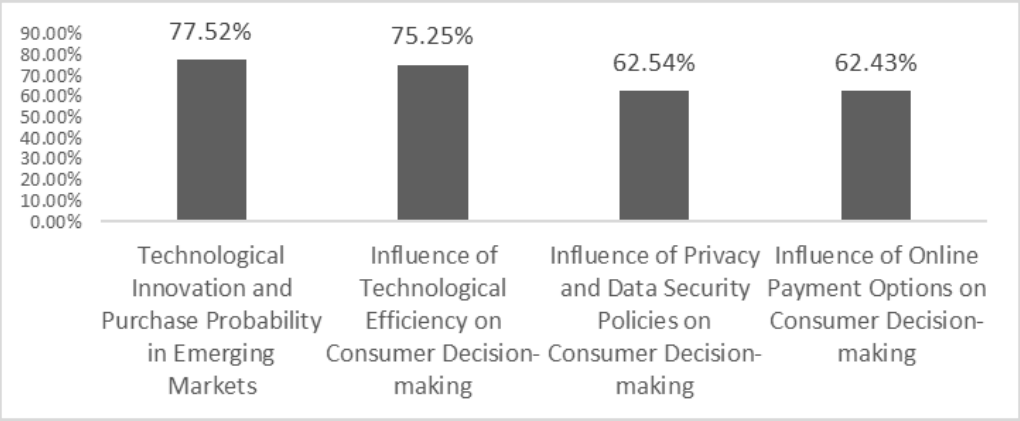


Figure 4. Influence of Digital Factors on Purchase Decision

Correlation Analysis

To begin the correlational study, the Kolmogorov-Smirnov test for normality was applied to each of the dimensions and totals of the analysis variables. The results of the normality test are shown in table 6.

Table 6. Kolmogorov-Smirnov Normality Test

Null Hypothesis	Sig[a].	Decision
The distribution of Digital Economy is normal with a mean of 14 and a standard deviation of 3,697.	0,000	Reject the null hypothesis.
The distribution of Purchase Decision is normal with a mean of 14 and a standard deviation of 3,750.	0,000	Reject the null hypothesis.
The distribution of Technological Structure and Broadband is normal with a mean of 3 and a standard deviation of 1,091.	0,000	Reject the null hypothesis.
The distribution of Hardware and Software is normal with a mean of 4 and a standard deviation of 1,057.	0,000	Reject the null hypothesis.
The distribution of Individuals is normal with a mean of 3 and a standard deviation of 1,078.	0,000	Reject the null hypothesis.
The distribution of Economic and Social Impact is normal with a mean of 4 and a standard deviation of 1,155.	0,000	Reject the null hypothesis.
The distribution of Purchase Decision by Technological Structure and Broadband is normal with a mean of 4 and a standard deviation of 1,026.	0,000	Reject the null hypothesis.
The distribution of Purchase Decision by Hardware and Software is normal with a mean of 3 and a standard deviation of 1,057.	0,000	Reject the null hypothesis.
The distribution of Purchase Decision by Individuals is normal with a mean of 3 and a standard deviation of 1,053.	0,000	Reject the null hypothesis.
The distribution of Purchase Decision by Economic and Social Impact is normal with a mean of 4 and a standard deviation of 1,167.	0,000	Reject the null hypothesis.

Note: a. The significance level is 0,050. The Lilliefors method is based on 10 000 Monte Carlo samples with a starting seed of 221623948.

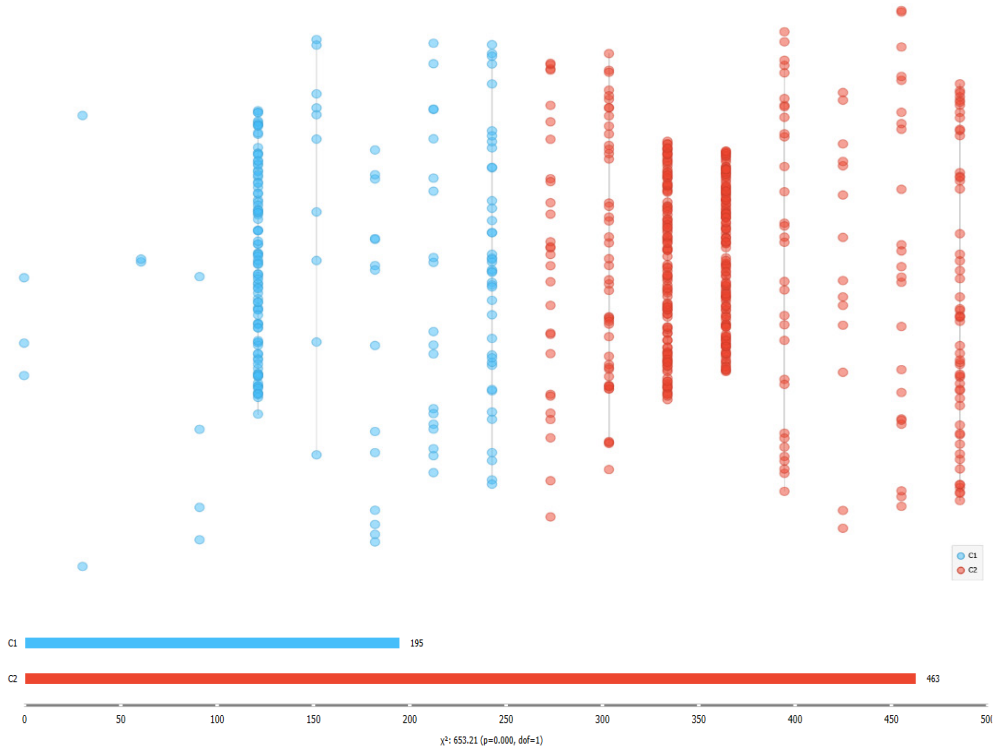
The results shown in table 6 indicate that the variables do not have a normal distribution (sig < 0,05). Therefore, the non-parametric Spearman's Rank Correlation Coefficient (SRCC) was applied to measure their relationship. Table 7 presents the correlation coefficients for each of the dimensions of the digital economy in relation to the purchase decision.

To quantitatively validate the previous exploration, Spearman's Rank Correlation Coefficient test[39] was applied based on the results shown in table 6. After applying the test, table 8 shows a considerable positive correlation between the Digital Economy and the purchase decision of customers in retail appliance stores. This result differs from the Pearson correlation coefficient obtained by [5] in their study on the impact of the digital economy on Peruvian businesses, where they found a low but significant level of correlation between the variables ($r = 0,364$, $p < 0,01$, $n = 63$ entrepreneurs).

Table 7. Correlation Coefficient by Dimensions		
Dimensions	**Correlation Test Result**	**Interpretation**
Correlation of Purchase Decision by Technological Structure and Broadband	Spearman's Rho = 0,596 Sig. (two-tailed) = p < 0,01 Sample n = 658	Moderate positive
Correlation of Purchase Decision by Hardware and Software	Spearman's Rho = 0,645 Sig. (two-tailed) = p < 0,01 Sample n = 658	Moderate positive
Correlation of Purchase Decision by Individuals	Spearman's Rho = 0,630 Sig. (two-tailed) = p < 0,01 Sample n = 658	Moderate positive
Correlation of Purchase Decision by Economic and Social Impact	Spearman's Rho = 0,748 Sig. (two-tailed) = p < 0,01 Sample n = 658	Considerable positive

Table 8. Correlation Coefficient Between the Dependent and Independent Variables				
			Digital Economy	**Purchase Decision**
Spearman's Rho	Digital Economy	Correlation Coefficient	1,000	0,752**
		Sig. (bilateral)		0,000
		N	658	658
	Purchase Decision	Correlation Coefficient	0,752**	1,000
		Sig. (bilateral)	0,000	
		N	658	658
Note: **. The correlation is significant at the 0,01 level (two-tailed).				

Subsequently, an unsupervised learning algorithm (hierarchical clustering algorithm)[40] was applied using Orange DataMining software,[41,42,43] and the Ward's minimum variance criterion was employed to minimize the total variance within the clusters. Based on this, it was possible to identify two clusters (figure 5).



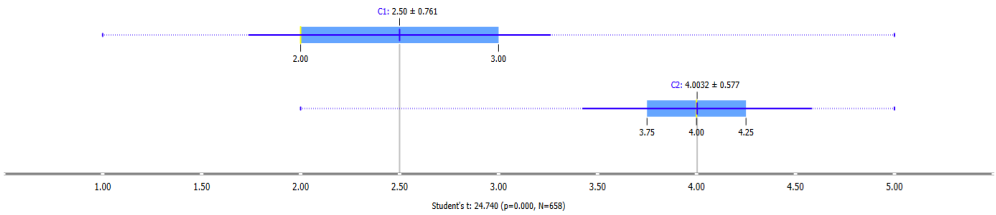


Figure 5. Hierarchical clustering

The preceding analysis underscores the robust correlation between the significance of digital economy factors and their influence on appliance purchase decisions. To further refine our understanding, we must consider the insights from.[8] They contend that adopting digital technologies alone is insufficient; a comprehensive digital strategy is needed to foster an innovative management model through digital transformation. This approach can create a new environment for economic progress.

Highlight the challenges posed by the digital economy, particularly in the context of tax collection in Ecuador. Hidden commercial transactions can hinder tax revenue, emphasizing the need for measures to combat tax evasion. These efforts should align with a broader transformation towards innovative economic development.[14]

Reminds us that work extends beyond basic needs and is crucial for social inclusion and recognition. With digitalization, automation, and remote work, there's a heightened risk of these social aspects of work deteriorating. Therefore, digital transformation must not only create jobs but also prioritize workplace well-being.[17]

CONCLUSIONS

The results suggest that customers view the presence of the digital economy positively, with clear preferences for online shopping. However, respondents expressed concern about access to high-speed internet, highlighting the need to strengthen digital infrastructure in Ecuador. Additionally, the importance of improving the user experience on digital platforms is emphasized, through intuitive interfaces, online customer support, detailed product descriptions, and clear data security and privacy policies.

The research concludes that there is a significant and strong relationship between the digital economy and customers' purchase decisions in the retail appliance sector. In this context, the importance of adopting comprehensive digital strategies is highlighted, focusing not only on technology use but also on developing an innovative management model through digital transformation. This approach will contribute to the advancement of digitalization and all aspects related to the digital economy, while also addressing issues related to tax collection and social inclusion in the context of digitalization and remote work. Additionally, it is recommended to review public policies and business strategies aligned with digitalization to enhance economic development and consumer satisfaction in the digital age.

The study fills an important gap in the scientific literature, as it supports the relevance of the digital economy for the economic growth of the retail appliance sector, which lacks scientific research in this area. The authors acknowledge the main limitation of the study, which is its focus on a specific geographic area and a single sector of retail, suggesting that the results may not be replicable in other sectors or countries. They also note a significant difference in survey participation between men and women. As future research directions, the authors suggest conducting studies in other countries and economic sectors to compare the impact of the digital economy. Longitudinal and experimental studies could also be conducted to analyze customer purchase decisions in more detail.

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None.

CONFLICT OF INTEREST

Authors declare that there is no conflict of interest.

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