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*Effects of e-commerce in areas with fewer resources and population in
Spain*

Measures to stop depopulation in the emptied Spain

Paula Mercadillo Pérez

Master Thesis

presented as a partial requirement for obtaining a master's degree in data-driven Marketing

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação

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by

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism, any form of undue use of information or falsification of results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honor from the NOVA Information Management School.

Cuenca (Spain), 12/06/2024

DEDICATION

I dedicate this thesis to my grandfather, thank you for teaching me that with effort things are always achieved without forgetting where you come from, to him and all my family for making me love my land and that one day empty Spain will be full of opportunities.

Esta tesis se la dedico a mi yayo, gracias por enseñarme que con esfuerzo las cosas se consiguen siempre sin olvidar de dónde vienes, a él y toda mi familia por hacerme querer mi tierra y que algún día la España vaciada esté llena de oportunidades.

ABSTRACT

This thesis delves into the impact of digital commerce in the rural areas of "empty Spain", detailing exhaustively both its advantages and disadvantages. It highlights the demographic uniqueness of the rural population, delving into the possibility of digital commerce serving as a fundamental tool to revitalize these regions affected by depopulation. The analysis focuses on the technological adaptation of rural communities, exploring the implementation of e-commerce and considering crucial aspects such as connectivity and technological infrastructure. Specific barriers that may arise in this process are identified, such as limitations of internet access and resistance to change. To address these obstacles, solutions and government strategies are proposed. The research achieves an in-depth understanding of the intersection between digital commerce, technological adaptation in rural areas, and government policies. In addition to offering a holistic view, the thesis provides practical recommendations aimed at improving the participation of these communities in the digital economy and effectively counteracting the phenomenon of depopulation.

KEYWORDS

Emptied Spain; e-commerce; depopulation; rural; opportunities

Sustainable Development Goals (SDG): Decent Work and Economic Growth



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1. INTRODUCTION

Due to a greater offer, a greater variety of products, more marketing methods, and more e-commerce have altered the way that businesses operate and raised customer expectations. It has also resulted in more competitive pricing (Valarezo et al, 2018). This competitiveness put utility and profit maximization as the main objective in markets (Fernández-Bonilla et al., 2022).

The adoption of online shopping (Valarezo, et al. 2019), by individuals and the trust necessary for it are explained by the socioeconomic, demographic, and digital skills factors identified in this paper. It would be helpful to discuss how businesses, the government, and regular people could encourage the adoption of such decisions E-commerce in Spain in 2022 will grow by 28.8% over the previous year according to CNMC (2023), every year there are more Spanish that uses the internet to do their shopping. every year there are more Spanish that use the internet to do their shopping.

In Spain, 94.5% of people aged 16 to 74 reported using the Internet within the previous three months (INE, 2022). There has been an 11% decrease in the digital divide between Autonomous Communities. Spain's regional disparities are a result of population density, income inequality, and unemployment (Fernández-Bonilla et al., 2022).

Another issue to be discussed in this study is the depopulation of rural Spain and its relationship with e-commerce. One global issue that is becoming almost uncontrollably large is the depopulation of rural areas. According to World Bank statistics (2018), the global population in rural areas decreased by more than 18% between 2000 and 2020, while it increased by 22% in metropolitan areas. A significant portion of Spain is currently experiencing depopulation, with several towns witnessing notable declines in population due to net migrant outflows as well as vegetative growth (Merino et al., 2024). Young people constitute the demographic most likely to leave rural areas, further contributing to the aging of these regions.

The aging of these areas makes it more difficult to create opportunities or take advantage of the new technology and opportunities offered by the XXI century. In this context, the present research dives into a critical analysis of the potential of digital commerce as a tool to counteract depopulation and revitalize local economies in the emptied Spain 'España Vacía.' This term has been gaining relevance since 2019 (Di Donato, 2019), because the issue it raises has been able to obtain traction on the national political agenda by leveraging the media and social support that social movements have garnered (Díez-Gutiérrez & Rodríguez-Rejas, 2022).

The decline in demographic assets resulting from extensive migration from rural areas to urban centers has multifaceted repercussions, encompassing economic stagnation, weakened social

bonds, desertification, and biodiversity loss (Bernáldez, 1991). The depletion of population assets (Manzo & Perkins, 2006), represents a formidable challenge to local economies jeopardizing the very existence of numerous villages (Cáceres-Feria et al., 2021).

This research is of particular importance because of its potential to inform sustainable development policies and strategies that can mitigate depopulation in depopulated Spain. How digital commerce can influence the younger population not to migrate from depopulated areas, thanks to the opportunities it can provide, both in terms of employment and quality of life.

Furthermore, e-commerce promotes the development of rural industries with unique characteristics, creating new opportunities (Wang et al., 2023). To effectively address this issue, it is essential to understand how digital commerce can attract new residents and influence the retention of current ones, particularly those from younger age groups.

This research aims to assess, via a survey, the impact of digital commerce on countering depopulation in rural areas of Spain, not only to understand the relationship between the implementation of e-commerce and the permanence of the local population but also to explore how this tool can act as a magnet to attract a younger and more dynamic population, thus bringing a new breath of life to these communities. The younger population (Domínguez, 2019) will reverse its tendency to move to the cities if the rural area is also conceived as a living space with labor alternatives not only linked to agriculture or traditional livestock farming (Rubio & Pascual Bellido, 2017).

Is digital commerce one of the solutions to stop depopulation or another aggravating factor?

This document consists of 4 parts, starting with the literature review where, thanks to other existing literature, we will address the topics of the study and develop those such as 1) Demographic Dynamics: Rural Depopulation, Youth Disparities, and E-commerce Impact in Spain and Globally 2) Impact of e-commerce on local business, 3) Government initiatives and e-commerce in rural Spain 4) Barriers to e-commerce adoption in rural Spain. This research will have an advanced study on the intersection between digital commerce and depopulation and provide critical information to businesses, local communities, and policymakers. The aim is to fully realize how digital commerce can be a positive vehicle to enable the reconstruction of depopulated rural areas in Spain and thus strengthen the social and economic cohesion of these communities by designing more efficient strategies.

Considering the great challenges involved, such as technology among the elderly, access to broadband internet, lack of communication with the outside world due to the great distances from the big cities, and the few basic services available to them, it will explore potential strategies to

mitigate their negative impacts, thus seeking a balance between technological innovation and the realities of these communities.

We have conducted a survey, both online and face-to-face, among the inhabitants of the emptied Spain, using data analysis software such as SPSS. Thanks to this study we will get to have more specific and deep knowledge about the needs and concerns of the inhabitants of these areas, see their point of view about new technologies and their adaptability and education about them, find out how digital commerce can be a tool among many others, to stop rural depopulation.

2. LITERATURE REVIEW

2.1. DEMOGRAPHIC DYNAMICS: RURAL DEPOPULATION, YOUTH DISPARITIES, AND E-COMMERCE IMPACT IN SPAIN AND GLOBALLY

Due to the limited prospects in rural areas and the increased allure of cities, the population of rural areas has not only started to decline since 2007 but has also been rapidly moving away from it (Merino et al., 2024). By 2022, the percentage of people living in rural areas worldwide was only 43.88% according to World Bank Data (2022).

In 2020, in Spain, the value of the youth tax in rural municipalities is 51,6 people under the age of 15 for every 100 people aged 65 and up, while it rises to 79,6 in urban municipalities. As a result, the rural rate is 35,2% lower than the urban rate, implying that the rural population is less youthful (older) than the urban population. The presence of young people decreases significantly as the size of the municipality decreases, reaching 28 young people for every 100 mayors in municipalities with fewer than 1.000 inhabitants (Demography of the Rural Population (MAPA), 2021).

Manifestations of disparities in development between regions, including per capita income, human resource quality, infrastructure availability such as transportation, energy, and telecommunications, as well as social services like health care and education, and access to banking, can exacerbate urban-rural disparities (Prabowo et al., 2021). This imbalance in urban-rural inequality is visible in regional economic development, a reality observed in many developing countries. The resulting economic disparity is anticipated to contribute to an increase in poverty in rural hamlets.

The European Union establishes a series of thresholds to determine whether or not there is depopulation; thus, the cohesion policy refers to sparsely populated areas with fewer than 8 inhabitants per square kilometer; regions with low population density are defined as having fewer than 12.5 inhabitants per square kilometer (Cuadrado et al., 2019). A considerable portion of Spanish territory (Pinilla et al., 2017) is currently relatively sparsely populated, with municipal densities far below levels considered crucial, such as 5 inhab/Km² and 10 inhab/Km² (...) regions below these thresholds prevail in the northern half of the Spanish inland.

Based on a poll done by Orús (2023), at the conclusion of the year 2022, about 90% of consumers globally stated that they had shopped at least once a year at various online stores throughout the year. The most recent e-commerce data published on the CNMC Data (2023) shows that in the third quarter of 2022, Spain's e-commerce turnover climbed by 28.8% year over year to €18,933 million. Online orders were received by 19% of all Spanish enterprises, beating the European average (17%). In Spain,

53% of the population utilized the Internet to buy products or services, whereas the European average was 60% (Abad et al., 2022).

2.2. IMPACT OF E-COMMERCE ON LOCAL BUSINESS

For over a decade (Pires et al., 2006), the Internet has played a significant role in consumer empowerment with the expansion of e-commerce, traditional brick-and-mortar stores are gradually closing their doors (Quora, 2017). Customers now have the convenience of placing orders from the comfort of their homes, making payments through credit cards, and patiently awaiting the delivery of goods to their doorstep (Rita et al., 2019). Consequently, there has been a shift in consumer behavior, with more people opting for online purchases over traditional in-store transactions. (Lee, G.-G. and Lin, H.-F., 2005), to stay competitive, physical businesses are actively engaging with clients through e-commerce platforms.

In this rapidly changing landscape, the primary challenge for online retailers is to ensure and sustain customer satisfaction. Adopting a service-focused strategy becomes a critical success factor for survival in the intensely competitive e-environment (Rita et al., 2019).

E-commerce, according to Amiri et al. (2023), comprises the distribution, sales, purchasing, marketing, and service of a product via an electronic system such as the Internet or other types of computer networks. It is a combination of goods and services (Udayana et al., 2024). According to INE (2022), 31.7% of businesses will be sold through e-commerce, up 20.3% from 2021.

People can now shop or browse for services such as online transportation without having to meet and converse in person. Furthermore, e-commerce is a transaction process in which buyers and sellers buy and sell various things electronically from one company to another using a computer as an intermediary for the business transactions they conduct (Udayana et al., 2024). E-commerce can provide (Dumitriu et al., 2019), flexibility in manufacturing, allowing for speedier delivery to clients, delivering and receiving offers quickly and affordably, and providing fast, paperless transactions for small businesses.

The advancement of information technology, particularly the internet, generates a virtual space that substitutes the physical space that spreads across the Earth's surface. All e-commerce transactions take place in this virtual area. The widespread availability of smartphones with internet connection at all levels of society has accelerated the growth of e-commerce. The evolution of e-commerce is highly important to analyze because the telecommunications industry will continue to expand in terms of service coverage and internet connection speed as time goes on. Electronic transactions or e-

commerce activities will continue to rise as payment systems become more accessible (Udayana et al., 2024).

Under these circumstances, we hypothesize that:

H1: Successful adoption of digital commerce in emptied Spain will contribute positively to reducing depopulation and boosting the local economy

E-commerce and related activities via the Internet can be a driving force for improving the domestic economy through the liberalization of domestic services and accelerating integration with global production activities (Hadi et al., 2022).

Face-to-face encounters, as in traditional storefronts (Udayana et al., 2024), are no longer required in the purchasing and selling process. Sellers and buyers must only complete deals online. Transactions are completed more efficiently and rapidly, particularly with the integration of numerous payment methods made possible by API technology. Buyers in various cities can deal without meeting and talking over the internet. Both buyers and sellers gain from e-commerce. Buyers save money and time since they do not have to go far to find the things they require. Aside from these benefits, there are several drawbacks to completing buying and selling transactions via the Internet. Buyers of electronic devices may have problems managing warranties, and the process of maintaining warranties is ambiguous. When it comes to online transactions, trust is the most valuable commodity for both vendors and purchasers.

Digital transformation has risen to the top of business agendas and raised awareness of the need for new competencies among business leaders strategizing and spearheading digital transformation (Müller et al., 2024). It is necessary to find an environment that facilitates their digitization, to understand the organization of the trade in the face of these changes, what knowledge and activities need to be performed, and empower employees to turn strategic initiatives into new work practices.

However, too much digitalization causes issues in both villages and cities. It is becoming increasingly unprofitable to do business on the first floors of metropolitan locations that are not commercial hubs. The recession and the development of Internet commerce have caused many merchants to close their doors, and in many cases, no one is ready to fill the space. The number of enterprises that have not been utilized for anything for at least five years has increased by 7.1% in recent years. There are between 8,000 and 10,000 abandoned buildings in Barcelona alone. Retailers attribute this phenomenon to an increase in Internet purchasing and a shift in approach by major brands (Catà et al. (2018).

If the stores close, life in the villages disappears, and small enterprises fight to raise social awareness to remain. Those customs of purchasing goods at village or community businesses have faded with the passage of time. The advent of department stores, as well as the Internet and online commerce, has made it even more difficult for businesses to establish a presence in the consumer market (Santisteban, 2023). For example, in the town of Palencia, one of the proposals they are carrying out through the association is to teach businesses to be able to make attractive content and search for customers through social networks. The idea is not to promote real online sales, since otherwise it would not make sense to maintain a physical business. The goal is that online they can show what they have and "that people see that in the establishments we give a specific service, care, that we treat the products with love and specially" (Santisteban, 2023).

Depopulation, online sales, competition from large supermarkets... The enemies of traditional stores are multiplying, and their effects are being felt (Montero, 2019). Spain has lost an average of 23 businesses per day in the last four years, with a 4.2% drop in self-employed workers, Lorenzo Amor, president of the ATA (2019), said that the sector that has suffered the most from the depopulation process that concerns us the most is commerce, when small companies collapse in a town, the community dies, and when there are no genuine chances for entrepreneurship and generational replacement in the same communities, young people leave, and businesses lose all consumer potential (CEOE, 2019).

2.3 GOVERNMENT INITIATIVES AND E-COMMERCE IN RURAL SPAIN

Rural regions in many Member States of EU have been depopulated in recent decades. These areas suffer from several environmental and socioeconomic issues. Lower per capita income, a larger percentage of the population at danger of poverty and social exclusion, a lack of access to essential infrastructure and services, and lower levels of access to fast broadband internet are just a few examples. The EU's rural development program has attempted to address some of these issues. Better integration of financial streams is required, as is maintaining conversation across European structural funds, with all of the implications for the new CAP strategic plans. The Commission's recommendations to Member States on their CAP strategic plans highlight several recurring themes relating to rural employment, education, and training needs, such as the need to address rural depopulation, promote generational renewal, improve connectivity, and address the role of local action. (Augère-Granier & McEldowney, 2021).

Following Franco's death, an attempt was undertaken in Spain to transition from a unitary dictatorship to a decentralized democracy. Since then, (Pinilla et al., 2017), it has been these two axes, European integration, and decentralization, around which all regional policy in Spain has revolved, the means of dealing with territorial concerns. In the case of Spain, given the greater proximity and flexibility of regional governments to regional governments, it should become a means of deepening democracy as well as integrating heterogeneous territories, economically, culturally, and demographically, so that they can feel an active part of a shared political project. As a result, decentralization has not achieved its basic objective of fostering territorial balance, in which an active regional policy should have played a key part. (Martínez-Herrera & Miley, 2010).

Small towns in outlying areas (Commission of the European communities, 2008), serve as exceptional laboratories for testing novel policies in response to Europe's challenges - climate change, energy, democracy, and globalization. There are examples of isolated little towns regaining their footing by capitalizing on opportunities provided by the New Economy and collaborative dynamics. In crises, technology, creativity, and social capital may be used in a more stimulating way to seek solutions (Pinilla et al., 2017). In this regard, the experience gained in regions such as Scotland's Highlands and Islands or the sparsely populated areas of Sweden, Finland, and Norway is illuminating and invites further study and reflection on the formulation of specific policies for the rest of Europe's depopulating regions (Arctic Smartness, n. d.).

The implementation of state agreement of all political factions (Lopez, 2019) is an important component of addressing the demographic crisis, a strategic state plan' is essential. (Narbona, 2017). A necessary component is to execute a minimum medium-term budget allocation (with a horizon of at least 25 years) as an investment in social and territorial cohesion in strength and sustainability, to ensure the right to health. Investment in social and territorial cohesion for strength and sustainability to ensure the right to equality and the right to remain in his homeland (Díez-Gutiérrez & Rodríguez-Rejas, 2022).

Given the above, our second hypothesis stipulates that:

H2: The effective implementation of government initiatives aimed at boosting e-commerce in rural areas of Spain will promote the digitization of local businesses but will also play a crucial role in the fight against depopulation

Very fast public network (Rojas, 2012), with at least 100 Mbps broadband, giving the best access to the internet and mobile phone, bridging the digital gap, and meeting the demands of teleworking

or digital work. Should be supplemented by training, digital assistance and guidance, and the advancement of e-government (Díez-Gutiérrez & Rodríguez-Rejas, 2022).

Jobs and non-locatable production (Díez-Gutiérrez & Rodríguez-Rejas, 2022), such as small industries for product transformation, local handicrafts, and so forth (Pulpón & Tabasco, 2016), new occupations the creation of high-quality, respectable, and legally protected jobs of resources, customs, or the environment; the promotion of industries not just connected to conventional agriculture and livestock farming but also robotics, web design, video production, computer programming, data mining, etc (Díez-Gutiérrez & Rodríguez-Rejas, 2022).

Developing public "micropolises" for research and technology development in rural regions is one way to plan policies that support R&D in these locations (Koutsou & Vounouki, 2012), and technical advancement in rural regions that, in partnership with public universities and reputable research institutes, produce high-value goods with added value, establishing research and innovation networks. This is a calculated risk that requires political will (Díez-Gutiérrez & Rodríguez-Rejas, 2022).

The European Union has implemented many initiatives, such as improving broadband coverage and connection. The Commission's report highlights (Augère-Granier & McEldowney, 2021), the potential benefits of digitalization.

Studies about smart regions, smart territories, and digital villages indicate that there are growing endeavors centered around the transformative potential of digitization in rural areas (Matern et al., 2020). The notion of smart villages has lately acquired traction in this setting. In the EU, the European Parliament initiated the Smart Villages project in 2017, and the European Commission produced a paper titled EU Action for Smart Villages in collaboration with the European Parliament. Furthermore, the issue of Smart Villages was included as a sub-theme under the work of the European Network for Rural Development (ENRD) on "Smart and Competitive Rural Areas".

In comparison to the EU average, Spain has a high degree of digital equipment in its businesses (above average). Companies' digital equipment (above average); nonetheless, e-commerce performance (below average) (Ministerio para la transformación digital y de la fundación pública [Gobierno de España], 2020). Especially in the case of micro-SMEs with less than ten employees, which constitute most of our country's business fabric (Ministerio de Industria, Comercio y Turismo. [Gobierno de España], 2023).

There is the "Strategy for the Digitization of the Agri-Food and Forestry Sectors" pushed by the Ministry of Agriculture, Fisheries and Food («Digitisation strategy for the agri-food and forestry sector and rural areas », 2019), which outlines the lines and measures required to foster digital

transformation, as well as the instruments envisaged for execution. One of its goals is to establish a National Training Center for Digital Competencies (Moyan, 2022). A key aspect of digital adoption consulting is the configuration of a service for SMEs and startups that, on the one hand, solves queries about solutions and/or methodologies to improve company management through the use of ICTs (Internet management through the use of ICTs, Internet presence, social networks and online marketing, e-commerce marketing, e-commerce, relationships with third parties) It is vital to encourage businesses to equip themselves with ICT equipment, opening up to e-commerce and consolidating Industry 4.0 as change agents in the digital 4.0, as change agents in the digital business models for the sector («Digitisation strategy for the agri-food and forestry sector and rural areas », 2019).

By 2025, the Spanish government plans to implement digital transformation initiatives (Ministerio para la transformacion digital y de la fundacion publica [Gobierno de España], 2020), in several sectors, such as addressing new gaps in social inequality caused by a lack of Internet access or use. Educational and cultural services, social and health services, and commerce in products and services are all examples of services. Focused on eliminating inequality and contributing to enhancing the potential growth of residents and businesses in all feasible dimensions.) With initiatives like as the SME Digitalization Plan, programs such as Acelera PYME, Activa Industria 4.0, and the Plataforma Comercio Conectado (Connected Commerce Platform) the goal is to ensure the combined efficiency of all activities and programs made available to SMEs.

The overall effectiveness of all activities and programs made available to SMEs, with a focus on synergies and economies of scale SMEs seeking synergies and economies of scale to better manage public monies and have a bigger effect. One aims to become an umbrella for the existing entrepreneurship support networks in Spain, all coordinated and in collaboration with the network of Entrepreneur Service Points (PAE), currently managed by the Ministry of Industry, Trade and Tourism. Spain also has digitization as a lever for commerce modernization. The goal of the Plan for the Modernization of Commerce (Ministerio para la transformacion digital y de la fundacion publica [Gobierno de España], 2020), is to increase the competitiveness of the retail industry by initiatives based on the retail sector's digital transformation. Improving the retail industry by activities centered on digital transformation and innovation capabilities, particularly in SMEs and micro-SMEs. Furthermore, the role of the Trade Observatory 4.0 will be critical in analyzing, coordinating, and disseminating the main trends related to the Spanish trade sector, as well as serving as a forum for the proposal and execution of initiatives in the field of Commerce 4.0.

2.4 BARRIERS TO E-COMMERCE ADOPTION IN RURAL SPAIN

Between 2014 and 2019 (Augère-Granier & McEldowney, 2021), the population of EU rural areas fell by 0.8 million, while urban regions added 3.8 million people. Depopulation is a long-term trend caused mostly by agricultural restructuring (becoming less labor-intensive, with fewer and larger farms) and a shift from the primary and secondary to the tertiary sectors. Low birth rates, out-migration of younger qualified individuals, and rising life expectancy all contribute to the rural population's aging. Rural communities have fewer career prospects as well as underutilized and unviable public services such as transportation and health care.

In towns with less than 5,000 people, about 25% of the population is over the age of 65, which is double the national average. Those over the age of 80 account for more than 10% of the population in communities with less than 1,000 residents, whereas the overall figure for Spain does not exceed 6%. The link between aging and the environment is, thus, obvious: the smaller the municipality, the bigger the share of elderly inhabitants it has climbed to nearly 40% in the smallest municipalities, well above the national average of 19% (Elizalde-San Miguel, 2017).

By the year 2022 in Spain, 94.5% of the population, aged 16 to 74, will have used the Internet in the last three months. Internet use is a majority practice among young people between 16 and 24 years of age, with 99.7% of men and 99.8% of women. As age increases, Internet use decreases, with the lowest percentage corresponding to the 65 to 74 age group, according to the INE (2022), but although most people have access to the Internet, its use is mainly in messaging applications.

Some barriers that face e-commerce in developing countries (OECD, 2004), vary greatly across countries, but are most commonly related to the following: enabling factors infrastructure (technology, network availability of ICT skills, qualified personnel); cost factors (costs of ICT equipment and networks); and security and trust factors (uncertainty of payment methods, and legal frameworks), poor distribution logistics, lack of feel-and-touch associated with online purchases, problems in returning products.

Elderly people may have difficulties while interacting with ICT interfaces (Guner & Acarturk, 2020), Spain, like many developing nations, is working to digitize government services through initiatives such as the e-Government Gateway. Both corporate and public entities are transforming their services and information. However, the senior population's expectations for utilizing ICT are often overlooked while building digital services and products.

Technology, particularly new information and communication technologies (NICTs) are an integral component of each of our everyday lives. However, the evolution of NICTs has been clearly

distinguished by this separating aspect that has followed technical growth, giving birth to the so-called digital gap, a segregating factor that, among other things, would justify the distance between the old and technology (Sánchez et al., 2005).

Seniors (Abad et al., 2022), remain one of the most vulnerable groups in the digital divide. Less than 15% of those aged 65 to 74 have used e-commerce in the previous three months (INE, 2020), compared to 83.3% of those aged 25 to 34. Just 60% of rural households have access to fast internet (>30 Mbps), compared to 86% of the EU population overall. In rural regions, just 70% of individuals use the Internet daily, compared to 81% in cities. (Augère-Granier & McEldowney, 2021).

Similarly, digital literacy and e-literacy continue to be a key barrier to the adoption of new technologies and are notably lacking in rural regions (Matern et al., 2020) Basic digital skills levels in Spain remain somewhat below the EU average. In comparison to the European average of 42%, 43% of persons aged 16 to 74 lack basic digital skills (European Commission, 2022).

In this context, we hypothesize that:

H3: Barriers such as limited infrastructure, connectivity, and cultural aspects in rural areas of Spain are expected to impact the adoption of e-commerce.

The Internet is also less attractive for traditional economic sectors (e.g., agriculture) that account for a significant proportion of developing countries' economies (Kshetri, 2007). The rapid growth of e-commerce in the US can be attributed to the infrastructure already in place and the easy availability of a physical delivery system (Hawk, 2004), such systems are rarer in developing countries. In some regions, logistics issues are one of the key impediments to e-commerce spread (Kshetri, 2007). Attracting FedEx and UPS (Kenny, 2009), to provide delivery services is tough. Sociopolitical hurdles, such as a preference for personal face-to-face communication over e-mails and prioritizing established ties above the Internet's interpersonal efficiency, might hinder e-commerce (Kshetri, 2007).

A survey of Brazilian consumers found that low e-commerce adoption was due to government regulations such as privacy and security concerns, lack of e-commerce laws, insufficient legal protection, and concerns about Internet taxation (Tigre & Dedrick, 2004). Cognitive factors (Kshetri, 2007), like many impacts such as insufficient awareness, knowledge, abilities, and confidence provide as cognitive feedback. Consumers' lack of awareness and knowledge of the benefits of e-commerce, as well as their lack of trust in service providers, have hampered e-commerce (Hawk, 2004). Non-English speakers, particularly the elderly generation, face significant barriers due to a lack of proficiency in the language (Gibbs et al., 2003). In Slovenia (Kenny, 2002), 75% of the English-speaking population accessed the Internet, whereas only 1% of non-English speakers did. Proper training and education are

crucial for attracting clients who are unfamiliar with online transactions and prefer traditional purchasing methods. Consumers prioritize lead time (Rezaee et al., 2006), when choosing cross-channel businesses. Therefore, management must continuously improve to provide optimum customer happiness.

3. METHODOLOGY

In this research, an online survey was conducted through Qualtrics, with a total of 194 responses. Of these, only 101 people completed the survey. Of these 101 responses, 89 showed concern about the term 'Empty Spain', which are the responses that will be analysed, as they are the ones that matter most to us and carry the most weight.

The target population was Spaniards over the age of 18 living in rural areas of Spain. 33% percent of the participants were men and 65.6% were women. A non-random convenience sample was used.

To test the purpose model, the survey has been posted in different social media as Instagram, LinkedIn, WhatsApp and sent to political parties and association that are aware of the emptied Spain. Respondents were directed to the questionnaire via the link shared. They were instructed to respond about some topics related to the main topic. Most of the questions were made with a Likert scale, and multiple-choice questions, adding space for self-qualitative expressions at the end.

The target population was Spaniards over the age of 18 living in rural areas of Spain. The largest percentage of the population that has participated are inhabitants of empty Spain between 18 and 24 years of age (table 1), almost half of those surveyed earn less than 18,000 euros per year, 65.2% of the respondents are women, the rest being men, except for the participation of one respondent with a non-binary gender and one respondent who preferred not to say, almost half of the population lives in villages with more than 3000 inhabitants, followed by 101-500 inhabitants and 5-50 inhabitants, more than half of those surveyed are from Castilla- La Mancha, followed by Castilla y Leon, the majority of respondents are university graduates.

Table 1 shows the distribution of the age

Table 1

Age of the respondents

	Frequency	Percentage	Cumulative percentage
>65	2	2,2	2.2
18 – 24	45	50.6	53.8
25 - 34	13	14.6	67.4
35 - 44	4	4.5	71.9
45 -54	14	15.7	87.6
55- 64	11	12.4	100
TOTAL	89	100	100

Once we clean all data in Excel, we started to analyse the data in SPSS, checking and changing when it's necessary the scale between nominal and ordinal, also the type between numeric or chain, so we start the analysis first for test our first hypothesis. For the h_2 we had to make new binomials variables to analyze the data.

This study uses a quantitative non-experimental design to evaluate the following hypotheses:

H1: Successful adoption of e-commerce in hollowed-out Spain will contribute positively to reducing depopulation and boosting the local economy

H2: The effective implementation of government initiatives to boost e-commerce in rural areas of Spain will promote the digitization of local businesses and will be crucial in the fight against depopulation

H3: Barriers such as limited infrastructure, insufficient connectivity, and cultural aspects in rural areas of Spain will impact e-commerce adoption

For each hypothesis, we have different variables and we have got demographic data such as age, gender, autonomous community, and population.

Table 2 illustrates the differences hypothesis and its variables.

Table 2

Hypothesis & variables

Hypothesis	Variables
<p>H1: Successful adoption of e-commerce in hollowed-out Spain will contribute positively to reducing depopulation and boosting the local economy</p>	<ol style="list-style-type: none"> 1. Contribution to the reduction of depopulation. 2. Positive impact on the local economy. 3. Ease of adoption of e-commerce in Empty Spain. 4. Relevance of e-commerce for local economic vitality. 5. Perception of Personal Benefits from the Adoption of Digital Commerce. 6. Influence of e-commerce on migration decision-making. 7. Creation of new jobs. 8. The closure of local shops. 9. It is a great opportunity tool for young people. 10. Accessibility. 11. Variety of products and services. 12. Convenience. 13. Competitive prices. 14. Confidence in security. 15. Access to products that I can't buy any other way.
<p>H2: The effective implementation of government initiatives to boost e-commerce in rural areas of Spain will promote the digitization of local businesses and will be crucial in the fight against depopulation</p>	<ol style="list-style-type: none"> 1. Acelera pyme 2. Active Industria 4.0 3. Plataforma Comercio Conectado 4. Estrategia de Digitalización del Sector Agroalimentario y Forestal y del Medio Ambiente 5. Pueblos inteligentes 6. None 7. Other. 8. The effective implementation of government initiatives to boost e-commerce in rural areas is perceived as a positive step for the digitisation of local businesses.

	<p>9. I believe that government measures to promote e-commerce will be effective in improving the digitisation of businesses in rural areas.</p> <p>10. The implementation of government initiatives to boost e-commerce is seen as crucial to revitalise local businesses in rural areas.</p> <p>11. Government support for e-commerce is perceived as an essential strategy to combat depopulation in rural areas in Spain.</p> <p>12. Government support for e-commerce is seen as an essential strategy for combating depopulation in rural areas of Spain.</p>
<p>H3: Barriers such as limited infrastructure, insufficient connectivity, and cultural aspects in rural areas of Spain will impact e-commerce adoption”</p>	<ol style="list-style-type: none"> 1. Limited infrastructure in rural areas 2. Cultural aspects in rural areas 3. Fear of new changes and technologies 4. Insufficient network connectivity 5. Average age of the population 6. Digital literacy 7. Preference for local commerce 8. Fear of local shops closing due to e-commerce use 9. Mistrust of online shopping

We did a lot of different tests to prove our hypothesis (See Appendices), like Descriptive Analysis; descriptive analysis was conducted to summarize the demographic characteristics of the participants and the responses to each questionnaire item; Correlation tests; Pearson correlation tests were carried out to assess the relationship between the independent variables and the dependent variables.

Correlations with a p-value of less than 0.05 were considered significant. Analysis of Variance (ANOVA); a one-way ANOVA was performed to determine if there were significant differences between the categorised groups of the independent variables and the dependent variables.

The independent variables included in the ANOVA were those that showed significance in the correlation analysis. Multicollinearity tests; multicollinearity between the independent variables was checked using the Variance Inflation Factor (VIF). VIF values of less than 10 were considered acceptable. Multiple Linear Regression; multiple linear regression was performed to assess the relationship between the independent variables and the dependent variables.

Only variables that were significant in the ANOVA were included. We have also created binary variables which are variables that can only take two possible values, typically represented as 0 and 1, and cross-tabulations which are tables that show the relationship between two categorical variables, allowing you to see how combinations of their categories are distributed and the T-test which is a statistical test that is used to compare the means of two groups and determine if there is a significant difference between them.

4. RESULTS AND DISCUSSIONS

Once we have all our data clean, and we know what we going to do, we start the analysis to test our first hypothesis which states that the Successful adoption of digital commerce in emptied Spain will contribute positively to reducing depopulation and boosting the local economy

We started checking their correlations and significance. First, we chose our dependent variables for this hypothesis, and tested 2 variables as dependent variables:

Y_1 : *contribution to population reduction* and Y_2 : *positive impact on the local economy*.

For Y_1 : *contribution to population reduction*, it was possible to find that we have a significant variables and moderate correlation, which means that as one variable increases, the other tends to increase as well. There are not strong enough to predict a high accuracy, but it does indicate a significant and conscious trend. So, the contribution to population reduction has a positively moderated correlation with a positive impact on the local economy, perception of personal benefits from adopting e-business, inflection of e-business in migration decision-making, it is a tool of opportunity for young people, and accessibility.

There is also a strong negative correlation between the contribution of the population reduction with the closure of local shops, but as it is not significant there is not enough evidence to reject the null hypothesis, that there is no correlation in the population.

While for $Y_2 =$ *positive impact on the local economy*, we also found significance variables and moderate and strong correlations. The variables *relevance of digital commerce for local economic vitality* and *creation of new jobs*, has a strong positive correlation which demonstrates a high accuracy, while variables such as *perception of personal benefits from digital commerce adoption, it is a great opportunity tool for young people* and *accessibility* has a moderate correlation. For this dependent, the variable *closure of local shops* is significant and has a negative moderate correlation, which means that when the variable closure of local shops increases the positive impact on the local economy decreases.

Once we identified the significant variables, we check if there is multicollinearity between the independent variables that are not significant and this could be important for the study, checking their VIF that has to be >10 and their TOL that has to be smaller than 0.1 to have multicollinearity, any variable has it, so there is no multicollinearity between independent variables for Y_1 : *contribution to population reduction* and with Y_2 : *positive impact on the local economy*.

The next step was a linear regression. We started with y_1 as the dependent variable; when all independent variables are 0, the positive impact on the contribution of population reduction is expected to be 0.791 units, but $p= 0.288$ indicating that there is insufficient evidence to claim that the value of the intercept is significantly different from zero.

Of all the variables, only two showed significances with $p < 0,05$. These variables have a *positive impact on the local economy* and *influence of digital trade on migration decision-making*. Since this coefficient is significantly different from 0, it is possible to state that for each unit increase in the *positive impact of the local economy*, the *contribution to population reduction increases* 0.302 with a $B= 0.338$ which is the standardized coefficient, indicating that this variable has a moderate influence on the dependent variable.

While for the independent variable *influence of digital trade on migration decision-making*, it was possible to confirm that for each unit increasing the *influence of digital trade on migration decision-making*, the positive impact on *contribution to reducing depopulation* by 0.340 units, with a standardized coefficient of 0.299 showing a weak influence on the dependent variable.

For y_2 as the dependent variable, when all independent variables are 0, the positive impact on the contribution of population reduction is expected to be 0.197 units, but $p= 0.774$ indicating that there is insufficient evidence to claim that the value of the intercept is significantly different from zero. Three variables have $p < 0,05$ (the *creation of new jobs*, *contribution to reducing depopulation*, and *relevance of e-commerce for local economic vitality*).

That means that for each unit increase in the *creation of new jobs*, the positive impact on the *local economy* increases by 0.324 units. Its beta it is 0.329 and the standardized coefficient indicates that this variable has a moderate influence on the dependent variable, for each unit increase in *the contribution to reducing depopulation*, the positive impact on the *local economy* increases by 0.256 units, with a beta of 0.228 indicating that this variable has a weak influence in the dependent variable and for each unit increase in the *relevance of digital commerce for local economic vitality*, the positive impact on the *local economy* increase by 0.257 with a weak influence in the dependent variable due to its 0.243 beta.

Next, it was conducted an ANOVA analysis with some variables of interest: *ease of adoption of digital commerce in emptied Spain*, *creation of new jobs*, *closure of local commerce*, *convenience*, *confidence in security and competitive prices*.

Once the analysis was done, we concluded that there are significant differences in the y_1 : *contribution to the reduction of depopulation* and in the y_2 : *positive impact on the local economy*, between the

groups of creation of new jobs, accessibility, while for the variable y_2 there are also significant differences in the positive impact on the local economy, between the groups of closure of local shops and confidence in security.

Table 3 illustrates the dependent and independent variables for the Hypothesis 1

Table 3

Dependent and independent variables for H_1

Dependent Variables	Independent Variables	Additional Independent Variables for Y2
Y1: Contribution to the Reduction of Depopulation.	Q18_2: Positive Impact on the Local Economy.	Q18_4: Relevance of Digital Commerce for Local Economic Vitality.
Y2: Positive Impact on the Local Economy.	Q18_5: Perception of personal benefits from e-commerce adoption.	Q18_7: Creation of new jobs.
	Q18_6: Influence of Digital Commerce on Migration Decision Making.	Q18_8: At Closure of Proximity Trade.
	Q18_9: It is a Great Opportunity Tool for Youth.	Q12_5: Confidence in security.
	Q12_1: Accessibility.	

Given that the variables related to the successful adoption of e-commerce in Spain have shown significant associations with both the contribution to the reduction of depopulation (y_1) and the positive impact on the local economy (y_2), and these associations have been confirmed in both correlation analysis and ANOVA, it was possible to support hypothesis H_1

In other words, the results suggest that the successful adoption of e-commerce in Spain is positively associated with reducing depopulation and boosting the local economy, thus supporting the hypothesis put forward.

Our H_2 suggests that the effective implementation of government initiatives to boost e-commerce in rural areas of Spain will promote the digitization of local businesses and will be crucial in the fight against depopulation. Regarding this topic, a descriptive analysis of the frequencies showed that most people are is not aware of any measures implemented to digitalize rural businesses and stop

depopulation. As several options can be selected, we will do a binomial analysis to find out exactly how many people know about each of the measures individually.

Most people did not know any measure, out of a total of 50 people; however, there were 17 people who know ‘Acelera Pyme’ followed by ‘Pueblos Inteligentes (Smart Villages) 15 and “Agroalimentario y Forestal y del Medio Ambiente” with 13, finally only 5 people know “Activa Industria 4.0”, and another 5 people know another measure, like “Leader”. The conclusion is that half of them do not know the measures and the other half know one or more of them.

To be able to make the cross tables, we found that they cannot be made with categorical or nominal variables, and we had it categorized as nominal; so we went back to Excel and categorized the variables as numerical putting a 1 if they knew the measure or a 0 if they did not know it and so we could make the cross table. Table 4 shows how we process the binomial analysis.

Table 4

Binomial Analysis

Governmental measure		TOTAL
Acelera Pyme	0	72
	1	17
TOTAL		89
Activa Industria 4.0	0	84
	1	5
TOTAL		89
Plataforma Comercio Conectado	0	83
	1	6
TOTAL		89
Estrategia de Digitalización del Sector Agroalimentario y Forestal y del Medio Ambiente	0	76
	1	13
TOTAL		89
Pueblos Inteligentes (Smart Villages)	0	74
	1	15
TOTAL		89
Otra (other)	0	85
	1	4
TOTAL		89
Ninguna (None)	0	38
	1	51
TOTAL		89

A T-test was performed between the different measures taken by governments and the opinions on the effectiveness of these measures in rural areas to digitize them and avoid depopulation. To analyze these tests, we first had to do the Levene test where we had to look at their significance, i.e. their p-value. When less than 0.05, we had to look at the data in the row where equal variances are assumed, if it was greater than 0.05, we had to look at the row where equal variances are not assumed. Then we have to look at the corresponding row and analyze that data, checking their T, gl, Sig(2-tailed) that has to be smaller than $< 0,05$ to reject the null hypothesis, also if the confidence interval includes 0 it indicates that we cannot state with confidence that there is a difference in the means.

The majority of T-test performed showed that there is no significant difference between the means of the two groups. Levene's test indicated that the variances are $> 0,05$ and then the rest of the data as T, gl, sig (2. tailed) mean differences and confidence interval with a 0 reinforced that there is insufficient evidence to claim a significant difference in the means of the groups compared. This suggests that there is no significant association between the two categorical variables in our cross-tabulation. In other words, knowledge of government measures does not influence how they perceive government aid for the digitization of rural Spain and the curbing of depopulation.

But there were some exceptions as was the case of the dependent *variable Government support for e-commerce is perceived as an essential strategy to combat depopulation in rural areas of Spain* and the independent variable '*Plataforma de Comercio Conectado*' (Connected Commerce Platform) which, in the Levene's test analysis, indicates that the variances of the two samples are statistically different ($p = 0.07$), suggesting that the assumptions of equality of variances for the T-test are not met.

The independent T-test revealed a significant difference between the means of the two samples ($T = -7.037$, $gl = 82$, $p < 0.001$). The average difference between the means is -0.759 , suggesting that group 1 has a lower mean than group 2. The 95% confidence interval for the difference between the means is $[-0.974, -0.544]$, indicating that the true difference between the means of the two populations is likely to be within this range.

In summary, the results showed that there is a significant difference between the means of the two populations and this difference can be considered statistically significant given the low p-value. The results suggest that perceptions of *Government support for e-commerce is perceived as an essential strategy to combat depopulation in rural areas of Spain* vary significantly depending on whether people are familiar with or use the '*Plataforma de Comercio Conectado*' (Connected Commerce Platform). Those who are familiar with this platform tend to have a more negative perception of government support compared to those who are not.

We can also highlight *other* measures that people are aware of with the dependent variable *I believe that government measures to promote e-commerce will be effective in improving the digitization of businesses in rural areas*. T-test conducted shows that, when considering a single factor, there is a significant difference between the means of the two groups (p -value = 0.035). However, when multiple factors are considered, there is not enough evidence to reject the null hypothesis of equality of means (p -value = 0.071).

The average difference between group means is -1.038. The 95% confidence interval for this difference [-2.166, 0.089] includes 0, indicating that, although there is a tendency for a difference, it is not strong enough to be conclusive in the multifactor analysis.

The next step was an analysis of the correlation between government measures and people's opinions of them. In all relationships, the p -value is greater than 0.05. This value indicates the probability of obtaining an equal or more extreme correlation by chance alone, under the null hypothesis that there is no correlation in the population. Therefore, the correlation is not statistically significant at a significance level of 95%.

We, then, perform a regression analysis, where we have considered two dependent variables which are y_1 *The effective implementation of government initiatives to boost e-commerce in rural areas is perceived as a positive step for the digitalization of local businesses*, and y_2 *Government support for e-commerce is perceived as an essential strategy to combat depopulation in rural areas of Spain*. For y_1 as a dependent variable, when all independent variables are 0, the positive impact on *the effective implementation of government initiatives to boost e-commerce in rural areas is perceived as a positive step for the digitalization of local businesses* it is expected to be 3.159 units, and we confirmed that the value of the intercept is significantly different from 0 due to the $p < 0,001$.

For the dependent variable y_2 , when all independent variables are 0, the positive impact on *government support for e-commerce is perceived as an essential strategy to combat depopulation in rural areas of Spain* it is expected to be 2.897 units, and we can confirm that the value of the intercept is significantly different from 0 due to the $p < 0.001$. Unfortunately, no variable for both dependent variables have a significance level of less than 0.05 and therefore no variable is significant. No governmental measure was shown to be significant to any of the dependent variables.

Considering these findings, it appears that there is insufficient evidence to support the hypothesis. While there is a significant difference observed in *the perception of government support for e-commerce in combating depopulation*, this may not be enough to conclude that the effective implementation of government initiatives will lead to the desired outcomes of promoting digitization and combating depopulation in rural areas of Spain.

For H_3 which states that barriers such as limited infrastructure, connectivity, and cultural aspects in rural areas of Spain are expected to impact the adoption of commerce, we start checking their correlations and significance. First, we chose our dependent variables for the hypothesis, y_1 : *contribution to population reduction* and y_2 : *a positive impact on the local economy*.

For the y_1 we concluded that we have significant variables, with positive weak, moderate, and strong correlation, which means that as one variable increases the other tends to increase as well. The strongest correlation it is between the dependent and the variable *positive impact on the local economy*, then we have a moderate correlation between the variables the *average age of the population*, *digital literacy*, and *fears of local businesses closing down due to e-commerce use*, and a weak correlation between *cultural aspects in the areas*, *fear of new changes and technologies*.

For y_2 , we also have significant variables and with positive moderate, and strong correlations. The strongest correlation is the *contribution to population reduction*, followed by a moderate correlation with the variables *fear of new changes and technologies*, *the average age of the population*, and *digital literacy*.

Once we identified the significant variables, we then checked if there was multicollinearity between the independent variables that are not significant and that could be important for the study, checking their VIF that has to be >10 and their TOL that has to be smaller than 0.1 to have multicollinearity, any variable has it, so there is no multicollinearity between independent variables for y_1 : limited infrastructure in rural areas and y_2 : insufficient network connectivity.

Table 5 shows the dependent and independent variables for Hypothesis₃.

Table 5

Dependent and independent variables for H_3

Dependent Variables	Independent Variables	Additional independent variables for Y_1	Additional independent variables for Y_2
y_1 : limited infrastructure in rural areas.	Q24_1_3. Fear of new changes and technologies.	Q24_1_2. Cultural aspects in the areas.	Q24_1_1. Limited infrastructure in rural areas.
y_2 : insufficient network connectivity	Q24_1_5. The average age of the population	Q24_1_4. Insufficient network connectivity.	
	Q24_1_6. Digital literacy	Q24_1_8. Fears of local businesses closing due to e-commerce use	

For the regression analysis we have considered two dependent variables y_1 : *limited infrastructure in rural areas* and y_2 : *insufficient network connectivity*. We started analyzing y_1 ; when all independent variables are 0, the positive impact on the contribution of population reduction is expected to be 0.658 units, but $p= 0.260$ indicating that there is insufficient evidence to claim that the value of the intercept is significantly different from zero, even though the relationship between *Insufficient network connectivity* and the dependent variable y_1 : *limited infrastructure in rural areas* was found to be statistically significant ($p = 0.001$).

The unstandardized regression coefficient (Beta) is 0.393, indicating that for every unit increase in the independent variable, the dependent variable increases on average 0.393 units. The standard deviation of the error is 0.086, suggesting an accurate estimate of the Beta coefficient. The standardized coefficient is 0.446, indicating a moderately strong impact of the independent variable on the dependent variable. Furthermore, the value of the t-statistic (4.438) reinforces the significance of this relationship. Taken together, these results provide robust evidence that the independent variable has a positive and significant effect on the dependent variable. While for the independent variable *fear of local business closing down due to e-commerce use* we can confirm that for each unit that increases the positive impact on *limited infrastructure in rural areas* by 0.291 units, the standardized coefficient is 0.308 having a moderate impact of the independent variable on the dependent variable.

For y_2 , when all independent variables are 0, the positive impact on the contribution of population reduction is expected to be 0.323 units, but $p= 0.635$ indicating that there is insufficient evidence to claim that the value of the intercept is significantly different from zero. Even though there are variables that are significant as *digital literacy* and *limited infrastructure in rural areas*, we can confirm that for each unit that increases *digital literacy*, *Insufficient network connectivity* has a positive impact of 0.298 units, with a weak impact on the dependent variable; relating to the independent variable *limited infrastructure in rural areas* we can confirm that for each unit that increase the variable *insufficient network connectivity* has a positive impact by 0.515 which a moderate impact on the dependent variable.

We have also performed ANOVA analysis between the two dependents and all their independent variables and have concluded that there are significant differences in y_1 : *Limited infrastructure in rural areas* and y_2 *Insufficient network connectivity*, with all their variables, except with y_2 with the variable *Cultural aspects in rural areas* that there is no significant association.

Given that most analyses (correlation, regression, ANOVA) show that variables such as *limited infrastructure*, *Insufficient network connectivity*, and *cultural aspects in the areas* have significant

relationships and some moderate effects on e-commerce adoption, we cannot completely reject the hypothesis. However, the evidence is mixed and suggests that while some barriers have a significant impact, others may not be as influential. Therefore, the hypothesis is partially supported: some barriers have a noticeable impact, but not all barriers mentioned in the hypothesis have a strong and clear effect.

The qualitative analysis reveals that improving 5G connectivity, especially in areas such as Castilla y León, implementing digital education programs, and developing specific logistics infrastructures are crucial to fostering the adoption of digital commerce in rural areas of Spain. In addition, addressing the lack of decent housing is essential to retain and attract the population. Although digital commerce offers multiple advantages, certain local services, such as hairdressers, face challenges in selling online. Addressing these holistic issues can boost digital commerce, boost the local economy, and curb depopulation in rural areas.

5. CONCLUSIONS

Table 6

Research objectives and the conclusions.

Objectives	Results
<p>To know if with a successful adoption of digital commerce in emptied Spain will contribute positively to reducing depopulation and boosting the local economy</p>	<p>The results of this research show that the adoption of e-commerce in rural areas of Spain has the potential to reduce depopulation and improve the local economy. Although some analyses were not statistically significant, factors such as the perception of personal benefits and the influence of e-commerce on migration decisions were found to play an important role. New job creation and accessibility also proved to be key aspects. Overall, these findings support the idea that e-commerce can be an effective tool to revitalize emptied Spain.</p>
<p>If the effective implementation of government initiatives aimed at boosting e-commerce in rural areas of Spain will promote the digitization of local businesses but will also play a crucial role in the fight against depopulation</p>	<p>The study also revealed that many people are not aware of government initiatives to promote digital commerce in rural areas. Moreover, awareness of these measures does not seem to influence how effective they are perceived to be in improving digitization and combating depopulation. Interestingly, those who are aware of the 'Connected Commerce Platform' have a more negative perception of government support. These results suggest that, although government initiatives are important, they are not currently having the expected impact on the digitization of rural businesses and the fight against depopulation.</p>
<p>To know if barriers such as limited infrastructure, connectivity, and cultural aspects in rural areas of Spain are expected to impact the adoption of e-commerce.</p>	<p>The analysis indicates that barriers such as limited infrastructure, connectivity, and cultural aspects do affect e-commerce adoption in rural areas. Factors such as digital literacy and fear of local business closure also play a significant role. These barriers need to be addressed to improve e-commerce adoption in these areas. In summary, the results confirm that overcoming these barriers is crucial to foster e-commerce in rural areas of Spain.</p>

Is digital commerce one of the solutions to stop depopulation or another aggravating factor?

Overall, the quantitative and qualitative results suggest that e-business adoption can play a crucial role in the economic and social revitalization of rural areas in Spain. However, there is a need to improve infrastructure, connectivity, and digital education, as well as increasing the effectiveness and awareness of government initiatives to achieve these goals.

6. LIMITATIONS OF THE STUDY

This study has had some limitations in that not all autonomous communities are equally represented, or are not represented at all, because it has been very difficult to find people from other autonomous communities or cities to complete the survey.

Also, most of the people who completed the survey were young people, since it is very difficult to reach people of a certain age with an online survey. Also, although it is the same country, each autonomous community has its governments and measures, so some conclusions are very difficult to generalize.

7. FURTHER RESEARCH

Despite the significant findings of this study, there are several limitations that future research could address. First, it is suggested that the sample size be expanded to improve the generalizability of the results. In addition, it would be valuable to explore the opinions of different EU countries as this is a pattern that is occurring in many member countries. And to be able to compare it with different nations and also within Spain between different autonomous communities. To address this issue a qualitative study can be of great help, to analyse exactly what are the problems from the first person of this population and suggest their ideas to stop the depopulation and encourage digital commerce. We could also make more use of demographic factors and compare hypotheses according to the age of the respondents and their education, for example, do young people think that thanks to digital commerce they do not have to migrate to big cities?

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APPENDIX – RESEARCH QUESTIONARY

Q1 Hello, I'm Paula Mercadillo, a master's student in Data-Driven Marketing - Marketing Research & CRM at the Information Management School NOVA in Lisbon.

This form is to complete my master's thesis, in which I am researching the effects of digital commerce in areas with fewer resources and population in Spain.

All information collected is for academic use only and no private information about respondents will be requested or shared.

Q7 Are you familiar with the term "Emptied Spain"?

- Yes (1)
- No (2)
- N/A (3)

Skip To: End of Survey If ¿Estas familiarizado con el termino "España Vacuada" ? = No

Q26 Have you made any online purchases in the last year?

- Yes (1)
- No (2)
- N/A (3)

Below are a series of statements, please indicate whether you agree or disagree with each statement, with "Completely disagree" being the lowest value and "Completely agree" being the highest value.

Q18 The implementation of digital commerce in emptied Spain helps...

	Completely disagree (1)	In disagreement (2)	Neither agree nor disagree (3)	Agree (4)	Completely agree (5)
Contribution to the Reduction of Depopulation (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive Impact on the Local Economy (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of Adoption of Digital Commerce in Empty Spain (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relevance of Digital Commerce for Local Economic Vitality (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Perception of Personal Benefits from the Adoption of Digital Commerce (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Influence of Digital Commerce on Immigration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Decision Making (6)

Creation of new jobs (7)

At the closure of local businesses (8)

It is a great opportunity tool for young people. (9)

Q12 What factors motivate you to use or not use digital commerce in your area?

	Completely disagree (1)	In disagreement (2)	Neither agree nor disagree (3)	Agree (4)	Completely agree (5)
Accessibility (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variety of products and services (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenience (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competitive prices (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Confidence in security (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to products that I cannot purchase any other way (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 Both regional and central governments, together with the European Union, have different projects to digitize rural areas, support digital commerce and entrepreneurship. Indicate which initiatives you know or if you don't know any.

- Accelerate SMEs (1)
- Activate Industry 4.0 (2)
- Connected Commerce Platform (3)
- Digitalization Strategy of the Agri-Food and Forestry Sector and the Environment (4)
- Smart Villages (5)
- None (6)

Other (7) _____

Q13 Below are a series of statements, please indicate whether you agree or disagree with each statement, with "Completely disagree" being the lowest value and "Completely agree" being the highest value.

	Completely disagree (1)	In disagreement (2)	Neither agree nor disagree (3)	Agree (4)	Completely agree (5)
The effective implementation of government initiatives to boost e-commerce in rural areas is perceived as a positive step for the digitalization of local businesses. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that government	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

measures aimed at promoting e-commerce will be effective in improving the digitalization of businesses in rural areas. (2)

The implementation of government initiatives to boost e-commerce is considered crucial to revitalize local businesses in rural areas. (3)

Government support for electronic commerce is perceived as an essential strategy to combat depopulation in rural areas of Spain. (4)

I believe it is crucial to

promote
greater
technological
literacy in rural
communities.
(5)

Q24 The difficulties faced by rural Spain in the adoption of electronic commerce are...

	Completely disagree (1)	In disagreement (2)	Neither agree nor disagree (3)	Agree (4)	Completely agree (5)
Limited infrastructure in rural areas (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cultural aspects in the areas (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fear of new changes and technologies (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient network connectivity (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The average age of the population (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital literacy (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Preference for local commerce (7)

Fear that local businesses will close due to the use of digital commerce (8)

Distrust when buying online (9)

Q2Age

- 18 - 24 (1)
 - 25 - 34 (2)
 - 35 - 44 (3)
 - 45 - 54 (4)
 - 55 - 64 (5)
 - > 65 (6)
-

Q3 Gender

- Male (1)
 - Female (2)
 - Non-binary/third gender (3)
 - I prefer not to say (4)
-

Q25 Indicate your annual income in the range.

- < €15,000 (1)
 - €15,000 - €25,000 (2)
 - €25,000 - €35,000 (3)
 - €35,000 - €45,000 (4)
 - €45,000 - €55,000 (5)
 - €55,000 - €60,000 (6)
 - €60,000 - €65,000 (7)
 - > €65,000 (8)
-

Q5 Number of inhabitants that your town has.

- 5- 50 (1)
- 51 - 100 (2)
- 101 - 500 (3)
- 501 - 1000 (4)
- 1001 - 2000 (5)
- 2001 - 3000 (6)
- > 3000 (7)

Q4 Indicate your Autonomous Community

- Andalusia (1)
- Aragon (2)
- Principality of Asturias (3)
- Balearic Islands (4)
- Canary Islands (5)
- Cantabria (6)
- Castile and León (7)
- Castilla la Mancha (8)
- Catalonia (9)
- Extremadura (10)
- Galicia (11)
- Madrid's community (12)
- Murcia Region (13)

- Foral Community of Navarra (14)
 - Basque Country (15)
 - The Rioja (16)
 - Valencia (17)
-

Q28 What is the highest educational level you have achieved?

- No Study (1)
- Primary education (2)
- Compulsory Secondary Education (ESO) (3)
- Baccalaureate (4)
- Medium-grade vocational training (5)
- Professional training of a superior level (6)
- University degree (7)
- Postgraduate or Master (8)
- Doctorate (9)



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