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# A Study on the Relationship Between ICT and Sustainability in Retailing

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**Abstract:** *It is proposed that innovation and sustainability will be crucial factors for large commercial distribution in the future. What's more, the improvement of Data and Correspondence Advances (ICT) arrangements, and particularly those connected with Man-made reasoning (i.e., Simply Leave, Astute Retail Lab) and digitization, are especially applicable elements in the ongoing pandemic situation in which retail organizations work. To deal with the resulting shifts in commercial relationships, particularly between businesses and consumers, these tools are absolutely necessary. As a result of all of these factors, the purpose of this work is to investigate the impact of ICT as a driver of innovation as well as its direct and indirect impact on retail sustainability. Additionally, this research takes into account the potential variations in these relationships between store formats. A theoretical model is proposed and empirically tested using a sample of 510 shoppers from three grocery retail formats (hypermarkets, supermarkets, and discount stores) in Spain to accomplish the aforementioned goal. The Multigroup Analysis and the partial least squares (PLS) regression method were utilized for the data analysis. The obtained results confirm that ICT has a direct and indirect impact on grocery retailing innovation and sustainability. Moreover, the outcomes show that purchasers inconsistent see the innovative advancement of organizations. Discount stores have more of these differences than hypermarkets and supermarkets do. In terms of innovation, the prevalence of ICT is higher the larger the store format. As a result, it is essential to take into account ICT, where Artificial Intelligence is essential for the development of long-term competitive advantages in retail businesses.*

**Keywords:** Artificial intelligence, innovation, sustainability, retailing, and ICT.

## I. INTRODUCTION

Progresses in the market digitization process because of natural changes have been recognizable as of late. One of the main factors that has altered the way businesses interact with customers is the development of information and communication technologies (ICT), particularly AI (Rodgers et al., 2021). Additionally, the global crisis brought on by COVID-19 has accelerated the digitization of businesses and is currently one of the top priorities for the majority of managers. The pandemic has undoubtedly tested thousands of conventional businesses; With the intention of remaining operational and simply surviving, they were forced to resort to new strategies for attracting customers and marketing their products after closing their doors to the public. Yet, digitalization is a cycle where various retailers might be at an alternate degree of development, and where the consolidation of Man-made consciousness is an extra step that can get new open doors the relationship with clients. As a result of the foregoing, numerous businesses find themselves in a position to incorporate new, more advanced, and creative tools into their day-to-day operations, many of which are directly connected to ICT and include Artificial Intelligence (Dubey et al., 2019; Mahmoud and other, 2020; Rogers and co., 2021). According to the InstitutoNacional de Estadstica [INE], 2021, the retail industry in Spain, one of the most affected by the COVID-19 economic crisis, sees the incorporation of ICT into its operations as an environmental opportunity. In this sense, these tools are set up as a strategic axis to lean on if you want to stay in business and win more battles. Some studies suggest that the future of retail must be approached from a dual perspective that is innovative and sustainable, using this new approach as a reference (Marcon et al., 2017; Mar-Garca and coworkers, 2020, 2021). Restructuring retailing must be based on innovation and sustainability, according to experts. Furthermore,

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these variables are recognized as key components for the improvement of upper hands and for the endurance of organizations (Gonzalez-Lafaysse and Lapassouse-Madrid, 2016; Morioka and other, 2016; LüdekeFreund et al., 2017). According to some studies (GonzalezLafaysse and Lapassouse-Madrid, 2016; GonzalezLafaysse and Lapassouse-Madrid, 2016; GonzalezLafaysse and Lapassouse-Madrid, 2016; GonzalezLafaysse and Lapassouse-Madrid, 2016; GonzMarcon and other, 2017; Mar-Garca and coworkers, 2020, 2021). However, based on previous research, the nature of the store format may have an impact on the benefits retail businesses receive from sustainable and innovative practices (Catuogno and Gutierres, 2015; Filipe and other, 2017). As a result, ICT-driven research into retail innovation and sustainability emerges as an area of particular interest.

## II. ICT IN RETAIL

The audit of the writing has permitted us to see that the investigation of ICT has been one of the subjects to which the most consideration has been paid among specialists from various review regions (Gil-Saura et al., 2014; Ruiz-Molina et al., 2017). According to Ryssel et al., "applications that are basically used inside the organization are office automation, transaction processing system, enterprise resource planning systems, data warehousing systems, groupware applications, intranets, and executive information systems." ICT has traditionally been associated with this group of applications. 2004: 198). In addition to being regarded as one of the primary contributors to business success, ICT are currently recognized as an important component in the innovation process of businesses, including retailers (Ham et al., 2005). These sorts of apparatuses are fundamental for the advancement of upper hands as they offer arrangements in administration and in the improvement of items and administrations, producing added incentive for clients (Ruiz-Molina et al., 2020). Numerous studies have examined the benefits of information and communications technology (ICT) to business management and its role in the creation of novel organizational processes (MahbubulHye et al., 2020). In this sense, numerous conceptual and empirical studies attempt to explain the connections between innovation and ICT (Wu et al., 2006; Musso, 2010; Reinartz and others, 2011; 2011 by Lin and Wu). In light of the obvious need to pay greater attention to relationships with the various members of the distribution channels, particularly customers, ICT are presented as a key component in the innovative actions developed by retailers. Then again, ICT are proposed as a working with component for the viable improvement of information and development, which are definitive elements in the financial development of retail organizations. The improvement of a considerable lot of these mechanical advancements incorporates electronic business, retail location (POS) terminal, standardized identification frameworks, optical perusers, and electronic information trade (EDI) frameworks, or at least, ICT straightforwardly connected to the end purchaser, which include the execution of data innovation all through the item improvement process, up until its deal to the end customer (MahbubulHye et al., 2020; Mahmoud and other, 2020). The development of virtual assistants, intelligent robotics, and the disappearance of tills are among the technologies that are currently grouped together under what is known as Artificial Intelligence (Mahmoud et al., 2020; Rogers and co., 2021). Along these lines, the utilization of ICT permits organizations to get significant data about buyers, for example, their necessities, assumptions and buying ways of behaving, which add to the making of development in retailing, and which considers a more fitted support of clients (RuizMolina et al., 2020). Similarly, it seems abundantly clear that businesses with a strong innovative spirit are more likely to implement and utilize ICT in their operations. In addition, the company's perspective and the actions of customers are directly impacted by the implementation of ICT in retail formats. For this large number of reasons, ICT are viewed as a foundation in the improvement of upper hands for retail organizations because of their capacity to diminish costs, increment piece of the pie and increase consumer loyalty (Gil-Saura et al., 2010) or improve customers' perceptions of the store's image, which in turn increases their likelihood of making a purchase (Cervantes and Franco, 2020). The utilization of Man-made consciousness in retail is dynamically turning into an essential issue, upheld by the remove from web based shopping, the improvement of new buyer propensities and the quest for a plan of action with qualities like that of bargain retailers (Liu et al., 2018; Mahmoud and other, 2020). Along these lines, the retail area is quickly going to the utilization of machine knowledge to effectively reproduce human insight and increment seriousness by lessening cost and further developing the client experience (Dubey et al., 2019; Mahmoud and other, 2020). In this way, some authors try to explain how customers shop in businesses that use ICT directly linked to AI (Liu et al., 2018). However, there are still few contributions to this field, and studies that attempt to explain the main

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benefits and drawbacks of this kind of tool from the perspectives of businesses and consumers are still in their exploratory stages (Semenov et al., 2017; Liu and co., 2018; Mahmoud and other, 2020; Rogers and co., 2021).

## III. INNOVATION

Companies' economic and competitive development have been linked to innovation (Aramburu et al., 2015; Gil-Saura and Marin-Garcia, 2017; Olsson et al., 2019; Mar-Garca and coworkers, 2020). According to Dawson and Frasquet (2006), innovation is viewed in this manner as a capital component for the development of economies and the creation of wealth. It enables businesses to gain access to new market segments, increase their level of competitiveness, and guarantee their expansion. Additionally, even in a market environment characterized by high complexity and turbulence, innovation is essential to a company's long-term survival (Hernández-Espallardo et al., 2011). Lin and Wu (2011) use a strategic approach to innovation in the business world to emphasize the centrality of innovation to business strategy. This vision is shared by Musso (2010), who, according to the viewpoint of retailers, adds that development in dispersion channels has a double reason. On the one hand, it should be viewed as a strategic activity for industrial organizations as well as distribution companies, with the acquisition of competitive advantages as one of its primary goals. Innovation in distribution channels, on the other hand, must be the primary driver of shifts in the economic function of distribution systems. Advancement with regards to retail is a build that started to get capital interest during the 1990s, much obliged, to some degree, to the development and improvement of new innovations. Up until that point, the changes brought about by the evolution of store formats had been primarily associated with innovation in commercial distribution (Dawson and Frasquet, 2006; Moliner-Velázquez and colleagues, 2019). However, the study of innovation is beginning to be approached from other angles at the moment, placing a greater emphasis on the product's and brand's evolution, pricing models, and channel relationships. All of this while keeping in mind that the customer is the foundation of this evolution. In addition, retail businesses' conceptual innovation in response to the globalized market environment has been observed. As a result, Reinartz et al. 2011) to explain the changes in the supply chain, product assortment, store layout, and brand itself—both in product and retail formats—consider the impact of globalization. In the field of marketing, it has not been easy to identify and define the various types of innovation. Perhaps of the most referred to gathering in the writing is the one that recognizes mechanical advancements and non-innovative developments (Lin, 2015; 2017 Stagnaro; De Oliveira and others, 2020; Kim and co., 2020). Innovations in technology include: a) brand-new products; and, b) improvements to processes; while non-mechanical advancements assemble together: ( a) New approaches to organizations; b) new marketing strategies; and (c) developments in relationships. According to Blanco-Callejo and de Pablos-Heredero (2019), product innovations can be defined as the introduction of new products that have not yet been marketed or as enhancements or modifications to already existing products. According to Liu and De Giovanni (2019), process innovations are the implementation or adoption of a production method that may involve modifications to equipment, human resources, or working practices. Taking into account the non-mechanical developments, the hierarchical ones infer the detailing of new methodologies and authoritative structures that straightforwardly or in a roundabout way influence the fundamental exercises inborn to an organization's business (Olsson et al., 2019). Then again, showcasing developments are characterized as changes that happen in the plan or bundling, situating, advancement or valuing models, in the promoting of an item or administration (Quaye and Mensah, 2019). In conclusion, social development is connected to further developing trust, steadfastness and the nature of connections between the gatherings in question (Marín-García et al., 2020). The methodology we embrace in this work considers development according to the viewpoint introduced by Lin (2015), who proposes a triple-pronged way to deal with the idea of development in promoting: relational innovation, product innovation, and marketing innovation. In addition, the idea of innovation will be approached from the perspective of the customer in accordance with this author's suggestion.

## IV. SUSTAINABILITY

Interest in concentrating on the idea of manageability arose in the last part of the 1980s with the introduction of the Brundtland Report (Chow and Chen, 2012; Lavorata, 2014; Ruiz-Real and others, 2019). This report showed the need to consider the effect that monetary advancement was having on the climate, with an adjustment of the plans of action of huge organizations considered indispensable (Quaye and Mensah, 2019). From that point on, there was a movement

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that was led by studies that challenged conventional business models and was supported by a large portion of society that was gradually becoming more aware of the need to take care of the environment. As a result, businesses and public institutions realize that they need to make strategic decisions about how their business models will change (Morioka et al., 2016; Kumar et al., 2017; De Vass et al., 2020), and that a key component is sustainable development (Elkington, 2004; Kamara and other, 2006; Ruiz-Real and others, 2019; Mar-Garca and coworkers, 2021). (2010, Lüdeke-Freund): 1) states, "business model eco-innovation should create competitive advantage through superior customer value (strategic requirement) and contribute to a sustainable development of the company and society." This is a description of the sustainable business model. The idea of sustainability, on the other hand, has recently taken on a special place in the retail context due to its close connection to innovation. According to some studies (Morioka et al., ), innovation is crucial to the transition from conventional business models, which have dominated in recent decades, to sustainable business models. 2016; LüdekeFreund et al., 2017; Marcon and other, 2017). The primary characteristic of these new business models is a reduction in the impact that economic activity has on society and the environment (Morioka et al., 2016; Lüdeke-Freund and others, 2017). Elkington (2004) coined the term "triple bottom line" to describe this new understanding of business models. According to the author, a company's success will be determined by its capacity to incorporate social, environmental, and economic considerations into their day-to-day operations. These considerations include the following three fundamental ideas: people, the planet, and money. Therefore, in light of these three pillars of sustainability, environmental value has been defined as the measures taken by businesses to produce goods and services in a way that does not harm the environment (Bakos et al., 2020). The ability of businesses to manage their businesses, improve quality of life, and strengthen relationships with the various stakeholders that make up their environment are all related to the social dimension (MalakRawlikowska et al., 2019). Last but not least, the economic aspect is crucial because it is regarded as a crucial requirement for the continued existence of businesses (De Vass et al.,, 2020). This study examines the three dimensions of sustainability identified by Elkington (2004), taking into account the consumer's perspective, the development perspective of this work, and studies that have focused on the concept of sustainable development in retail businesses. economic, social, and environmental factors.

## V. ANALYSIS

On the other hand, the PLS-MGA method was used to conduct a multigroup analysis in order to test the group of hypotheses that make up the fourth hypothesis of this study. Table 6 shows that store format moderates the relationship between ICT and innovation for supermarkets and discount stores, as well as for hypermarkets and discount stores. In contrast, there are no significant differences in the proposed relationships between shoppers at supermarkets and hypermarkets. However, due to the differences between discount stores and the other establishments under study, it is possible to affirm that the relationship between ICT and innovation is moderated by store format. These findings are consistent with those of other studies, which suggest that choosing which store format to compete in when making retailing decisions is very important.

Finally, the bootstrapping method used by Preacher and Hayes0 (2008) was used to examine the role of innovation as a mediator between ICT and sustainability in retailing. ICT and sustainability have significant direct and indirect effects, as shown in Table 7. As a result, hypothesis H5, which proposes that retailing's ICT-Sustainability relationship is mediated by innovation, receives support. In addition, the Variance Accounted For (VAF) result, which measures the size of the indirect effect in relation to the total effect (Hair et al., 2014; Nitzl and co., 2016; Cepeda and group, 2017), that development has a halfway intervening impact in this relationship (0.310). In addition, the direct and indirect effects of innovation mediation are depicted in Table 7. In this sense, it is observed that organizations with low innovative practice implementation will not have a favorable relationship between ICT and sustainability, whereas commercial formats that employ innovative actions in their operations will have a favorable relationship.

## VI. DISCUSSION

This work has attempted to proceed with the line of investigation of those examinations that show the significance of advancing in retailing through the advancement of imaginative and reasonable activities (Gonzalez-Lafaysse and Lapassouse-Madrid, 2016; Morioka et al., 2016; Marcon and other, 2017; Mar-Garca and coworkers, 2020, 2021). By incorporating ICT into the same causal model and examining the differences in consumer perceptions of these practices

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based on the retail format of the customers, this study contributes to an advancement in our understanding of these constructs. Subsequently, this work has decided to analyze the effect of ICT on maintainability, pondering both immediate and intervened impacts through development, and to show whether these impacts in the chain of outcomes are changed by store design. In this study, consumer perceptions have been examined in relation to the degree to which businesses have advanced technologically and implemented innovative and sustainable retail strategies. Retail business managers will have an easier time making decisions if they have a better understanding of how consumers make purchases. The main theoretical findings, as well as their implications for management and limitations, will be discussed in the sections that come after this one.

## VII. CONCLUSION

Relevant findings from the obtained results make it possible to advance our understanding of the proposed chain of consequences. Every one of them are introduced beneath. First, based on the evidence we have, we can say that ICT can be seen as a force for innovation and sustainability in retail. In this way, customers' perceptions of innovative practices and environmentally friendly actions implemented by retail formats are directly influenced by the degree to which they perceive retail companies' technological advancement. These outcomes mirror the significance of ICT in retailing, as they have the ability to set off beneficial outcomes both in advancement (Pantano and Gandini, 2017) and in supportability (De Vass et al., 2020). Second, this study provides evidence to back up the multidimensional nature of innovation and sustainability as perceived by consumers, both of which are constructed from three dimensions. According to Lin's argument, retail innovation under a market approach can therefore be conceived of as a second-order construct composed of product innovation, marketing innovation, and relational innovation. In addition, the TBL model's three factors can be thought of as the foundation of sustainability (Elkington, 2004). sustainability in terms of the economy, society, and the environment. Thirdly, that's what our outcomes show, given the personality of fractional go between of development (Pantano and Gandini, 2017), this build is a deciding variable in business technique, since it gives considerable data on how ICT follow up on purchaser impression of supportability activities carried out in the retail designs. Through in-store innovation, perceptions of the retailer's level of technological advancement have direct and mediated effects on retail sustainability. As a result, this study adds to the existing body of knowledge by explaining how and why sustainable practices are influenced by ICT perceptions, which is made even more powerful when innovation is factored into the equation. Also, in contrast to what authors like Gonzalez-Lafaysse and LapassouseMadrid (2016) say, this study shows that consumers have positive perceptions of innovative and sustainable actions. Frontiers in Psychology | www.frontiersin.org 10 May 2021 | Volume 12 | Article 678991 Marn-Garca et al. Regardless of the retail format in which they are customers, ICT, innovation, and sustainability toward retail formats. Last but not least, this study's finding that store format plays a moderating role highlights the need to take into account retail format characteristics in terms of commercial concept when analyzing consumer behavior in the retail sector, as Filipe et al. had hypothesized ( 2017). As a result, the findings demonstrate that the retail format influences the intensity of the observed relationships. These findings also highlight the significant distinctions that exist between discount stores and the other store formats that were the subject of this study—supermarkets and hypermarkets—especially in light of the fact that the effects of ICT on innovation are significantly greater in supermarkets and hypermarkets. As a result, we can draw the conclusion that store format strongly influences how customers perceive the use of ICT and innovative practices in retail settings.

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