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THE INFLUENCE OF COGNITIVE TECHNOLOGIES ON THE DECISION-MAKING PROCESS AND THE PURCHASING EXPERIENCE IN RETAIL

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ABSTRACT

This study explores the impact and use of cognitive technologies in the retail sector, which has recently attracted considerable interest from businesses, consultants, academics, and researchers. Through eight interviews with professionals from different areas within the retail sector, this paper aims to understand how industry professionals adopt these technologies and their role in shaping retail strategies. Our findings confirm that cognitive technologies significantly impact strategic decision-making within retail. These technologies drive new practices and investment decisions toward automation and optimization of internal operations and serve as key tools for understanding and gaining insights about consumers to shape purchasing behavior.

KEYWORDS: *artificial intelligence, cognitive technologies, technological innovation, technological strategy, business analytics, data mining, machine learning, big data, GDPR*

1. INTRODUCTION

Cognitive technology (CT), a product of Artificial Intelligence (AI) advances, can execute tasks that have previously required human intelligence. These include computer vision, machine learning, natural language processing, speech recognition, and robotics (Schatsky et al., 2015). Although these technologies have been integral to the computing world for some time, their applications have recently permeated various business sectors. Through innovative retail marketing strategies, CT plays a fundamental role in customer acquisition and retention (Dwivedi et al., 2021; Sung et al., 2021). Organizations have turned to innovative CT to automate tasks that require human perception and cognition, harnessing the power of data to gain accurate insights about their target audience (Penedo, 2018; Schatsky et al., 2015). This data-driven approach, facilitated by CT, has also created unique shopping experiences, transforming retail consumer behavior (Kaur et al., 2020).

This paper aims to comprehend how CT is used in retail and its impact on consumer decision-making and purchasing experiences. We seek to understand the key changes, challenges, and motivations associated with CT. We explore the changes and requirements that retail companies must meet to establish a robust technological stance and identify the primary

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technological investments made by retail businesses to gain comprehensive knowledge about their consumers.

The remainder of the paper is organized as follows. It begins with a brief outline of the research framework and primary objectives. It is followed by a literature review divided into four main sections, each addressing different facets of the research question. Next, the methodology, results, and discussion of the findings are presented. The paper concludes with practical implications, limitations of the study, and recommendations for future research.

2. LITERATURE REVIEW

2.1. Strategic vision

The term Artificial Intelligence (AI) was coined by John McCarthy in 1956 and is now regarded as one of the key trends in technology and business management (Deb et al., 2018). As companies develop their business strategies around AI, the associated Cognitive Technologies (CT) emerge as tools to establish new capabilities and gain business advantages, helping to increase the quality of decision-making (Gerbert, 2018). In the retail industry, the use of CTs is considered a valuable tool for organizations that want to remain competitive in the market (François & Robert, 2011), reinventing and adapting their marketing concepts to seize opportunities for long-term sustainable growth (Donnelly et al., 2017). These opportunities are enabled by technology with greater availability of internal and external data in real-time, advances in Machine Learning (ML), the development of systems that quickly learn about consumer behavior and an increase in computing speed. However, retailers must also consider challenges such as multi-channel distribution, changing customer expectations, shorter sales seasons, and abundant products competing in the same markets (Simchi-Levi & Wu, 2017).

As the marketing department is closer to the end consumer, it is important to understand the impact of CTs on the 4Ps of marketing strategies. There is more intensive use of relational marketing owing to more informed, sophisticated, and demanding customers, enabling the identification, continuity, development, and termination of relationships with customers and other interested parties. In this way, the objectives of all parties are fulfilled through mutual exchange and the fulfillment of promises (Gronroos, 1994; Kaur et al., 2020). To this end, an increasing number of social networks are being used. With the advent of Web 2.0 and new technologies, ordinary users have taken on a new and more active role (Beheshti-Kashi et al., 2015;

Kaur et al., 2020; Siddiqui et al., 2021). The use of the numerous social networks that consumers have access to today allows retailers to benefit from a variety of data, making it possible to get to know people better and gain insights into satisfaction with services, their preferences, and, above all, direct personalized offers and promotions to improve customer use and purchase experience (Aktas & Meng, 2017; X. Zhang et al., 2021).

It is expected that the line between online and offline will continue to narrow (Donnelly et al., 2017) with the contribution of the Internet to the rise of omnichannel retail models. These are characterized by an interaction between consumers and retailers that takes place anytime, anywhere, and on any digital device (Lee, 2020), with the customer deciding not only where, when, and what to buy but also which channels to use and what role each should play (Bellaiche et al., 2013). As such, the physical store concept is undergoing profound changes owing to the convergence between online and offline and the growth of purchases made in a digital environment, moving from a transactional place to an experiential place that is compatible with the technology that integrates online and offline sales channels and promotes a seamless shopping experience (Burggraaff et al., 2015; Knežević & Butković, 2020).

2.2. Processes

Companies have been integrating technology into their operations and processes to grasp the opportunities opened by automation, where the number of inputs and processing speed performed by machines for specific and repetitive tasks can be millions of times greater than those performed by humans (Gerbert, 2018). However, most retailers continue to build analytical capabilities and adapt the internal processes necessary to take advantage of the wide range of information they can access and the skills required to initiate technological integration into their working practices and business activities.

CTs provide retailers with the resources they need to support a frictionless, automated customer experience independent of human intervention. In doing so, the organization seeks to autonomize tasks typically considered human perceptual or cognitive. The result is that the job is performed faster, cheaper, better, or combines all three. Therefore, companies develop their products and services through automation, automate processes, and discover insights that can help them make operational and strategic decisions (Schatsky et al., 2015). For example, some companies already use computer vision systems for inspection and quality assurance during their prod-

ucts' manufacturing and packaging stages (Narula et al., 2015). In contrast, others have already implemented the concept of a fully automated shop with no employees and full dependence on technology to serve and provide a unique experience to the customer (Mehta et al., 2021).

When managing these processes, it is necessary to consider consumer data protection. Therefore, companies must pay attention to customers' rights and obligations when interacting with customers via technological applications. Companies must carefully consider this matter, mainly because data is an asset consumers recognize (Grewal et al., 2021). Companies that use certain technological processes must appoint a person responsible for data protection, known as the Data Protection Officer (DPO) internally or externally, whose role is fundamental for the company to comply with the European General Data Protection Regulation (GDPR) (European Parliament, 2016).

2.3. Technology

Advances in technology and decreases in data collection costs have made data processing an integral part of the lives of companies and individuals (Aktas & Meng, 2017). The introduction of Industry 4.0, technologies into products, and the ability to transform machine-generated data into value-added intelligence radically change the buying experience. The innovation and proliferation of retail technologies based on several underlying technologies, including cloud computing, Internet of Things (IoT), Radio Frequency Identification (RFID), Big Data, and AI, are driving the entire retail ecosystem to become more digital, smarter and more efficient (Singh et al., 2020; Walter et al., 2021; T. B. Zhang et al., 2018).

AI can predict decisions and interact with humans better than ever in real time. It can process trillions of data and deliver all the information at the speed of light. Companies such as Amazon, Google, and Netflix have already explored the potential of AI to better understand their customers based on purchase history, including time spent viewing certain products, types of behavior on social networks, and product and service recommendations, among others (Deb et al., 2018). Therefore, information systems have become catalysts in managing technological structures necessary for the flow of information and exchange between partners. Introducing information technology (IT) tools in the retail sector helps companies save time and increase their productivity. Actively used IT solutions increase the speed, reliability, and quality of work for all departments in an organization (Semenov et al., 2017).

One such transformation factor is Business An-

alytics (BA). The possibility of using tools that allow the collection and analysis of information, as well as the optimization of information and the study of data in real time, is already a reality (Hebert et al., 2014). Some of these tools and capabilities include the incorporation of advanced techniques such as Big Data, Data Mining, and ML (Balfour, 2013; Chung & Gray, 1999; McAfee & Brynjolfsson, 2012; Min, 2010; Yomtoubian et al., 2017). With these novel solutions, the knowledge economy is fuelled by the development of IT, which facilitates data processing, information use, and knowledge application (Liew, 2008; Polónia & Gradim, 2021). For this to happen, it is relevant to mention the role of devices such as radio frequency identification (RFID), beacons, and near-field communication, which make it possible to track the behavior of customers in the store (Gubbi et al., 2013).

Thus, changes in consumption patterns are derived from technological advances associated with new offers and opportunities provided by the Internet of Things (IoT), AI, blockchain technologies, and robotics, among others (Rafaeli et al., 2017; Sung et al., 2021). All these technological changes are clearly due to the influence of strong and fast advances on the Internet, computing and storage resources, and retail-oriented big data practices (Tubadji et al., 2021), leading to the need for a stronger online presence focused on e-commerce (Grewal et al., 2021). Therefore, cognitive technology can be illustrated by numerous examples. Some smart and advanced technologies oriented toward online media are blockchain, bots, and virtual try-on image interaction technology (Conick, 2017; Li et al., 2018; Nowiński et al., 2017; Yomtoubian et al., 2017). On the other hand, some new technologies oriented toward physical stores are augmented reality, beacons, RFID technology, IoT technology, and robots as agents to support people's activities and work as an integral part (Aktas & Meng, 2017; Gubbi et al., 2013; Kamei et al., 2010; Keller et al., 2014; Teicher, 2018).

2.4. People and resources

The possibilities of CT also influence people working in companies. To better integrate these modern technologies, the back end should not be separated from the front end, but the two parts should be fully integrated to promote an agile organizational structure (Gerbert, 2018). AI will be a collaborator for humans as they will be motivated to exceed current limits and test new concepts in all areas of innovation (Dwivedi et al., 2021; Yomtoubian et al., 2017), providing useful decision-making tools that help the company to connect with its customers, suppliers, and supply chain partners, facilitating the exchange of information be-

TABLE 1. Respondent selection

Group	Type of company	Post	Sector
Managers/Chief Executive Officer	B2B - B2C	*Co-Founder*	Retail Technology Solutions
Marketers/Business Analytics	B2B and B2C	*Head of Consumer Analytics*	Telecommunications
	B2C – Online Retail	*E-Commerce Business Intelligence Manager*	Food
	B2B and B2C	*Head of Analytics & Data Science*	Insurance
IT Managers/ Developers/Data Scientist	B2B	*Head Of Engineering*	Medical Technology Solutions
	B2B - Retail Solutions Provider	*Chief Science Office*	Retail Technology Solutions
	B2C – Online Retail	*IT Development Centre Manager*	Fashion and Decoration
Researchers/ Academics	Research Institute	*University teacher and researcher*	Academic

tween various business entities across the chain (Min, 2010).

In terms of partnerships, building dynamic partnerships with retail technology solution providers may be necessary for the retailer to improve its operations and market approaches successfully (Wyk et al., 2018), which leads to the need to establish a fruitful innovation ecosystem in which all participants derive significant benefits from the relationships established (Daskou & Mangina, 2003; Kaur et al., 2020; Suominen et al., 2019; Walter et al., 2022, 2023).

The use of new tools also influences consumers' shopping experiences. Consumer access to mobile devices and their familiarity with digital experiences can represent an opportunity for CTs to sustain a more natural interface with consumers (Narula et al., 2015). Consumers are familiar with these tools and recommend them to other consumers. Companies should emphasize developing technologies with built-in AI to deliver high-end consumer experiences while enabling increased revenue (Deb et al., 2018). To respond to customer demand and anticipate consumers' micro-moments of the 21st century, companies must be able to differentiate their brands using real-time data analytics by leveraging the ever-increasing number of converging technologies, including AI, IoT, and cloud computing (Große Holtforth, 2017).

This technological and digital evolution requires huge challenges and changes in strategic decisions, as companies that want to adopt these techniques need

to adopt the appropriate technology, hire the right people, and, above all, restructure their business processes, which is a major task for a large organization (Raj et al., 2018). Therefore, considering the literature review, this study aimed to answer the following research question:

How do the CTs adopted and developed by companies create competitive advantage, and how do they influence consumers' purchasing decisions and retail experiences?

3. METHODS

The adopted methodology is qualitative and consists of primary research. The topics addressed in the previous chapter are discussed with several experts in the field of information technologies in retail using a semi-structured interview (see Appendix I). To frame the research question, scientific databases, such as ScienceDirect and Scopus, were queried, while simultaneously considering the subject of study. Information was collected from the websites and repositories of large international companies such as BCG, Deloitte, Accenture, and IBM to find real case studies already adapted to the reality of technological retail.

As the main objective of this research is to understand what retail companies have been doing technologically and the influences of cognitive technologies on the customer purchase journey, it was decided to

carry out field research with professionals with specific profiles and work functions using the semi-structured interview method, as shown in Table 1.

The respondents were selected from a group of companies and institutions located in the same geographical area (Porto, Portugal) and where six of the eight companies are closely linked to the leading retail company in Portugal as suppliers or consultants, with the remaining two being subsidiaries of the company operating in a highly competitive and mature retail market. The sample was dimensioned based on the separate and complementary roles players perform in the cluster nurtured by the leading retailer. The construction of the questionnaire presented in Appendix One was based on the four main thematic relationships discussed in the literature review, thus creating a semi-structured script to guide the interviews.

Regarding strategy, the topics addressed were the adoption of technological innovation in retail and the influence of technology on organizational structure. The processes were analyzed by considering the use of cognitive technologies in operations and how technology enables automation. The technological issues addressed the influence of technology in enabling change processes in the organization, addressing the convergence of omnichannel approaches and the use of CTs to redefine the store and website layouts and the customer shopping experience. Finally, the people- and resources-related topics focused on consumer acceptance of CTs and the changes its adoption brings to the customer journey.

The responses were based on the respondents' experiences and allowed them to address relevant issues and topics that successfully contributed to their responses and the main research question (Allison et al., 2007). Once the interviews were completed, the results were analyzed using content analysis (Morais, 2016). The main objective was to interpret the messages and understand their meanings at a level that goes beyond ordinary reading. To this end, the analysis was conducted in five phases: preparation of the information, transformation of the content into study units/hypotheses, grouping of the data, systematic description of the main ideas and key topics covered by the respondents for each sub-theme, and interpretation of the results.

4. RESULTS AND DISCUSSION

4.1. Strategic vision

In general, all respondents agreed that technology is part of the strategic path of all companies, some later than others, with significant and early investments

in technology being made by companies in the retail sector. These companies have invested heavily in IT projects and tools that generate more interaction and knowledge with consumers. This emphasizes that the emergence of CTs applied to retail has reinforced the importance of this topic in organizations. This validates the concept mentioned by Gerbert (2018), which states that it is important for companies to have a defined strategy for AI because it is a transformative technology with serious implications for the future of business.

Some respondents highlighted the need for organizations to restructure teams and departments, even regarding skills to deal with modern technologies. Three respondents warned that not all companies have the capacity or maturity to innovate technologically. Gerbert (2018) also mentioned that many companies still do not know what they want to do and how to create a competitive advantage in this highly technological age. They also agreed that retail sector companies need to accelerate their pace of innovation to remain viable in the market, corroborating the vision of Donnelly et al. (2017).

When questioned about the importance of assessing whether retail-adapted technologies can create value and generate new insights that were previously impossible to achieve, the opinions and current experiences of the respondents suggest that, at this moment, technologies alone are not capable and cannot be considered as the only factor of change, needing to be properly complemented by human contributions to implement change processes. In addition, the change process must address some difficulties and challenges to convince customers and employees of the benefits of the implemented CTs, demonstrating added value to the buying experience for customers and productivity improvements in the case of employees.

One respondent pointed out that CT can help with customer relationships and is the best commercial approach for employees to adopt. This idea is related to the vision of Narula et al. (2015), who stated that the continuous use of technologies by teams raises the behaviors and expectations of consumers, who expect to obtain differentiating and innovative shopping experiences that deliver good sales results.

In terms of marketing, it was important to understand the influence of technology throughout the interviews. As indicated by the two respondents, some techniques for working models using CTs have already been considered. However, one of the barriers presented is the impossibility of implementing these models within the company, even though they admit it is necessary to 'do something' for this department.

The issue of price definition and optimization,

also identified by Simchi-Levi and Wu (2017), was one of the aspects mentioned by one of the respondents with the help of specific teams within the marketing department dedicated to the analytics theme. The vision identified by Schatsky et al. (2015) was also confirmed when the respondents mentioned that the advanced analytics of companies can provide automated tools that help influence consumers to choose the best product/service. Two respondents confirmed several initiatives at this level and involved the organization's marketing team as a fundamental partner.

However, to learn how to use these modern technologies, it is necessary to have the necessary skills. In addition to the need for internal knowledge and specific skills that organizations must have, there are other aspects that the three respondents point out in common, which in this case are change, culture, and the opening of the company itself to the initiation and incorporation of modern technologies in the business. Interestingly, these aspects are also highlighted in Yomtoubian et al. (2017), proving that they are key aspects for the attention of executives and business managers.

Another aspect highlighted by three respondents was their feeling of challenge. According to these professionals, retailers must constantly take the initiative to implement new work tools to achieve more advanced knowledge. It is also necessary for people in an organization to trust technological models that can be applied to the retail sector. This depends on the project and the organizational culture so that employees have confidence in these models, understand them, and then educate and train customers on the advantages of using technology.

Three respondents also highlighted the behaviors, goals, and objectives the company intends to achieve by implementing modern technologies. As stated by Yomtoubian et al. (2017), one of the requirements for companies is to adopt a clear corporate strategy in which information technology plays a formal and explicit role, as well as a requirement for strong leadership in information technology. Two respondents also shared this consideration, reporting that the entire organization must have its information well-structured and organized and that there needs to be an information management model so that the information it extracts is useful and rich in knowledge. It is important to create elastic and flexible computing architectures to achieve this goal.

Two respondents admitted that omni-channels have not been welcomed by all companies in the retail sector, stating that it has been painful to coordinate the two worlds, and technology alone does not solve the problem of maintaining consistency in the communication carried out across the different channels, perhaps because of the mix of channels that consumers select throughout their purchase process. Some companies have adopted processes where channel convergence is noted, and, in this case, technology helps this situation materialize, a view also identified by Donnelly et al. (2017). As for applying Big Data and ML techniques in micro space, two respondents referred to it as the area that may have the most interest in these projects. However, two respondents agreed that these techniques are well suited to discovering consumption patterns that can be decoded over time.

To summarize, technological advancement plays a significant role in businesses, particularly in the retail sector, advocating strategic investment in IT projects for enriched consumer interaction and insight. Navigating transformative technologies, such as AI, requires strategic management owing to their profound business implications. The importance of organizational restructuring is underscored, along with the need for human intervention to implement and communicate technological advantages fully. The influence of technology is also evident in shaping consumer relationships and marketing practices, highlighting the role of analytics teams in price definition and optimization processes. Successful adoption of these technologies requires strong leadership, a transformative organizational culture, and well-structured information systems. Despite the challenges of integrating omnichannel strategies, technology aids in channel convergence, with the promising potential of Big Data and Machine Learning techniques for identifying consumption patterns earmarked for future research.

4.2. Processes

In addition to an understanding of the application of CT in operations and direct interactions with the customer/consumer, an understanding of the processes and internal work of organizations is also important. Seven of the eight respondents stated that CT is now part of internal operations, namely, in the optimization and automation of the company's processes and activities, and justified this by stating that these are areas in which there is a lot of knowledge and experience. Some examples of the application of CT in the processes and operations of teams and activities are stock management, pricing definition, evaluation of promotional campaigns, and e-commerce, which emphasizes the benefits of this application in the operations practiced in the store, corroborating the findings of Schatsky et al. (2015).

Nevertheless, the need for managers to open

their minds to the incorporation of new technological practices is a challenge highlighted by one of the respondents, who pointed out that technology is necessary for technology to show results for them to be convinced and invest in more internal projects. It is necessary to understand the opinions of professionals about the incorporation of technologies into business processes and tasks and determine whether these automation and optimization practices through specific technologies generate effectiveness and efficiency in the relationship and interaction with customers and consumers (Schatsky et al., 2015).

Considering the importance of protecting data and the increased use of CTs, the General Data Protection Regulation (GDPR) came into force in the European Union on May 25, 2018. The main concern of this regulation is the protection of the personal data of individuals (European Parliament, 2016), and it imposes certain rules and guidelines on companies for how the personal data of customers that are part of these companies' databases are being managed and used. In general, six respondents did not see GDPR as a problem but as an opportunity for companies to position themselves with their customers. Three of the respondents agree that this regulation must be viewed by companies with transparency and truth toward their customers and consumers.

Companies must take on the position of educating and raising awareness among customers and consumers. The customer must be aware of the communication brought to them by the brands they follow and that they are used to buying products/services because it brings them advantages. These campaigns must adapt to the customer's needs. Otherwise, consumer loyalty to the company/brand may decrease if they are concerned about the amount of information the company has (Rygielski et al., 2002). For companies, regulation should be seen as an asset in reformulating their databases and updating their techniques. According to one of the respondents, a provider of technological solutions for retail, GDPR encourages companies to reformulate their databases, forget about the volume of data, and be concerned about data quality.

To summarize, the extensive integration of Cognitive Technologies (CT) into internal operations is emphasized, which most respondents confirm. Areas such as stock management, pricing definition, promotional campaigns, and e-commerce have been significantly optimized and automated owing to CT. The necessity for an open mindset among managers toward new technological practices is highlighted, demonstrating the need for an understanding of the efficacy and efficiency of these technologies in customer interactions. The enforcement of the General

Data Protection Regulation (GDPR) in the European Union is seen not as a hurdle but as an opportunity for companies to increase transparency toward customers and to educate them on the benefits of tailored communication. It catalyzes companies to restructure their databases, thereby prioritizing data quality over quantity and underlining the importance of customized customer communication and respect for data privacy.

4.3. Technology

Having assessed the internal processes and operations of companies using CTs, it is important to understand which technologies have been adopted in the retail sector and which contribute to the interaction with the consumer throughout their purchasing journey.

Several different tools were mentioned. However, it is interesting that only one respondent mentioned more specific technologies, such as RFID, Augmented Reality, and Virtual Reality. He mentioned that many retailers were already implementing these solutions together with big data practices but also acknowledged that they were uncertain whether companies were doing it properly and effectively.

Since technology is an area that IT professionals are constantly working on, it is important to determine whether these professionals, who are knowledgeable about techniques and technological practices, can maintain active and initiative-taking participation in the decision-making process for implementing modern technologies (Hogarth-Scott & Parkinson, 2006). Six respondents mentioned that the IT manager must participate in decision-making and have a business vision by incorporating technology into each retailer's business practices. However, there are still some barriers between companies' technical and business areas, although it is believed that many professionals with technical knowledge can take responsibility and have a say in business decisions. Following the introduction of technological tools and solutions that are integrated into the organizational system, it is crucial to understand whether companies succeed in gaining insights from them. On this issue, opinions were divided among respondents. Some believe that companies are already using and working on the knowledge provided by technologies, while others believe that many companies are not yet at that level.

In general, the respondents agreed that the outputs generated by the technology influence future actions. This is in line with the vision of Semenov et al. (2017), who stated that introducing IT tools in retail helps companies save time, increasing the speed, reliability, and quality of work of all departments. There-

fore, technology ultimately influences other actions in the company. Finally, it should be noted that one of the respondents argued that the results that technology can deliver to managers are valuable, and yet, it is not considered. Its potential is often not explored to its full potential. Nevertheless, this scenario is expected to change as the relevance and importance of the information generated for business decisions becomes increasingly important.

In terms of consumer acceptance of technologies, all the respondents say, directly or indirectly, that most consumers are positive about the existence of technology during their shopping journey. The respondents reported that technology communication is centered on the customer's profile. Consumers prefer this approach in terms of personalization, customization, and recommendation.

After applying the tools to gain knowledge about customers and consumers, it is important to understand whether companies can effectively capitalize on this knowledge when applied to influence their customers' shopping experience. Regarding this aspect, all the respondents stated that companies can achieve profitability and improve their results after implementing practices through technology in the commercial relationship with their customers. Thus, the implementation of technological models applied to the retail sector can significantly increase the effectiveness and efficiency of companies as well, and of course, in the relationship and interaction with customers and consumers, strengthening and influencing the loyalty of these customers/consumers toward the company and the products/services they receive.

From the perspective of interactions with end customers, it is important to understand the extent to which companies communicate with them in real time. Some respondents see this as a competitive advantage in business, in this case, in the retail sector. Two respondents reported that real-time interactions are beneficial for managing business information, emphasizing customization and personalized interactions, as highlighted by Aktas and Meng (2017) and Raj et al. (2018). Therefore, it is accepted that brands need to communicate in real-time, which is imperative if customers are not to feel overwhelmed or inundated by these campaigns.

This study underscores the pivotal role of Cognitive Technologies (CT), such as RFID, Augmented Reality, and Virtual Reality, in transforming internal processes and operations, particularly in the retail sector. However, the effective application of these technologies, especially in combination with big data, is a source of uncertainty. The study underscores the need for IT professionals, particularly IT managers, to

proactively engage in decision-making processes to better integrate technology into business practices despite potential technical/operational barriers. The ability of companies to gain valuable insights from these technologies has emerged as a point of divergence among respondents. However, there is a consensus that these findings are influencing future actions. Consumers are positive about technology in their shopping experiences, especially when it leads to personalized communication. Technology implementation in customer relationships has been reported to improve profitability and loyalty. While real-time communication is seen as a competitive advantage, it must be carefully managed so as not to overwhelm consumers.

4.4. People and resources

Given the need for cooperation and collaboration between the different departments of a company in the adoption of certain practices and technological tools to achieve efficient and effective results and influence the interaction with the customer, it is essential to understand the perspectives of professionals on the integration of the different departments of the company and try to find the main dynamics and challenges for this integration.

In general, all the respondents agreed that the departments must be coordinated for the projects to move forward and achieve the expected results. This idea was also expressed by Gerbert (2018), who pointed out that the front end, the part of the company that runs the business, needs to work closely with information technology staff (back-end) to enable interaction and leverage an agile organizational structure.

However, there are concerns about the difficulty of collaboration and connection between departments. Most respondents immediately assumed several barriers that often exist for "reasons for survival and power struggle." Again, this is the inappropriate mindset of managers, interdepartmental incompatibilities in terms of the objectives to be achieved by each department, and the way companies are organized regarding technological structure.

Finally, we wanted to know the professionals' opinions on the weight of technology in the purchasing decision process compared to other organizational forces, such as human customer representatives (salespeople). In general, the respondents felt that technology alone would not make a difference in this panorama without the human hand behind it. Most respondents believe that the influence of technology on retail purchasing depends on a case-by-case and strategy-by-strategy basis. As Deb et al. (2018) em-

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phasize, some technological tools adapted to retail can provide a shopping experience and improve the business relationship between companies and customers.

Another view is highlighted by a respondent who believes that the customer's purchase journey will not be fully robotized, as there will always be a need to associate certain products with an emotional stimulus, and of course, the technology still cannot match. There is also the opinion that technology will only be a tool and instrument to support decision-making, as managers will always make this in the end. This view coincides with that of Yomtoubian et al. (2017), who assume that AI will be a collaborator for humans. This means that humans will design the technology and that every part of critical thinking will continue to be overseen by them, despite a growing trend toward incorporating AI into decisions to the detriment of other strategic management practices.

In answering the research question, it is clear from all four perspectives that CTs used and developed by companies have great benefits and influence consumers' purchase decisions and experiences in the retail sector. Therefore, companies in this sector should seek to develop technological tools to remain active in the market and maintain their competitive advantage.

In conclusion, interdepartmental cooperation and collaboration are required to successfully adopt and implement technological tools that improve the efficiency and effectiveness of customer interactions. Respondents unanimously agreed that coordination between departments is important to drive projects forward and achieve expected results, echoing Gerbert's (2018) view on the need for close cooperation between front-end and back-end teams. However, concerns were also raised about potential barriers to cooperation, such as power struggles and mismatched departmental objectives. Despite these challenges, it is recognized that technology plays an important role in the retail sector, but not in isolation from human intervention. The influence of technology on retail shopping is context-dependent, offering a refined business relationship between the company and the customer. While technology can support decision-making, it does not replace the critical thinking and emotional stimuli humans provide. This study reaffirms the importance of CTs in shaping consumers' retail purchasing decisions and experiences. It highlights the need for companies to continuously develop technological tools to maintain their market viability and competitive advantage.

5. CONCLUSIONS

Given the research question formulated above, it can be concluded that the Cognitive Technologies (CTs) adopted and developed by companies create competitive advantages in several respects. First, they optimize and automate internal processes and help with stock management, pricing, promotional campaigns, and e-commerce tasks. This efficiency boosts productivity, allowing companies to operate at lower costs and improved speed, giving them an edge over the competitors. Second, CTs such as RFID, Augmented Reality, and Virtual Reality provide enhanced customer interaction and a more immersive and interactive shopping experience, allowing companies to stand out in the highly competitive retail market.

CTs play a pivotal role in influencing purchase decisions and the consumer experience. They provide personalized and real-time communication with customers, promote a sense of individual attention, and make consumers feel valued. This personalization, achieved through practices such as targeted recommendations and tailored promotions, can strongly influence purchasing decisions in favor of companies that use these technologies effectively.

In addition, CTs help collect and analyze big data, allowing companies to understand consumer behavior and patterns better. This understanding can then be leveraged to predict future purchasing decisions and tailor marketing strategies to improve the overall customer experience. Using CTs also enhances transparency and trust, especially regarding compliance with data protection regulations such as GDPR, fostering a positive image and boosting customer loyalty.

However, this study underscores that while technology plays a significant role, it does not eliminate the need for human intervention. Decisions that are influenced or supported by technology still require human control and approval. Companies must also balance communication strategies to avoid overwhelming consumers through technology-driven interactions.

The strategic integration of CTs into retail operations can significantly enhance competitive advantage by improving operational efficiency and enriching the customer experience. However, this should be complemented by a human-centered approach to decision-making and customer interaction, highlighting the importance of a balanced digital-human interface in retail.

5.1. Theoretical and practical implications

Technology is increasingly central in shaping managers' strategic visions, leading to an inevitable shift in sectoral strategies driven by technological forces.

This, in turn, will likely lead to changes in the tactics retailers use to engage with consumers and subtly influence their purchasing experiences and decisions. While complex and fraught with political and legal obligations, the task of protecting and processing consumer data should not be viewed by managers as a problem to avoid. Instead, they represent an opportunity for growth and development. In this digital age, leaders must manage consumer perceptions and expectations regarding data usage. Consequently, companies need to prioritize transparent and honest communication.

From this perspective, the information and insights gained from these technology-enabled interactions can be seen as drivers of an organizational change cycle. This cycle stimulates decision-making and fosters the adoption of innovative strategies and investments, all of which depend on the results achieved by the various operational processes within the model.

In addition, the pervasive impact of technology on a company's overall vision also brings about direct changes in the four main components of the model: sectoral strategic vision, processes, people/resources, and consumers. Through consumer interaction, new data is generated, processed through technological systems, and fed to managers to guide business decisions.

Innovation in retail is seen as a means of overcoming traditional retail problems. However, the risk taken by managers in adopting modern technologies has remained the same in this sector, favoring traditional technologies over more disruptive and unique ones. This trend could be due to several factors, such as financial limitations, the boldness of managers, and a number of the previously mentioned challenges.

5.2. Limitations and suggestions for future research

The limitations of this study can be attributed to the absence of primary research input from operational-level professionals within technology companies. The interviews were primarily conducted with senior-level executives, who may have a biased view. In addition, including insights from smaller companies would enrich the study, even though anecdotal observations from these organizations were noted during the interviews. A comprehensive look at customer interaction at the frontline can provide valuable insights.

Another obstacle is the lack of direct information from consumers about their purchasing experience and their perception of the role of technology during the purchasing process. It is important to note that the qualitative nature of this study imposes certain limitations when analyzing and interpreting the results. Due to the small sample size, it was impossible to fully generalize the findings, even though consensus was reached on all sub-themes at the end of the eight interviews. Nonetheless, these findings pave the way for future research.

Finally, it should be noted that this was not a homogeneous group of experts. They do not come from the same industry or have the same position in the supply chain, nor are they all business people. Nevertheless, this fact has little impact on this paper's information, findings, and conclusions and provides a valuable starting point for further practical research in this area.

To complement this study and for future research, it would be beneficial to conduct a more comprehensive study that tracks and validates the impact and influence of technology on the purchasing process. This would allow the study to move toward a more quantitative and analytical approach. To this end, a coordinated investigation of both the business and consumer perspectives would be beneficial to enable a correlation between causes and effects.

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UTJECAJ KOGNITIVNIH TEHNOLOGIJA NA PROCES DONOŠENJA ODLUKA I ISKUSTVO KUPOVINE U MALOPRODAJI

SAŽETAK

Ova studija istražuje utjecaj i upotrebu kognitivnih tehnologija u sektoru maloprodaje, području koje je nedavno privuklo znatan interes poslovnih subjekata, savjetnika, akademika i istraživača. Kroz seriju od osam intervjua s profesionalcima iz različitih područja unutar sektora maloprodaje, ovaj rad nastoji razumjeti kako stručnjaci iz industrije usvajaju ove tehnologije i ulogu koju igraju u oblikovanju strategija maloprodaje. Naši nalazi potvrđuju da kognitivne tehnologije imaju značajan utjecaj na strateško donošenje odluka unutar maloprodaje. Ove tehnologije ne samo da potiču nove prakse i odluke o investicijama prema automatizaciji i optimizaciji internih operacija, već služe i kao ključni alati za razumijevanje i dobivanje uvida o potrošačima kako bi se oblikovalo ponašanje kupovine.

KLJUČNE RIJEČI: *umjetna inteligencija, kognitivne tehnologije, tehnološka inovacija, tehnološka strategija, poslovna analitika, rudarenje podataka, strojno učenje, veliki podaci, GDPR*

APPENDIX I. Semi-structured questionnaire

Main thematic relationship	Qx	Question	Discovery intent
1. Strategy	Q01	What types of products and technological innovations have been introduced in the retail sector?	To understand whether companies focus on redesigning their software and hardware and whether they have invested in modern technologies to achieve more meaningful results in the retail sector.
	Q01.1	Have these solutions been designed specifically for the sector, or are they no more than generic solutions adapted to the reality of retail?	To understand the nature of the offer, vendors should develop retail-specific solutions or simply adapt generic offers.
	Q02	Are there IT specialists with a strong retail focus?	To understand whether the company's employees, in addition to technological knowledge and technical skills, also have retail-specific business knowledge and skills to support the company's decisions, objectives, and plans.
	Q03	Do retail companies, in addition to having the capabilities to collect data and information, also have the tools to extract knowledge from that data?	To understand whether companies can only collect information without having the tools or skills to understand the data, identify outliers, or visualize meaningful results.
	Q04	How do you anticipate the impact of technology on the definition of strategies of retail companies?	To understand whether the strength of the results (outputs) generated and presented by the technological solutions integrated into the company-customer relationship is sufficient to support and influence the strategic business decisions that must subsequently be made after reviewing these results.
2. Processes	Q05	From the company's perspective, should AI be applied to internal processes and operations?	To realize that before technological practices are used in the interaction with customers, it is necessary that these practices and techniques are also part of the company's operations and processes in order to achieve the best possible result.
	Q06	How does the automation of internal processes through Machine Learning, Computer Vision, Natural Language Processing (NLP), Voice Recognition and Robotics techniques, among other techniques and areas, contribute to the efficiency and effectiveness of customer relationships?	To understand whether companies need to change their processes by adding new techniques and automated systems to achieve satisfactory results in the customer relationship.

Main thematic relationship	Qx	Question	Discovery intent
2. Processes	Q07	In light of the General Data Protection Regulation, how should companies position themselves with their customers to safeguard their privacy and preserve the company's advantages in obtaining this data for customization and personalized offers to each consumer profile?	To understand whether companies are concerned about consumer privacy issues.
	Q07.1	What practices/processes does your company use or plan to use in this area?	To understand what practices and processes companies are using or considering activating.
3. Technology	Q08	Are companies reshaping their strategic vision toward the new technological era?	To find out what experts think about the changes companies should make (or are already making) to adapt their original global vision to the new potential of modern retail technologies.
	Q09	Are strategic issues seen as having an impact on the organizational, technological and knowledge-related levels?	The Strategic Sector Vision is currently being considered from the perspective of structural reorganization of the company, implementation of new practices, and technological techniques to gain a deeper knowledge of consumers.
	Q10	Do (will) Cognitive Technologies have sufficient capacity to create value for retail companies in terms of speed, cost, and quality?	CTs can provide insights that lead to reduced costs, improved efficiency and effectiveness, increased revenues, and more engaged customer care because they can improve the customer experience throughout the buying journey.
	Q11	Are decisions in the marketing mix already influenced by cognitive technologies?	To understand whether CTs increase value and product creation, improve price optimization, identify the most cost-effective channels and means of selling products and services, and uncover the most effective ways to interact with customers.
	Q12	What needs, requirements, and changes do retailers need to adopt to incorporate modern technologies into their business?	To confirm the needs and requirements highlighted by Yomtoubian et al. (2017): a clear corporate strategy in which information technology plays a formal and explicit role, the need for strong leadership in information technology, a change in organizational culture, the involvement of users in technologies, preferably in the early stages of adoption, and finally the establishment of tangible goals regarding the benefits of information technology.

Main thematic relationship	Qx	Question	Discovery intent
3. Technology	Q13	Is technology driving increased convergence between online and offline channels in the retail sector? How do the managers perceive this momentum?	To understand how technology is being used as a common thread to bridge the gap between traditional and online retail and determine if organizations are comfortable with the convergence between consumers' shopping experiences in physical spaces and digital channels.
	Q13.1	Is the convergence between the two channels observed by the omni-channel trend?	
	Q14	Are companies reshaping their strategic vision toward the new technological era?	To understand whether technology-enabled stores with specific and diverse formats have the ability to influence the shopping experience and increase sales.
4. People and Resources	Q15	Do consumers engage positively and recognize the benefits of technologies applied to retail and their shopping experience?	To analyze whether retail technologies are well received by consumers and whether they see benefits in their existence and use.
	Q16	Does the knowledge about customers that technology provides to retailers allow them to achieve effective results, particularly in terms of turnover and operating margins?	To explore whether the use of retail-tailored technologies, which provide deeper customer knowledge, brings greater returns and profitability to businesses.
	Q17	Is real-time consumer behaviour analysis the key competitive advantage for retail companies to differentiate themselves in the market?	To understand whether professionals and businesses perceive real-time consumer analytics as a fundamental need to meet consumer needs in an immediate and personalized manner.
	Q18	Do the different departments of the company need to be coordinated and interconnected so that the technological projects implemented have the desired impact on the customer's entire purchase journey?	To understand whether the teams of the different departments of the organization need to be integrated and have more technological skills and abilities to understand the potential, functionalities and results obtained by integrating the different tools in the customers' purchasing process.
	Q19	To what extent is the customer journey and the act of purchase influenced by technology?	To identify whether technological actions influence the path that the consumer takes and the purchase decision.