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The impact of automation and optimization on customer experience: a consumer perspective

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The adoption of digital technologies has significantly transformed businesses and society as a whole. The automation of tasks is leading to changes in organizational structures and strategies. Due to technological growth, users are able to identify the benefits and risks that technology can entail in the purchasing process. Specifically, robotic process automation (RPA) can improve efficiency and agility in a company, which in turn can positively impact consumer satisfaction and engagement. However, automation can also negatively affect the consumer experience and service quality if not applied correctly. Therefore, this research focuses on analyzing the impact of automation technologies on purchasing processes and consumer satisfaction. For this purpose, a survey was developed by means of the Likert 5-point scale, which allowed for obtaining 215 valid responses from consumers in the Community of Madrid. The data were processed through the SPSS tool, which enabled the analysis of the data and the proposed model. Consequently, the results show that potential RPA-based automation and optimization of processes can be of great utility for businesses to better address investment for improving consumer satisfaction. In addition, it should be highlighted that this research contributes in an original way to the area of information and communication technologies by allowing for the development of proactive technological implementation plans that consider end-user satisfaction.

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Introduction

The market and the way consumers make their purchases are constantly evolving, with technology and digital information being key elements with a fundamental role in the continuous change. The increasingly widespread use of digital technologies and dependence on them has led to significant changes in businesses and society (Dana et al. 2022; Grewal et al. 2015).

The evolution of digital technologies has had broad organizational and policy implications in the last decade. Uncertainty in decision making has been identified as a challenge, and information technology (IT) has been linked in research such as that proposed by Jensen (2007) as it can improve information processes and market outcomes. In this sense, technological advancement has significantly improved productivity in developed economies (Lee 2021). Therefore, studies on digital transformation and business innovation focus on different dimensions, with the impact of IT on business innovation being key (Liu et al. 2023).

In the field of Big Data, an area that involves analyzing and processing vast and intricate datasets to extract valuable insights and drive strategic decision making based on identified patterns and trends, data analysis and machine learning are used to provide personalized services. Technological acceptance and its influence on user satisfaction in the purchasing process and from a marketing perspective have been the subject of numerous studies in recent years (Cuesta-Valiño et al. 2022b). Business process automation optimizes organizational management by reducing task execution time and freeing up employees for more creative and engaging responsibilities (Moreira et al. 2023), specifically, with automation such as robotic process automation (RPA), understood as an innovative and relatively new technology that can replace humans in operating graphical user interfaces, improving the efficiency and agility of the company (Syed and Wynn 2020). RPA technology allows for easy integration and adaptation into the company's processes and systems (Axmann and Harmoko 2020), which can lead to a positive impact on customer satisfaction and brand commitment.

The information age, driven by digital technologies, enables us to apply knowledge creatively in novel ways (Alkhabra et al. 2023). In that sense, organizations need to focus on developing digital initiatives that effectively respond to these shifts in consumer behavior and market dynamics (Rangaswamy et al. 2022). Businesses are beginning to digitize processes by implementing new technologies, with changes occurring rapidly and constantly. One of the most important points is consumer satisfaction. There is an increasingly pronounced trend toward focusing on the customer, their needs, and their financial possibilities (de Oliveira Barreto et al. 2019; Erkmen 2018).

User engagement is an important factor in satisfaction and security and is a predictor of the success of automated services. Companies aware of these trends introduce Customer Relationship Management (Dyche 2009) within the organization, as these systems enable companies to increase their offering, increase trust in the company, and maintain their position in the market (Siu 2016). Companies have invested a large amount of money in implementing and putting these systems into production, which have evolved to store and effectively use information (Ryding 2010). The use of automation technologies for sales and consumer relationship management (CRM) has increased; however, it should be noted that there is a possibility of failure (Azad and Ahmadi 2015; Speier and Venkatesh 2002) or even the inability to cope, particularly for small or medium-sized businesses (SMEs), which may need to use new technological approaches to customer relations (Januszewski and Kujawski 2021).

In particular, the role of service automation in promoting customer wellbeing is also critical to customer engagement (Anderson et al. 2013). However, automation can negatively affect consumer experience and service quality if not implemented correctly. Although studies on digital transformation and business innovation have increased in recent years, research is limited on the role of service automation in promoting consumer wellbeing and engagement. Automation can have a positive or negative impact on consumer experience and service quality, depending on how it is implemented. Therefore, there is an urgent need for further research on this topic to better understand how automation can influence consumer engagement and satisfaction, and to develop effective strategies for its implementation.

Accordingly, the following research is articulated as follows: a theoretical framework is set out that positions the concepts of automation and customer and consumer satisfaction, considering the impact of digitization today. Subsequently, the sample is analyzed. This is followed by a description of the methodology used. Then, the results are presented and discussed, and the conclusions of the work are considered. Finally, the limitations encountered in conducting the research are considered and future lines of research in the field are proposed.

Theoretical framework and literature review

Digital transformation refers to the process of changing and rebuilding business models through the use of emerging digital technologies (Li et al. 2023; Wang et al. 2018). Digitization has been considered to be a trend with one of the biggest capacities for change and impact on society (Parviainen et al. 2017). Thus, it has been the transforming element of the business world in the last decade. This digitization has given rise to e-business, which has generated very rapid growth in the companies that have adopted it, transforming the world of commerce.

The automation of business processes can have a significant impact on consumer satisfaction. Ganesh (2020) considers the irony of automation, which highlights the tensions that arise between machines and humans, since despite being computationally superior and efficient, they need the intervention of human operators to ensure their effectiveness. Thus, process automation can help companies to offer personalized services tailored to the specific needs of each consumer. However, it can also pose risks in managing and implementing them in organizational structures. Therefore, further research in this field is needed to analyze in depth the impact of automation on user satisfaction.

Heimbach et al. (2015) propose that marketing is the activity that is linked to IT and becomes a key activity of organizations. Thus, when considering marketing strategies, the trust and security that the online environment brings to the user must be taken into account, which is essential to achieve customer engagement. In this sense, the interaction of customers on an organization's website can generate positive experiences and build long-lasting relationships, whether they are seeking information, purchasing or delivering services (Rose et al. 2011). Similarly, online reviews are an important source of information for companies analyzing user demands (Wang et al. 2018). Consequently, several factors have the ability to influence technological adaptation processes in organizations, thus impacting user experience and satisfaction.

Considering the challenges that society is facing with digitization, it is essential to analyze the influence it has on the user through user satisfaction. As a consequence, the study is based on a comprehensive review of the current and previous literature regarding customer satisfaction, automation and process optimization, and the use of automation and RPA regarding their

impact on businesses, as well as how consumers can benefit from these advances.

Consumer satisfaction. Digitization has changed the way customers, consumers and the company interact. Intermediaries have disappeared or have been transformed into new figures (Bakos 2001), giving rise to a direct relationship between seller and customer. Customers expect companies to meet their expectations in terms of trust, product quality and satisfaction. For that reason, it is essential to consider the knowledge derived from the analysis of information and data (Ahumada Tello and Perusquia Velasco 2016) of customers or potential customers. The importance given to consumer satisfaction is very high given that a satisfied customer acts as an evangelist for the company. However, this is not enough if it does not have a direct impact on customer loyalty (Bowen and Chen 2001). The customer is at the center of all strategies, events and processes to ensure customer retention (Mohsan et al. 2011).

Businesses are in an era of transformation in which digitization is to a large extent the harbinger of change. This digitization is transforming companies, making it possible for them to offer products and services through the use of these new technologies (Hagberg et al. 2016). These new technologies enable the creation of new shopping experiences as well as value creation (Raynolds and Sundström 2014). The main objective of the company is to maintain customer loyalty and to focus strategies around this (Jain and Singh 2002). CRM systems also allow the company to increase its offerings to reach new customers, which benefits the company by gaining the security and trust of its business partners and customers (Fotiadis and Vassiliadis 2017). While CRM is one of the most widely considered tools for maintaining and building relationships with customers, other authors such as Cuesta-Valiño et al. (2019) highlight corporate social responsibility (CSR) as a variable used in business strategy to increase competitiveness and generate favorable responses from consumers and other stakeholders. Both consider the relationship as the key point of the strategy, so once the user is impacted and relationships are created, it is easier to identify the needs of potential customers and be able to satisfy them before the competitors.

The concept of satisfaction is known in various research areas and occurs when the service or product is received and meets the customer's expectations, including the satisfaction of needs and wants associated with the buying process (Kotler and Armstrong 2016). Customer satisfaction is considered one of the newest and most important performance measures that aim to increase companies' profits (Cuesta-Valiño et al. 2022a). Digitization affects the level of customer satisfaction (Poncin and Ben Mimoun 2014), being one of the factors influencing consumer loyalty toward the company (Ariff et al. 2013; Harazneh et al. 2020). Customer satisfaction will be the main source of customer attraction and retention (Patterson and Spreng 1997) and failure to meet it will lead to dissatisfied customers. Employees should pay special attention to customers to care and develop new means to maintain customer satisfaction (Anderson and Sullivan 1993). It is important to have both short- and long-term customer loyalty and to be able to measure this satisfaction and make decisions about it based on indicators (Binsar Kristian and Panjaitan 2014). Customer relationships have to be developed and maintained in order to have a competitive advantage (Kale 2004). Having a CRM system does not imply that customer satisfaction per se will be achieved; it will be influenced by the attention given by employees, as well as product knowledge and the ability to communicate with them (Long et al. 2013).

H_1: Digitization of the organization has a direct impact on consumer satisfaction during the purchasing process.

Automation and processes optimizations. Over the last decade, the evolution of digital technologies has significantly transformed both innovation and entrepreneurship, with broad organizational and policy implications (Gavrila Gavrila and de Lucas Ancillo 2021a; Nambisan et al. 2017). At the technology level, elements such as big data, data analytics and machine learning are seen to be used to provide personalized services to customers, with the aim of increasing customer engagement (Aluri et al. 2019; Gavrila Gavrila and de Lucas Ancillo 2021b). Companies have to cope with global competition, seek cost reduction in their operation and have a rapid capacity for the development of new services and products (Georgakopoulos et al. 1995). With the growth of technologies, the use of artificial intelligence should be highlighted, understood as a powerful tool that allows real-world problems to be solved where deterministic solutions are difficult to achieve (Al Aani et al. 2019).

The role of service automation in promoting customer wellbeing is also central to customer engagement (Anderson et al. 2013). Over time, companies have directed their efforts not only to provide quality service to customers but have now increased digitization efforts in both operational and business processes, capturing all types of industries (Siderska 2020). Authors highlight areas where such applications are being incorporated: human resources (Balasundaram and Venkatagiri 2020; Nawaz et al. 2021), banking (Gogineni 2019), business (Januszewski and Kujawski 2021), insurance (Oza et al. 2020), logistics (Sullivan et al. 2021), telecommunications (Arie Sandy et al. 2022), retail and in general most of the services that can be found in a company (Gerbert et al. 2017).

Furthermore, given the growth of technology, research linked to technology acceptance and user satisfaction has increased (Dwivedi et al. 2019). As employees move into more customer-focused roles and processes become more efficient and error-free through automation, a high ratio of customers is likely to be more satisfied with the user experience, i.e., as a company improves customer satisfaction, customers are retained and new customers can be attracted (Craig 2006). Therefore, it becomes relevant to continue research in this area considering the link of technologies such as RPA in the User's purchase process. Thus, the following hypotheses are raised:

H_2: Automation could be considered strategic for business activity.

H_3: Automation of repetitive tasks could enable employees more time for customer interaction.

Robotic process automation (RPA). Over the last few years, the use of digital technologies has increased and transformed organizational models, products, their processes and the structure of the organization (de Lucas Ancillo et al. 2021; González-Tejero and Molina 2022). The use of these technologies has led to a digital transformation in continuous progress (de Lucas Ancillo et al. 2022) in which RPA is one of the most active fields.

Robotic process automation (RPA) is a technology that uses software to replace humans in the operation of graphical user interfaces, but its scope is limited, and its environment must meet many requirements for its success (König et al. 2020). RPA as a technology automates existing tasks by training software to perform the iterative tasks involved (Karn et al. 2019). RPA is based on software solutions that have a high benefit such as improved productivity, service quality, and reduced employee cost (Lee 2021).

Robots and RPA are increasingly required to conduct business operations in organizations (Madakam et al. 2019). In this sense, authors such as Cabrales et al. (2020) have measured the effort made by workers who could be replaced by robots. Therefore,

RPA can also alleviate the monotony of manual and repetitive labor-intensive tasks (Gupta et al. 2022). The purchasing process is another organizational procedure where the user and the organization must interact. In order to be successful, different tasks must be carried out. At this point, we can talk about the term "Botsourcing" which refers to the utilization of robots or robotic technology to substitute human labor (Vedder and Guynes 2016). RPA offers maximum efficiency in terms of personnel costs while requiring minimal investment (Axmann and Harmoko 2020). Thus, the use of RPA ranges from operational to transactional tasks, including supplier relations tasks or payment processing, among others (Flechsig et al. 2022). This phenomenon has grown exponentially mainly due to information technology (IT) products and the services they have provided (Vedder and Guynes 2016).

The value-driven RPA approach recognizes and addresses challenges to improve business procedures and sustain achievements by focusing on the right sub-processes, context, and hybrid workforce management (Kirchmer and Franz 2019). Recent studies report the benefits of implementing RPA in terms of productivity, costs, speed, and error reduction (Aguirre and Rodriguez 2017). This technology will make it easier for workers to handle a greater number of processes, thus being able to work more efficiently and make fewer mistakes (Madakam et al. 2019). On the other hand, authors such as Aguirre and Rodriguez (2017) highlight the capacity of these technologies to reproduce and increase the repetition of some routines that occur in offices. In this way, it is key to analyze the impact of RPA technology understood as a technology capable of automating repetitive tasks developed in purchasing processes. To this end, from the consumer's perspective, the following hypotheses are put forward (Fig. 1):

H_4: Automation of tasks in the purchasing process could improve service quality through faster response time (reduced processing time).

H_5: RPA technology could improve consumer experience through automation of self-service management.

Methodology

Model and structure. As a result of the literature review process, it was observed that empirical research methodology is generally employed either qualitative, quantitative, or a combination of both methods to obtain relevant data for subsequent research analysis. The quantitative method is used to search for causal relationships or to obtain objective and generalizable results as in this case. Therefore, the paper proposes an empirical methodology, utilizing a quantitative approach through a Likert 5-scale questionnaire, in order to obtain and analyze measurable data. Nevertheless, this approach has some limitations compared to a qualitative approach, which can provide more varied feedback and insights due to the unstructured nature of interviews.

Therefore, the following research model has been established, covering a step-by-step procedure (Fig. 2):

(1) Design of the survey linking the consumer aspects, automation aspects, consumer experience issues and business perception with consumer satisfaction (H_1), automation and process optimizations (H_2, H_3) and RPA (H_4, H_5);
(2) Survey collection of the consumer responses;
(3) Data analysis for integrity and validation check; and finally,
(4) Insight analysis of the data in order to explore any relevant aspects concerning businesses and consumers.

Survey design and collection. In order to construct the survey adapted to the identified research gap, the questions used by other authors have been adjusted. Thus, the questionnaire is developed taking into account others previously validated and used by authors such as Jensen (2007), Siderska (2021), and Zhang et al. (2022). In particular, authors such as Ye et al. (2020) consider the business environment linked to digital experience and knowledge, which has served as an inspiration to continue our research considering the user's awareness of technology and the descriptive variables of ICT use, also analyzing age, gender and the sector in which the work activity is carried out. Siderska (2021) refers to the efficiency and effectiveness of robots, which has allowed us to adapt these questions and consider how robotization influences the shopping processes of the organization and takes into account the image that this technology generates in the user. Finally, Zhang et al. (2022) allowed us to consider variables such as digital exposure.

A survey was designed using a Likert evaluation questionnaire, which consisted of 30 items with a 5-point scale rating ranging from "totally disagree" (1) to "totally agree" (5). Thus, the survey is divided into four clearly identified blocks (Table 1): (1) perception of consumers regarding the consumer experience issues; (2) perception of businesses from the point of view of consumers; (3) perception of consumers regarding automation of the consumer experience issues, and (4) perception of consumers regarding business automation aspects.

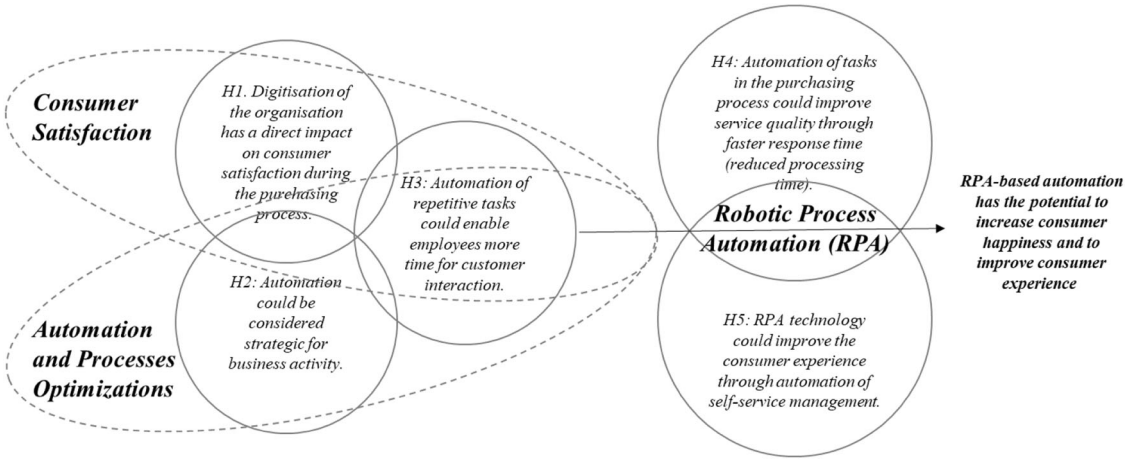

Fig. 1 Proposed theoretical model. Diagram of Hypotheses from Consumer Satisfaction and Automation perspectives, leading to Robotic Process Automation, depicted within interconnected circles.

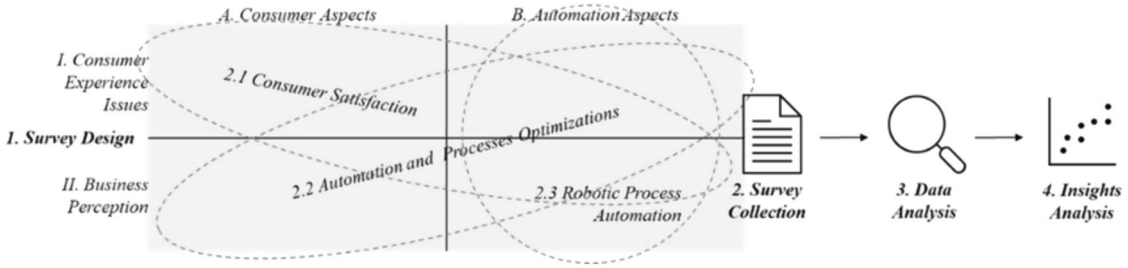

Fig. 2 Research model. Depicts survey design perspectives, response collection, data and insights analysis.

Table 1 Main variables.

	A. Consumer aspects	B. Automation aspects
I. Consumer experience issues	A1. Avoid shopping in an online shop if the order must be confirmed afterwards/manually by an operator.	B1. The company should automate the sending of purchase confirmation emails.
	A2. If an online shop cannot confirm the status of my purchase, I avoid buying from them.	B2. The confirmation email should be sent as soon as possible.
	A3. It is important to receive a purchase confirmation email.	B3. The confirmation email should contain the exact details of the order.
	A4. Basic tasks, such as changing delivery details, payment, etc., are best handled by an operator.	B4. Basic tasks, such as changing delivery details, payment, etc., should be automated as a natural part of the purchase/contracting process.
	A5. It is important for customer service that the operator has up-to-date information.	B5. The company should synchronize customer information and customer history.
	A6. Sometimes, it seems that operators/companies have to do a lot of manual work to solve problems.	B6. The response time of the company is a priority when it comes to the purchasing process, customer service, etc.
	A7. For customer service, when entering information manually, many errors can occur.	B7. Automated data entry could reduce many basic errors.
	A8. Returns are always best handled by an operator/employee.	B8. Customers should be able to handle returns/incidents themselves.
II. Business perception	A9. To provide good service, companies need to hire more staff.	B9. Eliminating repetitive tasks could allow employees to serve more customers.
	A10. More employees provide better service to customers.	B10. Eliminating repetitive tasks could allow employees to serve customers better.
	A11. Cutting staff will always worsen the quality of service.	B11. Eliminating repetitive tasks could allow employees more time for each customer.
	A12. Manual tasks prevent urgent/important problems from being addressed/solved.	B12. Eliminating repetitive tasks could increase the productivity of the company.
	A13. An employee can only serve one customer at a time.	B13. Automation would allow thousands of customers to be served simultaneously.
	A14. Sometimes, I have the feeling that many companies lack digital skills.	B14. Companies should invest more in technology and tools for customer management.
	A15. Sometimes, I wonder how some companies still do not invest more in digitization/automation.	B15. I like it when a purchasing process is quick and easy.

This provides a novel perspective on the problems businesses need to solve and the demands of consumers, providing valuable insight into where automation efforts should be focused.

Sample characteristics. Using a representative selected sample of 500 people (March 2023) will make the characteristics and proportions of the sample a good approximation of the characteristics and proportions present in the total population. However, only 215 valid responses for the analysis have been obtained.

A descriptive analysis of the sample allows us to consider that, in this case, we obtained a majority response from women (53.5%). Two people preferred not to indicate their gender. Considering age, the 45–59 age range stands out, representing 60.9% of the total sample. At the same time, only 16 of those surveyed were under 29 years of age. This is noteworthy since, among the consumers, the age trend is in the 45–59 range.

Analysis and results

One-sample statistics. In order to validate and check the results for coherence, a one-sample *t*-test is executed for each of the questions to evaluate if the answers are consistent. A first analysis is conducted to check the basic statistics such as the mean and standard deviation aspects (Table 2). In general, relatively high mean scores can be observed, except for some questions such as "A4. Basic tasks, such as changing delivery details, payment, etc., are best handled by an operator" or "A12. Manual tasks prevent urgent/important problems from being addressed/solved." However, the rest of the data may seem encouraging being mean ≥3 but a further analysis regarding the distribution of the data is required in order to statistically assess if the answers really support the proposed hypotheses.

One-sample test. Therefore, in order to execute the one-sample *t*-test, the research seeks to confirm if the consumers' preferences

Table 2 One-sample statistics.

	N	Mean	Std. deviation	Std. error mean
A1. Avoid shopping in an online shop if the order must be confirmed afterwards/manually by an operator.	215	3.0605	1.04169	0.07104
A2. If an online shop cannot confirm the status of my purchase, I avoid buying from them.	215	3.8512	1.10063	0.07506
A3. It is important to receive a purchase confirmation email.	215	4.6791	0.68650	0.04682
A4. Basic tasks, such as changing delivery details, payment, etc., are best handled by an operator.	215	2.6465	1.14209	0.07789
A5. It is important for customer service that the operator has up-to-date information.	215	4.5070	0.77863	0.05310
A6. Sometimes, it seems that operators/companies have to do a lot of manual work to solve problems.	215	3.3209	0.94931	0.06474
A7. For customer service, when entering information manually, many errors can occur.	215	3.3023	0.93065	0.06347
A8. Returns are always best handled by an operator/employee.	215	3.6837	0.94348	0.06434
A9. To provide good service, companies need to hire more staff.	215	3.4837	1.04946	0.07157
A10. More employees provide better service to customers.	215	3.1395	1.09334	0.07457
A11. Cutting staff will always worsen the quality of service.	215	3.6279	1.06830	0.07286
A12. Manual tasks prevent urgent/important problems from being addressed/solved.	215	2.6093	0.98868	0.06743
A13. An employee can only serve one customer at a time.	215	3.5953	1.10605	0.07543
A14. Sometimes, I have the feeling that many companies lack digital skills.	215	3.5767	0.80444	0.05486
A15. Sometimes, I wonder how some companies still do not invest more in digitization/automation.	215	3.7488	0.90800	0.06193
B1. The company should automate the sending of purchase confirmation emails.	215	4.3535	0.80051	0.05459
B2. The confirmation email should be sent as soon as possible.	215	4.5674	0.66548	0.04539
B3. The confirmation email should contain the exact details of the order.	215	4.6372	0.66171	0.04513
B4. Basic tasks, such as changing delivery details, payment, etc., should be automated as a natural part of the purchase/contracting process.	215	4.1674	0.77932	0.05315
B5. The company should synchronize customer information and customer history.	215	3.8279	0.88242	0.06018
B6. The response time of the company is a priority when it comes to the purchasing process, customer service, etc.	215	4.1023	0.81959	0.05590
B7. Automated data entry could reduce many basic errors.	215	3.8512	0.93538	0.06379
B8. Customers should be able to handle returns/incidents themselves.	215	4.2977	0.75179	0.05127
B9. Eliminating repetitive tasks could allow employees to serve more customers.	215	4.0651	0.82340	0.05616
B10. Eliminating repetitive tasks could allow employees to serve customers better.	215	4.0419	0.83896	0.05722
B11. Eliminating repetitive tasks could allow employees more time for each customer.	215	4.0977	0.77021	0.05253
B12. Eliminating repetitive tasks could increase the productivity of the company.	215	4.1674	0.77932	0.05315
B13. Automation would allow thousands of customers to be served simultaneously.	215	3.6186	0.88794	0.06056
B14. Companies should invest more in technology and tools for customer management.	215	4.6698	0.60200	0.04106
B15. I like it when a purchasing process is quick and easy.	215	4.1302	0.70497	0.04808

are indeed something that matters for them (4 "agree" or 5 "totally agree") or simply not relevant (3 "neither agree nor disagree", 2 "disagree" or 1 "totally disagree").

The null hypothesis (H_0) states the consumer preferences are equal to 3 ("neither agree nor disagree").
The counter hypothesis (H_a) states that the average is different from 3, where an additional exploration is required to determine if below or above 3.

From the one-sample *t*-test (Table 3) it can be observed that for "A1. Avoid shopping in an online shop if the order must be confirmed afterwards/manually by an operator." ($p = 0.396$) and "A10. More employees provide better service to customers." ($p = 0.063$), the null hypothesis is accepted as $p > 0.05$ (two-tailed), therefore indicating that these questions do not seem that relevant for the majority of the consumers (mean equals 3 "neither agree nor disagree").

On the other hand, the rest of the questions, according to the *t*-test results, are indeed different than 3; however, the direction (above or below) needs to be analyzed. Following the results from Table 2, all questions except "A12. Manual tasks prevent urgent/important problems from being addressed/solved." indicate a positive impact as the mean is above 3.

Results

Taking into account the results obtained after carrying out the survey (Tables 2 and 3) together with Table 4, obtaining a sufficient sample and processing the data, it can be said that:

(H_1) Digitization of the organization has a direct impact on consumer satisfaction during the purchasing process, is supported as the linked questions A1–A8; B1–B9 have a mean higher than 3 impact (except for "A1. Avoid shopping in an online shop if the order must be confirmed afterwards/manually by an operator." ($p = 0.396$), and "A4. Basic tasks, such as changing delivery details, payment, etc., are best handled by an operator." where mean is less than 3).

(H_2) Automation could be considered strategic for business activity, and (H_3) Automation of repetitive tasks could enable employees more time for customer interaction are supported as the consumers consider relevant mean higher than 3, except for "A10. More employees provide better service to customers." ($p = 0.063$); and "A12. Manual tasks prevent urgent/important problems from being addressed/solved.", where mean is less than 3.

(H_4) Automation of tasks in the purchasing process could improve service quality through faster response time (reduced processing time), and (H_5) RPA technology could improve consumer experience through automation of self-service management, are supported as the consumers consider relevant mean higher than 3.

Discussion and conclusions

Discussion. The results of this research suggest that digitization and automation of organizational tasks positively impact consumer satisfaction during the purchasing process. Thus, in relation to what Poncin and Ben Mimoun (2014) indicate, digitization influences the consumer, so H_1 can be affirmed.

Accordingly, as proposed by Parasuraman et al. (2000), it is important to select automation appropriately, since it can replace and modify human activity to a large extent, imposing new coordination needs on the human operator. Thus, each of the relevant tasks in the purchasing process susceptible to automation should be considered, this prior analysis being key to really achieve a substantial improvement in consumer satisfaction and perception.

Specifically, the study concludes that the use of technology in the purchasing process can lead to faster response times, shorter processing times and better self-service management, so that process automation can be considered strategic for the company, thus validating H_2. Thus, automation, as proposed by Gupta et al. (2022), allows the elimination of labor-intensive repetitive tasks, which, according to our H_3, allows more time for the key human-to-human interaction (H2H) in business-consumer relations. In this sense, Flechsig et al. (2022) considered the ability to automate by means of RPA different tasks linked to suppliers and payment processes, key elements in the purchasing process, which allows linking it to our results according to H_4, thus being able to optimize response times thanks to the automation of tasks. However, in our results, basic tasks, such as changing delivery data or payment, are best handled by an operator, suggesting that there are still some tasks that require a human touch.

Finally, according to H_5, the study also supports the idea that automation could be considered strategic for business, as it enables more efficient use of resources by favoring the consumer experience through automation of self-service management.

Table 3 One-sample test.

Test value = 3	t	df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
A1	0.851	214	0.396	0.06047	−0.0796	0.2005
A2	11.339	214	0.000	0.85116	0.7032	0.9991
A3	35.863	214	0.000	1.67907	1.5868	1.7714
A4	−4.538	214	0.000	−0.35349	−0.5070	−0.2000
A5	28.379	214	0.000	1.50698	1.4023	1.6116
A6	4.957	214	0.000	0.32093	0.1933	0.4485
A7	4.763	214	0.000	0.30233	0.1772	0.4274
A8	10.626	214	0.000	0.68372	0.5569	0.8106
A9	6.758	214	0.000	0.48372	0.3426	0.6248
A10	1.871	214	0.063	0.13953	−0.0074	0.2865
A11	8.618	214	0.000	0.62791	0.4843	0.7715
A12	−5.794	214	0.000	−0.39070	−0.5236	−0.2578
A13	7.893	214	0.000	0.59535	0.4467	0.7440
A14	10.513	214	0.000	0.57674	0.4686	0.6849
A15	12.093	214	0.000	0.74884	0.6268	0.8709
B1	24.792	214	0.000	1.35349	1.2459	1.4611
B2	34.536	214	0.000	1.56744	1.4780	1.6569
B3	36.279	214	0.000	1.63721	1.5483	1.7262
B4	21.965	214	0.000	1.16744	1.0627	1.2722
B5	13.757	214	0.000	0.82791	0.7093	0.9465
B6	19.721	214	0.000	1.10233	0.9921	1.2125
B7	13.343	214	0.000	0.85116	0.7254	0.9769
B8	25.310	214	0.000	1.29767	1.1966	1.3987
B9	18.967	214	0.000	1.06512	0.9544	1.1758
B10	18.209	214	0.000	1.04186	0.9291	1.1546
B11	20.897	214	0.000	1.09767	0.9941	1.2012
B12	21.965	214	0.000	1.16744	1.0627	1.2722
B13	10.215	214	0.000	0.61860	0.4992	0.7380
B14	40.671	214	0.000	1.66977	1.5888	1.7507
B15	23.508	214	0.000	1.13023	1.0355	1.2250

General conclusions. Digitization has had a significant impact on consumer satisfaction processes. It is therefore relevant to consider the influence and challenges for users. Thus, after conducting the survey and based on the results of this research, it can be affirmed that there is a direct impact between the automation of tasks carried out by organizations and the satisfaction perceived by the user. The study highlights that task optimization will generate positive consumer expectations, which can have an impact on loyalty, engagement and business results, and through appropriate management of the challenges involved in the introduction and implementation of these technologies, can improve the organization's positioning.

One of the novel approaches taken in this research is to consider RPA as a key aspect of digital technologies. Thus, despite having been in the market for years, its use has not yet been fully extended in many organizations and much remains to be explored in terms of its application and how it can affect the customer experience. The digitization of processes has had a significant impact on consumer satisfaction. Consumers have come to expect fast, efficient, and user-friendly experiences when interacting with organizations. Therefore, it is important to consider the influence and challenges that arise for users in this new digital landscape.

Theoretical implications. The research emphasizes the importance of RPA as a key aspect of digital technologies. Despite its existence in the market for years, its use has not yet been fully extended in many organizations. Therefore, there is still much to be explored in terms of its application and how it can affect the customer experience.

Considering the theoretical implications, customer satisfaction linked to the influence of task automation should be highlighted. Therefore, it should be considered that in business strategies the user's perception and the explanation and information provided by the company to improve this in order to meet their expectations, is essential. In addition, the implementation of technologies such as RPA will need to be integrated into organizations' strategies to ensure their effectiveness and efficiency. Therefore, at a theoretical level, it is necessary to continue exploring the research area and discovering the challenges that arise in the organization considering the value of the consumer, which is fundamental for the development and growth of the organization.

Table 4 Link between hypothesis and variables.

H_1: Digitization of the organization has a direct impact on consumer satisfaction during the purchasing process.	A1–A8; B1–B9
H_2: Automation could be considered strategic for business activity.	A9–A15; B9–B15
H_3: Automation of repetitive tasks could enable employees more time for customer interaction.	A9–A15; B9–B15
H_4: Automation of tasks in the purchasing process could improve service quality through faster response time (reduced processing time).	B1–B15
H_5: RPA technology could improve consumer experience through automation of self-service management.	B1–B15

Practical implications. Given RPA as a technology to automate tasks within the procurement process and the influence of customer satisfaction, a thorough assessment of the task to be automated must be carried out to ensure that they are appropriate. Not all processes are automatable with RPA, so consider the task that can be implemented, and that no important aspect of customer service is lost. In addition, the objectives of the implementation should be identified, and metrics established to measure success. Due to the cost of the technology, rigorous testing and simulations must be carried out before it is implemented in the organization. Therefore, this research has practical implications as it allows business owners and leaders to consider the implications and links between automation and customer satisfaction in order to consider whether or not to develop it in the organization.

The implementation of digital technologies such as RPA poses challenges for organizations. One of the challenges is the need for proper management of these technologies. RPA implementation requires a significant investment in time, money, and resources. Therefore, it is important to ensure that the technology is implemented correctly and managed efficiently to avoid issues such as system downtime, errors, and data breaches. In addition, organizations need to ensure that they have the necessary expertise to manage the technology effectively and ensure that it remains up to date.

Another challenge is ensuring that the customer experience is not negatively impacted by the introduction of these technologies. Customers need to feel that they are still receiving a personalized and human touch, despite the automation of certain tasks. This can be achieved through effective communication and by using RPA to complement rather than replace human interaction.

In conclusion, digitization has had a significant impact on consumer satisfaction processes, and the introduction of RPA can generate positive outcomes for both organizations and customers. However, it is important to manage the challenges that come with the implementation of these technologies and ensure that they are used to complement rather than replace human interaction. An example of this would be the self-checkout kiosk where a staff member would be present near the kiosk offering help to customers on how to use the service, answering any questions and giving personalized attention when needed.

Limitations. The research suggests that the adoption of digital technologies is significantly transforming business tasks and processes, which has a direct impact on customer satisfaction. Thus, it is critical that companies adapt their organizational structures and strategies to continue to meet user needs and improve customer relationships through digitization and automation. Future research in this area should be highly considered. In particular, it could focus on how organizations can manage this transformation process effectively and efficiently. As it has already been shown to have a direct impact on user satisfaction, it is essential to analyze how the organization implements and adapts to it in order to optimize time. In addition, the impact of task automation on specific parts of the organization should be further investigated; in this case, the user relationship and purchasing process have been assessed; however, there are many parts and business tasks for which it could be of great use. Moreover, the universe can also be extended to other types of organizations and professionals that could benefit from RPA.

Future research lines. The automation of tasks and processes supported by the adoption of RPA has significant implications for organizational structures and strategies. In turn, further analysis should continue to consider which organizational variables such as organizational culture, technological readiness, and financial resources influence the adoption of these types of technological tools. In particular, considering the rapid evolution of technologies today, it will be relevant to compare the impact of RPA with other technologies.

Finally, future research could extend the research into new geographical territories. Thus, a call is made for future researchers to consider the survey in new territories, leading to a cross-cultural analysis to analyze and consider the differences between countries' digitization and macroeconomic indicators.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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References

Aguirre S, Rodriguez A (2017) Automation of a business process using robotic process automation (RPA): a case study. Commun Comput Inf Sci. https://doi.org/10.1007/978-3-319-66963-2_7

Ahumada Tello E, Perusquia Velasco, JMA (2016) Inteligencia de negocios: Estrategia para el desarrollo de competitividad en empresas de base tecnológica. Contaduria y Adm. https://doi.org/10.1016/j.cya.2015.09.006

Al Aani S, Bonny T, Hasan SW, Hilal N (2019) Can machine language and artificial intelligence revolutionize process automation for water treatment and desalination? Desalination. https://doi.org/10.1016/j.desal.2019.02.005

Alkhabra YA, Ibrahem UM, Alkhabra SA (2023) Augmented reality technology in enhancing learning retention and critical thinking according to STEAM program. Humanit Soc Sci 10(1):1–10

Aluri A, Price BS, McIntyre NH (2019) Using machine learning to cocreate value through dynamic customer engagement in a brand loyalty program. J Hosp Tour. https://doi.org/10.1177/1096348017753521

Anderson EW, Sullivan MW (1993) The antecedents and consequences of customer satisfaction for firms. Mark Sci. https://doi.org/10.1287/mksc.12.2.125

Anderson L, Ostrom AL, Corus C, Fisk RP, Gallan AS, Giraldo M, Mende M, Mulder M, Rayburn SW, Rosenbaum MS, Shirahada K, Williams JD (2013) Transformative service research: an agenda for the future. J Bus Res. https://doi.org/10.1016/j.jbusres.2012.08.013

Arie Sandy D, Ritchi H, Adrianto Z, Alfian A (2022) Robotic process automation in action: a use case in accounting task. J Digit Sci. https://doi.org/10.24198/digits.v1i1.38534

Ariff MSM, Yun LO, Zakuan N, Ismail K (2013) The impacts of service quality and customer satisfaction on customer loyalty in internet banking. Procedia Soc Behav Sci. https://doi.org/10.1016/j.sbspro.2013.06.462

Axmann B, Harmoko H (2020) Robotic process automation: an overview and comparison to other technology in Industry 4.0. Paper presented at the 2020 10th International Conference on Advanced Computer Information Technologies, ACIT 2020 – Proceedings. https://doi.org/10.1109/ACIT49673.2020.9208907

Azad N, Ahmadi F (2015) The customer relationship management process: Its measurement and impact on performance. Uncertain Supply Chain Manag. https://doi.org/10.5267/j.uscm.2014.9.002

Bakos Y (2001) The emerging landscape for retail E-commerce. J Econ Perspect. https://doi.org/10.1257/jep.15.1.69

Balasundaram S, Venkatagiri S (2020) A structured approach to implementing robotic process automation in HR. J Phys Conf Ser. https://doi.org/10.1088/1742-6596/1427/1/012008

Binsar Kristian PFA, Panjaitan, H (2014) Analysis of customer loyalty through total quality service, customer relationship management, and customer satisfaction. Int J Eval Res Educ. https://doi.org/10.11591/ijere.v3i3.6191

Bowen JT, Chen SL (2001) The relationship between customer loyalty and customer satisfaction. Int J Contemp Hosp Manag. https://doi.org/10.1108/09596110110395893

Cabrales A, Hernández P, Sánchez A (2020) Robots, labor markets, and universal basic income. Humanit Soc Sci. https://doi.org/10.1057/s41599-020-00676-8

Craig JJ (2006) Introduction to robotics. Pearson Education

Cuesta-Valiño P, Gutiérrez-Rodríguez P, García-Henche B (2022a) Word of mouth and digitalization in small retailers: tradition, authenticity, and change. Technol Forecast Soc Change 175:121382. https://doi.org/10.1016/j.techfore.2021.121382

Cuesta-Valiño P, Gutiérrez-Rodríguez P, Núnez-Barriopedro E (2022b) The role of consumer happiness in brand loyalty: a model of the satisfaction and brand image in fashion. Corp Gov. https://doi.org/10.1108/CG-03-2021-0099
Cuesta-Valiño P, Rodríguez PG, Núñez-Barriopedro E (2019) The impact of corporate social responsibility on customer loyalty in hypermarkets: a new socially responsible strategy. Corp Soc Responsib Environ Manag. https://doi.org/10.1002/csr.1718
Dana L-P, Salamzadeh A, Hadizadeh M, Heydar G, Shamsoddin S (2022) Urban entrepreneurship and sustainable businesses in smart cities: exploring the role of digital technologies. Sustain Technol Entrepreneurship 1(2):100016
de Lucas Ancillo A, del Val Núñez MT, Gavrila SG (2021) Workplace change within the COVID-19 context: a grounded theory approach. Econ Res Ekon Istraz 34(1):2297–2316. https://doi.org/10.1080/1331677X.2020.1862689
de Lucas Ancillo A, Gavrila SG, Cañero Serrano J (2022) Emerging technologies in financing startups. p. 99–116. https://doi.org/10.1007/978-3-030-94058-4_7
de Oliveira Barreto TB, Pinheiro PR, Silva CFG (2019) The multicriteria model support to decision in the evaluation of service quality in customer service. Adv Intell Syst Comput. https://doi.org/10.1007/978-3-319-91186-1_17
Dwivedi YK, Rana NP, Jeyaraj A, Clement M, Williams MD (2019) Re-examining the Unified Theory of Acceptance and Use of Technology (UTAUT): towards a revised theoretical model. Inf Syst Front. https://doi.org/10.1007/s10796-017-9774-y
Dyche J (2009) CRM Handbook. A business guide to customer relationship management. Addison Wesley
Erkmen E (2018) Managing your brand for employees: Understanding the role of organizational processes in cultivating employee brand equity. Adm Sci. https://doi.org/10.3390/admsci8030052
Flechsig C, Anslinger F, Lasch R (2022) Robotic process automation in purchasing and supply management: a multiple case study on potentials, barriers, and implementation. J Purch Supply Manag. https://doi.org/10.1016/j.pursup.2021.100718
Fotiadis AK, Vassiliadis C (2017) Being customer-centric through CRM metrics in the B2B market: the case of maritime shipping. J Bus Ind Mark. https://doi.org/10.1108/JBIM-11-2014-0226
Ganesh MI (2020) The ironies of autonomy. Humanit Soc Sci. https://doi.org/10.1057/s41599-020-00646-0
Gavrila Gavrila S, de Lucas Ancillo A (2021a) COVID-19 as an entrepreneurship, innovation, digitization and digitalization accelerator: Spanish Internet domains registration analysis. Br Food J. 123(10):3358–3390. https://doi.org/10.1108/BFJ-11-2020-1037
Gavrila Gavrila S, de Lucas Ancillo A (2021b) Spanish SMEs' digitalization enablers: E-Receipt applications to the offline retail market. Technol Forecast Soc Change. 162:120381. https://doi.org/10.1016/j.techfore.2020.120381
Georgakopoulos D, Hornick M, Sheth A (1995) An overview of workflow management: from process modeling to workflow automation infrastructure. Distrib. Parallel Databases. https://doi.org/10.1007/BF01277643
Gerbert P, Grebe M, Hecker M, Rehse O, Roghé F, Döschl S, Steinhäuser S (2017) Powering the service economy with RPA and AI. Boston Consulting Group
Gogineni C (2019) 10 use cases of RPA in banking industry. UnlockingInsights.Com
González-Tejero CB, Molina CM (2022) Training, corporate culture and organizational work models for the development of corporate entrepreneurship in SMEs. J Enterp Communities. 16(1):168–188. https://doi.org/10.1108/JEC-12-2021-0178
Grewal R, Lilien GL, Bharadwaj S, Jindal P, Kayande U, Lusch RF, Mantrala M, Palmatier RW, Rindfleisch A, Scheer LK, Spekman R, Sridhar S (2015) Business-to-business buying: challenges and opportunities. Cust Needs Solut. https://doi.org/10.1007/s40547-015-0040-5
Gupta A, Prabhat P, Sawhney S, Gupta R, Tanwar S, Kumar N, Shabaz M (2022) Robotic process automation use cases in academia and early implementation experiences. IET Softw 17(4)
Hagberg J, Sundstrom M, Egels-Zandén N (2016) The digitalization of retailing: an exploratory framework. Int J Retail Distrib Manag. https://doi.org/10.1108/IJRDM-09-2015-0140
Harazneh I, Adaileh MJ, Thbeitat A, Afaneh S, Khanfar S, Harasis AA, Elrehail, H (2020) The impact of quality of services and satisfaction on customer loyalty: the moderate role of switching costs. Manag Sci Lett. https://doi.org/10.5267/j.msl.2019.12.034
Heimbach I, Kostyra DS, Hinz O (2015) Marketing automation. Bus Inf Syst. 57:129–133
Jain D, Singh SS (2002) Customer lifetime value research in marketing: a review and future directions. J Interact Mark. https://doi.org/10.1002/dir.10032
Januszewski A, Kujawski J (2021) Best practices in robotic process automation in global business services. Paper presented at the 27th Annual Americas Conference on Information Systems, AMCIS 2021
Jensen R (2007) The digital provide: information (technology), market performance, and welfare in the South Indian fisheries sector. Q J Econ. https://doi.org/10.1162/qjec.122.3.879
Kale SH (2004) CRM failure and the seven deadly sins. Marketing Management
Karn S, Chaurasia S, Davate K, Nemade M, Ansari N (2019) RPA based digital marketing robot. Int J Comput Eng Res Trends. https://doi.org/10.22362/ijcert/2019/v6/i04/v6i0402
Kirchmer M, Franz P (2019) Value-driven robotic process automation (RPA): a process-led approach to fast results at minimal risk. Lect Notes Bus Inf Process. https://doi.org/10.1007/978-3-030-24854-3_3
König M, Bein L, Nikaj A, Weske M (2020) Integrating robotic process automation into business process management. Lect Notes Bus Inf Process. https://doi.org/10.1007/978-3-030-58779-6_9
Kotler P, Armstrong G (2016) Principles of marketing, 12th ed. Pearson/Prentice Hall
Lee I (2021) Service robots: a systematic literature review. J Electron. https://doi.org/10.3390/electronics10212658
Li S, Gao L, Han C, Gupta B, Alhalabi W, Almakdi S (2023) Exploring the effect of digital transformation on Firms' innovation performance. J Innov Knowl 8(1):100317
Liu M, Li C, Wang S, Li Q (2023) Digital transformation, risk-taking, and innovation: evidence from data on listed enterprises in China. J Innov Knowl 8(1):100332. https://doi.org/10.1016/j.jik.2023.100332
Long CS, Khalafinezhad R, Ismail WKW, Rasid SZA (2013) Impact of CRM factors on customer satisfaction and loyalty. Asian Soc Sci. https://doi.org/10.5539/ass.v9n10p247
Madakam S, Holmukhe RM, Kumar Jaiswal D (2019) The future digital work force: robotic process automation (RPA). J Inf Technol Manag. https://doi.org/10.4301/s1807-1775201916001
Mohsan F, Nawaz MM, Khan MS, Shaukat Z, Aslam N (2011) Impact of customer satisfaction on customer loyalty and intentions to switch: evidence from banking sector of Pakistan. Int J Bus Soc 2(16):263–270
Moreira S, Mamede HS, Santos A (2023) Process automation using RPA–a literature review. Procedia Comput Sci 219:244–254
Nambisan S, Lyytinen K, Majchrzak A, Song M (2017) Digital innovation management MIS Q 41(1):223–238
Nawaz N, Gomes AM, Faisal SU (2021) Is the revolution of technologies transforming human resources? J Manag Inf Decis Sci 24(3):1–10
Oza D, Padhiyar D, Doshi V, Patil S (2020) Insurance claim processing using RPA along with chatbot. SSRN Electon J. https://doi.org/10.2139/ssrn.3561871
Parasuraman R, Sheridan TB, Wickens CD (2000) A model for types and levels of human interaction with automation. IEEE Trans Syst Man Cybern. 30(3):286–297
Parviainen P, Tihinen M, Kääriäinen J, Teppola S (2017) Tackling the digitalization challenge: how to benefit from digitalization in practice. Int J Inf Syst Proj Manag. https://doi.org/10.12821/ijispm050104
Patterson PG, Spreng RA (1997) Modelling the relationship between perceived value, satisfaction and repurchase intentions in a business-to-business, services context: an empirical examination. Int J Serv Ind Manag. https://doi.org/10.1108/09564239710189835
Poncin I, Ben Mimoun MS (2014) The impact of 'e-atmospherics' on physical stores. J Retail Consum Serv. https://doi.org/10.1016/j.jretconser.2014.02.013
Rangaswamy E, Nawaz N, Changzhuang Z (2022) The impact of digital technology on changing consumer behaviours with special reference to the home furnishing sector in Singapore. Humanit Soc Sci 9(1):1–10
Raynolds J, Sundström M (2014) Digitalisation, reteil transformation and change: what will European consumer want from their future shopping centre experience? The 4th Nordic Retail and Wholesale
Rose S, Hair N, Clark M (2011) Online customer experience: a review of the business-to-consumer online purchase context. Int J Manag Rev. https://doi.org/10.1111/j.1468-2370.2010.00280.x
Ryding D (2010) The impact of new technologies on customer satisfaction and business to business customer relationships: evidence from the soft drinks industry. J Retail Consum Serv. https://doi.org/10.1016/j.jretconser.2010.03.008
Siderska J (2020) Robotic process automation—a driver of digital transformation? Eng Manag Prod. https://doi.org/10.2478/emj-2020-0009
Siderska J (2021) The adoption of robotic process automation technology to ensure business processes during the COVID-19 pandemic. Sustainability. https://doi.org/10.3390/su13148020
Siu NYM (2016) Customer relationship management and recent developments. Adm Sci. https://doi.org/10.3390/admsci6030007
Speier C, Venkatesh V (2002) The hidden minefields in the adoption of sales force automation technologies. J Mark. https://doi.org/10.1509/jmkg.66.3.98.18510
Sullivan M, Simpson W, Li W (2021) The role of robotic process automation (RPA) in logistics. The digital transformation of logistics. Wiley, p 61–78. https://doi.org/10.1002/9781119646495.ch5
Syed R, Wynn MT (2020) How to trust a bot: an RPA user perspective. Lect Notes Bus Inf Process. https://doi.org/10.1007/978-3-030-58779-6_10

Vedder R, Guynes CS (2016) The challenge of botsourcing. Review of Business Information Systems (RBIS). https://doi.org/10.19030/rbis.v20i1.9677
Wang Y, Lu X, Tan Y (2018) Impact of product attributes on customer satisfaction: an analysis of online reviews for washing machines. Electron Commer Res Appl. https://doi.org/10.1016/j.elerap.2018.03.003
Ye Q, Zhou R, Anwar MA, Siddiquei AN, Asmi F (2020) Entrepreneurs and environmental sustainability in the digital era: regional and institutional perspectives. Int J Environ Res Public Health. https://doi.org/10.3390/ijerph17041355
Zhang T, Stough R, Gerlowski D (2022) Digital exposure, age, and entrepreneurship. Ann Reg Sci 69(3):633–681

Author contributions
SGG, CBG-T, JAGG and AdLA: contributed equally to all aspects of the research and manuscript.

Competing interests
The authors declare no competing interests.

Ethical approval
Approval was obtained from the University's Ethical Committee (CEIP/2023/3/076). The procedures used in this study adhere to the approved ethical guidelines from the University's Ethical Committee.

Informed consent
Prior to beginning the survey, participants were informed about the purpose and nature of the study, as well as their right to withdraw from the survey at any time. In addition, all participants provided their consent by actively choosing to complete and submit the survey, and no personal identifiable information was collected.

Additional information
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