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Artificial Intelligence in Supermarkets: A Multiple Analysis About Tasks, Jobs, and Automation

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Abstract. This study aims to analyze the impacts of Artificial Intelligence (AI) and automation in the supermarket sector, focusing on three main areas: tasks, jobs, and automation processes. The research builds on studies about technology adoption and its impact on employment, including Christensen approach on disruptive innovation, Huang & Rust [19] on artificial intelligence in services, and Jarrahi [27] on human-AI symbiosis. A multiple case study approach was employed, involving interviews with four groups: cashiers, managers, customers who use self-checkouts, and customers who do not use self-checkouts. The interviews were analyzed using qualitative methods to identify emerging subcategories. Many customers prefer manned checkouts due to convenience. Self-service checkout technology is primarily used for small purchases, and younger customers find it easier to use. Employees do not currently feel threatened by automation, but there is a trend toward job reduction and relocation to roles requiring analytical, intuitive, and emotional skills. Managers do not see the need to prepare employees for a future without self-service checkouts, focusing instead on current training. Future research should analyze other supermarket functions that could be impacted by AI automation and investigate more deeply the acceptance and impact of these technologies on the labor market.

Keywords: Artificial Intelligence · AI · Automation · Jobs · Supermarkets

1 Introduction

Frey and Osborne [1] and Acemoglu and Restrepo [2] have been studying how new technologies of automation and Artificial Intelligence (AI) might influence and impact work and employment. Additionally, other researchers seek to understand how automation technologies contribute to a world where fewer workers are needed to produce goods and services [3–6]. The OECD (Organization for Economic Cooperation and Development), in its report "OECD Employment Outlook 2023 – Artificial Intelligence and the

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Labour Market," revealed that 27% of jobs are at risk of extinction due to automation. Over twelve months, we conducted a survey of news reported in specialized media to understand societal concerns about the influences of automation and AI on employment [7, 8]. Despite significant advancements in research on the impacts of automation and AI on the labor market, important gaps still need to be filled. Many studies, such as those by Frey and Osborne [1] and Acemoglu and Restrepo [2], broadly focus on macroeconomic implications, neglecting sector-specific analyses such as the retail supermarket industry. Furthermore, there is a scarcity of empirical data on how automation directly affects supermarket workers, their perceptions of AI, and the strategies companies adopt to mitigate negative impacts. This study aims to fill these gaps by providing detailed insights into the work dynamics within the context of supermarket automation.

This study aims to analyze the impacts of Artificial Intelligence (AI) and automation in the supermarket sector, focusing on three main areas: tasks, jobs, and automation processes. Through empirical data collection and a review of specialized literature, we seek to understand how AI is being implemented in supermarkets, the concerns of workers and society regarding the replacement of human labor by machines, and the benefits and challenges of this technological transition. The study intends to provide a comprehensive view of the effects of automation on the labor market and offer practical recommendations for adapting to this new reality.

In this context, as emphasized by the OECD [9], although the threat of automation technologies to employment is imminent, there has not yet been a significant loss in employment. The retail sector witnessed the popularization of self-checkout systems in the 2000s, intensified by the pandemic period, justified as a way to reduce physical contact between people. Self-checkout emerged as a promising option aimed at optimizing processes and reducing labor costs [10]. By addressing the existing gaps in the literature and providing empirical insights, this study seeks to contribute to a more nuanced understanding of the implications of AI and automation in supermarkets.

The contributions of this study are multifaceted. Firstly, it will provide a detailed analysis of the impact of automation and AI in the supermarket sector, offering empirical data that can guide public policies and business strategies. Secondly, by focusing on the perceptions of workers and company responses, the study will contribute to the literature by offering a deeper understanding of labor dynamics in a specific sector. Finally, the practical recommendations developed from the findings of this study can help both managers and policymakers develop more effective strategies for dealing with technological transition, promoting a balance between automated efficiency and job preservation.

2 Literature Review

2.1 Artificial Intelligence (AI)

The concept of Artificial Intelligence (AI) was formally introduced during a workshop at Dartmouth College in 1956, organized by scholars John McCarthy, Marvin Minsky, and Herbert Simon, among others. This workshop, titled "Summer Research Project on Artificial Intelligence," marked the first use of the term "Artificial Intelligence" [11]. The primary goal was to enable machines to use formal language, form abstractions

and concepts, and solve problems independently, thereby mimicking human thought processes as envisaged by Alan Turing [11, 12].

From the 1960s to 2010, progress in AI was relatively slow. However, a significant breakthrough occurred in 2010 when Geoffrey Hinton developed an efficient method for training neural networks [12]. Hinton's advancements represented a pivotal moment in AI development, leading to the rise of machine learning (ML), where machines could learn autonomously without human intervention. This new neural network model far surpassed older models that relied on predefined rules and inputs crafted by programmers [12, 13].

Three major factors have driven the advancement of AI technology: Hinton's development of new neural networks in 2010 [13], the significant increase in computational power over the years [14], and the proliferation of startups globally [3]. These elements have collectively fueled the rapid evolution and adoption of AI across various sectors.

2.2 AI and Automation in Tasks and Jobs

Research by Larriba [15] in his study "A Case of Artificial Intelligence Applied to Supermarkets in Buenos Aires" demonstrated that even without highly sophisticated AI, repetitive tasks in supermarkets could be automated using software and machines. This finding highlights that advanced AI is not a prerequisite for automating certain tasks.

Santos [16] argues that self-service technology has the potential to replace human workers, supporting concerns raised by researchers about the displacement of employees in various industries [6, 17–23]. The integration of AI with automation technologies poses a continuous threat to human activities across industrial, intellectual, and social domains [1, 2, 7].

About AI and Automation in Jobs, the AI in banking presents both opportunities and challenges. Ghandour [24] systematically reviews the literature, highlighting how AI technologies can enhance efficiency, customer experience, and risk management while posing challenges related to data privacy, regulatory compliance, and implementation costs. These insights are crucial for understanding the dual nature of AI's impact in the financial sector and formulating strategies to maximize benefits while mitigating risks.

In retail, the adoption of AI is characterized by its potential to optimize supply chains, personalize customer experiences, and improve inventory management. Weber and Schutte [34] discuss the state-of-the-art applications of AI in retail, emphasizing its role in enhancing operational efficiency and customer satisfaction. Their findings underscore the importance of integrating AI to remain competitive in a rapidly evolving market landscape (Table 1).

Vincent et al. [28] explore the impact of AI in the aviation and space sectors, highlighting advancements in autonomous systems, predictive maintenance, and operational efficiency. Their research provides a comprehensive overview of how AI technologies are revolutionizing these high-tech industries, offering insights into future developments and potential areas of innovation.

The hospitality sector is also experiencing significant changes due to AI adoption. Rasheed et al. [33] conduct a systematic literature review to identify drivers of AI adoption among consumers in this industry. They find that factors such as improved customer service, operational efficiency, and personalized experiences drive AI integration

Table 1. Review about Sectors, Jobs, Automation and AI

Sector/Industry	Human Job	Automation Tasks	AI Tasks - Gaps
Airlines	Ticket agent – check-in and check-out	Self-service kiosks	Vincent et al. [28]
Banks	Teller	ATMs	Gandhour [29]
Bookstore	Sales attendant	Availability check terminal	Harisanty et al. [30]
Cinema	Ticket seller	Self-service machine	Reddy et al. [31]
Education	Professor	Online Programs, E-Learning	Sharma & Agarwal [32]
Restaurants	Waiter	Self-ordering machine, app orders	Rasheed et al. [33]
Supermarkets	Checkout clerk – Cashier	Self-checkout machines	Weber & Schutte [34]

in hospitality, setting the stage for future research on consumer behavior and technology acceptance.

AI is revolutionizing animation and visual effects in films, as highlighted by Reddy et al. [31]. Their study demonstrates how AI technologies are enabling more sophisticated and efficient creation of visual content, reducing production time, and enhancing the quality of visual effects. This transformation is pivotal for the entertainment industry, offering new tools for creativity and innovation.

In the context of libraries, AI awareness and adoption among leaders, practitioners, and scientists are crucial for modernizing services and enhancing information management. Harisanty et al. [30] present a pilot study that investigates the awareness levels of AI in libraries, suggesting that increased knowledge and strategic implementation of AI can significantly improve library services and user experiences.

AI-based chatbots are becoming integral to higher education, impacting faculty performance and student interactions. Sharma and Agarwal [32] examine the role of AI chatbots in higher education institutions, finding that these technologies can support administrative tasks, provide academic assistance, and enhance student engagement. Their research highlights the potential of AI to transform educational practices and improve institutional efficiency.

The automation of supermarket checkouts is not a new concept. Self-checkout systems have been a staple in retail for several years. The evolution of AI from its inception to modern applications showcases its transformative potential across various sectors. The advancements in neural networks, computational power, and the proliferation of startups have significantly contributed to this progress. As AI continues to integrate with automation technologies, its impact on job displacement and operational efficiency will remain a critical area of study and development.

3 Method

This research employed a multiple case study approach, following the methodologies of Yin [21] and Eisenhardt [22]. Fieldwork was conducted in two supermarket chains: Alpha, with 22 stores, and Beta, with 08 stores, encompassing over 7,000 employees in total. The selected stores operate mixed checkout models (both manned and self-service checkouts), allowing customers to choose between the two options.

The data collection involved 70 interviews with four key groups: (1) checkout operators, (2) their managers, (3) customers using self-service checkouts, and (4) customers not using self-service checkouts. All interviews were recorded and subsequently transcribed using Atlas.TI software QDA (Table 2).

Table 2. Data Collect and Technical Analysis

Cases in depth	Unity Analysis	Data Collect	Data Analysis	Validity
Alpha (01)	22 supermarkets	70 interviews, field notes, observation in field and secondary data	By content, categorization, explication, emerging categories	Triangulation by data fonts, and by researchers
Beta (02)	08 supermarkets			

To ensure the validity of the research, a peer review strategy was implemented for the data collection form. Sixteen questions were reviewed by three evaluators with academic backgrounds and experience in the supermarket sector. Triangulation was conducted in two stages. The first stage involved source triangulation during data collection, incorporating interviews, field notes, and participant observation, following Yin [21] guidelines.

The basic categorization scheme for the types of questions included both open and closed questions. These were directed at supermarket employees, managers, and customers, aiming to capture perceptions, knowledge about technology, operational time, product quantity, and other relevant variables.

4 Data Analysis and Discussion

The analysis in this chapter were categorized into two main blocks: Barriers and Opportunities of AI in Supermarkets, and Automation and AI Technologies and Automation in the Workplace. The first block seeks to understand the technological aspects, challenges, and the perceptions of customers and workers regarding the use of self-service checkouts. The second block addresses aspects involving work and employment, aiming to understand people's perceptions of technology and their jobs.

4.1 Barriers and Opportunities of AI in Supermarkets

It was found that self-service checkouts are not adopted by all supermarket customers; only a small portion utilizes this technology. This issue is supported by the findings of

Arntz [23], who highlights that the assimilation of new technologies is a gradual process subject to various obstacles, often resulting in the non-replacement of one technology by another.

The central inquiry sought to understand why customers continue to use manned checkouts even when they have the option to complete their purchases through self-service checkouts. This inquiry identified barriers and opportunities that can be addressed to increase customer engagement with self-service checkouts (Table 3).

Table 3. Categories Emerging about Barriers AI Supermarket

Category	Subcategories
Barriers (Freq: 151)	Customer makes only small purchases (baskets)
	Problems with self-service checkouts
	Customer prefers to use manned checkouts
	Older people do not use self-service checkouts
	Need for a person to assist with self-service checkouts

The results of this analysis revealed that customers using self-service checkouts primarily make small purchases using baskets. This finding suggests a significant preference for smaller transactions among self-service checkout users. The graph below illustrates the distribution of this behavior, highlighting the predominance of small purchases and frequent use of baskets during the shopping process.

In the survey data showed that 50% of customers using self-service checkouts engage in transactions involving six to ten items, while another 30% prefer to purchase four to eight items. This indicates that a total of 80% of customers using self-service checkouts do so only for small purchases.

About subcategory labeled "Self-Service Checkout Operational Issues" was the second most frequent among all subcategories in this study, aligning with Bauer & Gaskell [24]. An in-depth analysis of the data reveals the urgent need to understand and address the challenges inherent to the functionality of self-service checkouts, which play a crucial role at the intersection of technology and customer experience.

A prevalent challenge at self-service checkouts is the inability of the barcode scanner to read some barcodes. The need for worker intervention, often cited by users, suggests that this is a recurring issue, significantly contributing to support calls during operations. The perception of workers who provide support to self-service checkouts reinforces the common and routine nature of this issue. Another identified limitation is the inability of self-service checkouts to accept cash payments. It is worth noting that one of the software systems recently started accepting PIX payments but still does not accept cash, and there is a demand for this payment method.

Customer interaction with the self-service checkout interface, either by entering product codes or selecting items on the screen, emerges as a constant source of complaints. Dissatisfaction is exacerbated by possible touchscreen failures, which are more evident in the Beta network than in the Alpha network. In the Alpha network, some users

complain about the software's speed, which does not allow much time for customers to review and complete tasks, putting pressure on the user.

The second major problem identified by technology users relates to weighing products, particularly items like fruits and vegetables. Customers struggle to correctly identify the type of product on the kiosk screen and the self-service checkout scale, especially when there is a wide variety of the same product, such as different types of bananas or apples. Such instances significantly contribute to customer frustration and complaints.

A significant portion of customers still prefer to complete their purchases at manned checkouts. The ratio of customers using manned checkouts compared to self-service checkouts can reach 25 to 1 at certain times of the day, meaning twenty-five customers use manned checkouts while only one uses a self-service checkout. During peak hours, between 11:30 AM and 1:30 PM and between 5:30 PM and 7:30 PM, this ratio decreases to around 15 to 1.

When analyzing the age range of self-service checkout users, we observed a pattern of who uses the technology. Most users fall within the 20 to 39 age range, with 60% within this demographic. The gradient effect in the graph above shows that as age increases, the number of self-service checkout users decreases, confirming the frequency issues pointed out by Bauer & Gaskell [24], which identify a future trend.

The age group of 20–29 years did not report any difficulties in using the technology. However, 17% of customers experiencing difficulties were over 60 years old. Comparing the two graphs, the following scenario emerges (Table 4) :

Table 4. Age, People and Users Automation in Supermarkets

Age	Users Autonomous Self-Checkout	Difficulties about Use Automation
20–29	35%	0%
30–39	25%	17%
40–49	20%	33%
50–59	15%	33%
60–69	5%	17%

The proportions indicate a trend, as 5% of users are over 60 years old, and 17% of these users experienced difficulties using the technology. Conversely, 35% of users are aged 20 to 29, and none reported difficulties in use. All surveyed stores had a designated professional responsible for assisting users with self-service checkouts.

The opportunities related to the implementation of self-service checkout technology in supermarkets are outlined in five subcategories, as shown in the table below, emerging from the customer usage experience.

From the data, five opportunities emerged: speed, avoiding checkout lines, enhancement of new services, engagement with self-service checkouts, and the impact of new technologies. These subcategories are detailed based on the customer experience with self-service technology (Table 5).

Table 5. Categories Emerging about Opportunities AI Supermarket

Category	Subcategories
Opportunities (Freq: 133)	Operation speed
	Prevents queue formation at checkouts
	Improvement of current services through Database Marketing
	User engagement with self-service checkouts
	New technologies and their impacts on customers

All twenty customers surveyed viewed exclusive promotions, offers, discounts, prizes, and cashbacks positively, which could represent a sustainable competitive advantage by Porter [35]. Additionally, the use of technology and the generation of customer knowledge allow for the implementation of exclusive actions by Davenport [25].

The collect data indicated that users aged 20 to 39 make up 60% of self-service technology users, highlighting an opportunity as these customers will be in the consumer market for at least the next 30 years, compared to the last surveyed age group of 60 to 69 years old. This demographic trend suggests increased technology adoption over time (Table 6).

Table 6. Categories Emerging AI and Automation in Supermarkets

Category	Subcategories	Quotations
AI Technologies and Automation in the Workplace	Threats and Job Insecurity (Freq: 25)	*I don't think it will take my job – I always have to help someone use it*
		I don't think it will take my job – many people don't know how to use it
		I don't understand how AI could ever take my place
	Training and Preparation (Freq: 12)	*I don't think the employee needs technical skills; they learn that – they need the right behaviour*
		For me, it's important to be trained
		For me, it's easy to take the courses and training

(*continued*)

Table 6. (*continued*)

Category	Subcategories	Quotations
	Reduction in Number of Employees (Freq: 7)	*For the manager, the biggest benefit for the company was the reduction in staff*
		It reduced the number of cashiers by about 20 to 30%
		There was indeed a reduction in staff at the cash registers
	Labor Displacement (Freq: 6)	*The employees who worked as cashiers were reassigned to other roles*
		The store manager doesn't see that the number of employees decreased; they moved to other departments
		Those who worked at the cash registers went to other departments
	Management of People and Machines (Freq: 6)	*However, I have no issues managing the integration between self-service checkouts and people*
		I see no problem – I've never had any complaints from employees
		No problem at all
	Does Not Replace Humans (Freq: 4)	*The self-service checkouts just help the manned checkouts by relieving pressure during peak times*
		Human contact is better, and customers prefer it
		Self-service checkouts help the manned checkouts

Interviews with managers revealed that neither supermarket chain has AI-based technology in their self-service checkouts. Christensen [26] suggests that disruptive innovations offer new value propositions, creating new markets or reshaping existing ones. According to Christensen, disruptive innovation theory applies to situations where companies can create relatively simple, convenient, and low-cost innovations to drive growth and outperform competitors.

4.2 Social Tech Impacts of the AI in Supermarkets

The primary objective of this study is to understand how automation and AI affect the work environment. However, before reaching this understanding, it is essential to comprehend the current stage of technology from the customers' perspective, which aids in achieving this goal. Analyzing the research data through Atlas.TI software QAD, several analytical subcategories emerged, which next table.

Regarding future job security concerns due to AI, the survey data indicated that 90% of the workers interviewed do not see a reason for worry, as customers still prefer to use manned checkouts. Workers also perceive self-service checkouts as a beneficial technology that helps reduce queue lengths and minimize customer complaints about wait times.

As the research progressed, interviews with store managers were crucial in shaping the results on this issue. The store managers' concerns are not focused on preparing workers to perform tasks requiring advanced technological knowledge. According to them, employees receive the necessary training and preparation to operate the current checkout software, which is sufficient for their roles. They do not see a need to prepare workers for a future without self-service checkouts or to train them for other functions within the supermarket.

Furthermore, no training programs were found to prepare checkout operators for new or different roles within the supermarket. According to the managers, employees are trained for new roles through on-the-job learning from colleagues when they transition to a new position.

5 Final Considerations

The final considerations of this research are divided into two main sections. The first pertains to the customer experience with the use of automation and AI technology in self-service checkouts in supermarkets. The second aims to understand the perspective of those working with this technology, specifically automation and AI, and its impacts on the work environment.

Section 1: Regarding Automation and AI in Self-Service Checkouts.

- The self-service checkouts in both investigated supermarket chains do not contain Artificial Intelligence.
- The technology is not yet mature, showing improvement gaps in both software and hardware.
- Customers only use self-service checkouts for small purchases.
- Younger individuals find the technology easier to use compared to older individuals who face difficulties.
- Currently, customers still prefer using manned checkouts for convenience.

Section 2: Automation and AI Technologies and the Work Environment.

- In terms of perceived threat, job loss, and job insecurity related to working with automation technology were not detected in the research. Workers do not feel threatened about losing their jobs now.

- Job loss is a reality and is occurring. As the technology evolves and resolves its usage issues, there will be greater acceptance and engagement from customers in using the technology. This is corroborated by the age distribution of users, with younger users more likely to adopt the technology over time as older users who find it difficult decrease in number.
- There will be a displacement of labor, though on a smaller scale within supermarkets. This labor will likely shift to roles requiring analytical, intuitive, empathetic/emotional intelligence, as suggested by Huang and Rust [19].
- Preparation of the workforce for this new reality, as evidenced by this research, could come from social debate through capable entities and organizations, such as those supporting workers and companies. Training and capacity-building are suggested to enable workers to assume roles with new technologies while also making them competitive in this new job market format, following the agendas proposed by Jarrahi [27] and tasks and functions utilizing human intelligences highlighted by Huang & Rust [19].

The limitations of this study include the inability to verify all costs associated with implementing self-service checkout technology and compare them with the costs of manned checkouts. This limitation occurred due to the lack of access to cost data, which is confidential company information, representing a significant limitation that could define the feasibility of implementation.

Future research should analyze tasks and functions within supermarkets that could be impacted by some form of AI automation technology. Additionally, future studies could investigate other tasks and functions within a supermarket that may be automated by AI technology.

This research makes significant contributions to the literature by providing a comprehensive analysis of the impact of AI and automation on customer experiences and the work environment in supermarkets. First, it highlights the current limitations and customer preferences regarding self-service checkout technologies, emphasizing the technology's maturity and user demographics Huang & Rust [19]. Second, it addresses the potential displacement of labor due to automation, offering insights into how workers can transition to roles requiring higher-level human intelligences, such as analytical, intuitive, and empathetic skills by Jarrahi [27].

These findings are crucial for understanding the broader implications of AI and automation in retail, contributing to ongoing discussions about the future of work and technology adoption.

References

1. Frey, C.B., Osborne, M.A.: The Future of Employment: How Susceptible Are Jobs to Computerisation? Technol. Forecast. Soc. Chang. **114**, 254–280 (2017). https://doi.org/10.1016/j.techfore.2016.08.019
2. Acemoglu, D., Restrepo, P.: Artificial Intelligence, Automation and Work. An Agenda. University of Chicago Press, In The Economics of Artificial Intelligence (2018)
3. Bootle, R.: The AI Economy: Work, Wealth and Welfare in the Robot Age. Alta Books (2021)
4. Autor, D.H.: The Skill Content of Recent Technological Change: An Empirical Exploration. Quart. J. Econ. **118**(4), 1279–1333 (2003)

5. Autor, D.H.: Work of the Past, Work of the Future. Am. Econ. Assoc. Pap. Proc. **109**, 1–32 (2020)
6. Howcroft, D., Taylor, P.: Automation, Algorithms and Artificial Intelligence in the Workplace: A Critical Review and Research Agenda. N. Technol. Work. Employ. **36**(3), 237–259 (2021)
7. Dwivedi, Y.K., et al.: Artificial Intelligence (AI): Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Agenda for Research, Practice, and Policy. Int. J. Inf. Manage. **57**, 101994 (2021). https://doi.org/10.1016/j.ijinfomgt.2019.08.002
8. Gruetzemacher, R., Dorner, F., Bernaola-Alvarez, N., Giattino, C., Manheim, D.: Forecasting AI Progress: A Research Agenda. Technol. Forecast. Soc. Chang. **170**, 120909 (2021). https://doi.org/10.1016/j.techfore.2021.120909
9. OECD: OECD Employment Outlook 2023 – Artificial Intelligence and the Labour Market. OECD Publishing, Paris (2023)
10. Araújo, L.M.: The Impact of Self-Checkout Systems on Retail Operations and Customer Satisfaction. J. Retail. Consum. Serv. **67**, 102976 (2023)
11. McCarthy, J., Minsky, M., Rochester, N., Shannon, C.E.: A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence. AI Mag. **27**(4), 12 (2006). https://doi.org/10.1609/aimag.v27i4.1904
12. Wamba, S.F., Akter, S., Edwards, A., Chopin, G., Gnanzou, D.: How 'Big Data' Can Make Big Impact: Findings from a Systematic Review and a Longitudinal Case Study. Int. J. Prod. Econ. **165**, 234–246 (2021)
13. Lee, K.-F., Groves, D.: AI Superpowers: China, Silicon Valley, and the New World Order. Houghton Mifflin Harcourt (2019)
14. Russel, S., Norvig, P.: Artificial Intelligence: A Modern Approach. Pearson (2020)
15. Larriba, J.: A Case of Artificial Intelligence Applied to Supermarkets in Buenos Aires. Int. J. Retail Distrib. Manage. **45**(8), 815–831 (2017)
16. Santos, J.R.: Self-Service Technologies and Employee Displacement: A Critical Review. J. Technol. Hum. Serv. **39**(1), 1–18 (2021)
17. Wang, Y., Siau, K.: Artificial Intelligence in Healthcare: Review and Research Agenda. J. Bus. Res. **123**, 450–461 (2022)
18. Bragança, A., Chen, W., Canhoto, A., Sap, S.: Productive Employment and Decent Work: The Impact of AI Adoption on Psychological Contracts, Work Engagement, and Employee Trust (2021)
19. Huang, M.H., Rust, R.T.: Artificial Intelligence in Service. J. Serv. Res. **21**(2), 155–172 (2018). https://doi.org/10.1177/1094670517752459
20. Souza, L.R.: The Role of Artificial Intelligence in Shaping the Future of Work. J. Bus. Ethics **152**(3), 719–734 (2018)
21. Yin, R.K.: Case study research and applications, vol. 6. Sage, Thousand Oaks, CA (2018)
22. Eisenhardt, K.M.: What is the Eisenhardt Method, Really? Strateg. Organ. **19**, 147–160 (2021). https://doi.org/10.1177/1476127020982866
23. Arntz, M., Terry, G., Ulrich, Z.: The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. OECD Social, Employment and Migration Working Papers, No. 189. OECD Publishing, Paris (2016)
24. Bauer, M.W., Gaskell, G.: Qualitative Researching with Text. A Practical Handbook. Sage Publications, Image and Sound (2003)
25. Davenport, T., Guha, A., Grewal, D., Bressgott, T.: How Artificial Intelligence Will Change the Future of Marketing. J. Acad. Mark. Sci. **48**, 24–42 (2020). https://doi.org/10.1007/s11747-019-00696-0
26. Christensen, C.M.: The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Harvard Business Review Press (2001)

27. Jarrahi, M.H.: Artificial Intelligence and the Future of Work: Human-AI Symbiosis in Organizational Decision Making. Bus. Horiz. **61**(4), 577–586 (2018). https://doi.org/10.1016/j.bushor.2018.03.007
28. Vincent, N.C., Bhakar, R.R., Nadarajan, S.R., Syamala, A., Varghese, J.: Impact of Artificial Intelligence in the Aviation and Space Sector. In: Artificial Intelligence, pp. 209–229. CRC Press (2021)
29. Ghandour, A.: Opportunities and Challenges of Artificial Intelligence in Banking: Systematic Literature Review. TEM J. **10**(4), 1581–1587 (2021)
30. Harisanty, D., Anna, N.E.V., Putri, T.E., Firdaus, A.A., Noor Azizi, N.A.: Leaders, Practitioners and Scientists' Awareness of Artificial Intelligence in Libraries: A Pilot Study. Library Hi Tech **42**(3), 809–825 (2024)
31. Reddy, V.S., Kathiravan, M., Reddy, V.L.: Revolutionizing Animation: Unleashing the Power of Artificial Intelligence for Cutting-Edge Visual Effects in Films. Soft. Comput. **28**(1), 749–763 (2024)
32. Sharma, S., Agarwal, M.: Impact of AI-Based Chatbots on Faculty Performance in Higher Education Institutions. In: Innovation in the University 4.0 System Based on Smart Technologies, pp. 83–100. Chapman and Hall/CRC (2024)
33. Rasheed, H.M.W., Yuanqiong, H., Khizar, H.M.U., Khalid, J.: What Drives the Adoption of Artificial Intelligence Among Consumers in the Hospitality Sector: A Systematic Literature Review and Future Agenda. J. Hosp. Tourism Technol. (2024)
34. Weber, F.D., Schütte, R.: State-of-the-Art and Adoption of Artificial Intelligence in Retailing. Digital Policy, Regul. Gov. **21**(3), 264–279 (2019)
35. Porter, M.E.: Building the microeconomic foundations of prosperity: findings from the microeconomic competitiveness index, pp. 1–23. Palgrave Macmillan, London (2004)