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Integrating AI in business: benefits, challenges, key capabilities, and managerial solutions for a successful implementation

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INTRODUCTION

In this thesis, we will talk about Artificial Intelligence (AI), one of the most advanced technologies that is completely revolutionizing the way businesses operate. This technology is characterized by important advantages, but it also implicates barriers and high complexity in its implementation, for which skills and competencies are required.

Artificial intelligence can be defined as the simulation of human intelligence by means of systems that are designed to think like humans and imitate behavior in order to learn and solve problems (Singh et al., 2022). It's considered as an emerging technology that is creating enormous economic potential and changing the corporate ecosystem thanks to its ability to simulate human intellect by improving a machine's capacity to learn, comprehend, and make decisions similar to those of a human brain (Sharma et al., 2024).

Organizations are constantly searching for ways to enhance their overall performance, particularly through better predictions and decision-making (Dirican, 2015) and artificial intelligence stands out as a crucial technology that enables these improvements (Davenport & Ronanki, 2018). By leveraging AI, businesses can in fact automate tasks, make more effective the decision-making process, engage employees, and manage customer relationships efficiently. Therefore, this AI-driven approach helps organizations secure a competitive advantage (Schrettenbrunner, 2020).

According to Statista (2024), the global market value of this branch of computer science is anticipated to increase significantly by 2030 to US$826 billion compared to its US$184 billion valuation in 2024. It's clear that companies will keep investing in it to be competitive and this is proved by another research conducted by Chatterjee et al. (2021) where it resulted that 89% of international organizations strongly believed that businesses would lose market share and competitive momentum if they did not implement this technology (Chatterjee et al., 2021).

Artificial intelligence increases output, reduces costs, and enhances customer service and quality in both domestic and international markets (Sharma et al., 2024). It is then capable of proactive operation without guidance or human assistance, in contrast to earlier technologies (Tussyadiah & Park, 2018) as it can adjust automatically to changes in ecosystems based on the stimuli it receives, and its outcomes are the result of learning and prediction (Dwivedi et al., 2023).

Another advantage is represented by the reduction of errors, because when it is integrated into devices, the mistake likelihood decreases, and tasks are completed automatically and continuously (Peres et al., 2020). All this allows for a high level of automation as it can, with minimal human intervention, turn ordinary machines into intelligent machines that can perform jobs more quickly and produce output with fewer errors (Sharma et al., 2024). AI allows machines to replicate human activities such as gaining knowledge, reasoning, and decision-making based on inputs and outputs taken from the past and present (Madanguli et al., 2024) and in this way, it provides businesses with capabilities that improve internal processes' efficiency (Mehmood et al., 2019; Mor and Gupta, 2021).

Furthermore, AI is becoming more and more seen as a clever solution that may help organizations to better comprehend their internal and external aspects, factors that will improve the ability to make decisions (Chatterjee et al., 2021; Delen and Zolbanin, 2018). This is made possible by AI's ability to gather more valuable and up-to-date data, facilitating accurate assessments of both the market environment and internal operations simultaneously (Bian et al., 2020; Chan et al., 2020; Kshetri et al., 2023; Mikalef and Gupta, 2021). This can be applied to make insightful decisions in a variety of industries, including decision science, banking, finance, automobile communication, healthcare, and information management (Liebowitz, 2001).

Widespread application of such technology might result in critical breakthroughs for industrialization. Instead of focusing just on the production process, companies are now embracing complex designs and concepts for dematerialization, disintermediation, product creation, and manufacturing on demand (Singh and others, 2022). Other than optimizing processes, leading to cost optimization and efficient company operations another area where AI is very useful is therefore decision-making, for which this technology assists in determining causality and drivers, allowing managers to make judgments more easily. The human brain is in fact incapable of processing all the information that can now be found in the market (Sharma et al., 2024).

Lastly, another big advantage is represented by improved customer integration since businesses can use AI to provide services in real-time and build personalised experiences by continuously analysing data and enabling a more effective adaption to people,

objectives, and settings. AI can in fact assist firms to find customers, opportunities, and the best times to connect with each one individually and effectively (Alet, 2023).

Despite the great benefits of AI, there are also downsides that complicate its implementation and effectiveness within a company. According to Huang and Rust (2021), even though service companies have made significant investments in AI, 70% of these efforts have shown little to no return to date. Furthermore, 85% of AI projects did not meet expectations because of a lack of knowledge about the potential for AI-powered service innovation (Akter et al., 2021). In fact, merely investing in technology isn't enough to make a business competitive; companies also need to identify the factors that can favour the development of AI to improve business performance (Sharma et al., 2024). Other drawbacks such as risks to security and privacy, and the results of prejudices, abuse, and false information have to be taken in consideration because Artificial intelligence (AI) has profound effects on individuals, organizations, and societies (Dwivedi et al., 2023). Other disadvantages are connected to the impact on employment and workforce dynamics, for which it's necessary to underline that the automation of organizational tasks could cause the disappearance of repetitive and administrative roles in favour of the use of machines. Training employees becomes therefore important to preserve jobs but also to simplify AI implementation (Jarrahi et al., 2022) (Kar et al., 2021).

In this paper, we will also analyze the practical implications that managers should adopt to enable a more effective AI implementation. One of the biggest mistakes that leaders make is to view AI as a plug-and-play technology with immediate returns (Fountaine et al, 2019). Businesses should first develop dynamic capabilities that focus on the moral application of the technology, organizational culture, and structure in order to favour the implementation. Those skills would allow the developopment AI-powered innovations that can fulfil consumers' evolving expectations and give businesses a competitive edge (Akter et al., 2023).

Companies should also know from the beginning what they want to achieve and confront themselves with AI professionals. It is in fact necessary to first clearly define the opportunity to be taken advantage of, restrict the problem to be solved, or determine the optimization priority, as Ascarza et al. (2021) point out. This is consistent with Accenture's assessment, which shows that only 12% of businesses have sufficiently

advanced their AI maturity to see superior growth and business transformation. Most of the time this happens because concepts cannot be effectively incorporated into how the organization is run because of the lack of AI expertise within the company (Brethenoux, 2020). This suggests that for an effective AI implementation and to be really suitable to drive the company's strategic prospects, it is necessary to fully comprehend the business, what the technology can add to it, and how procedures and strategies must evolve.

This challenge in the implementation of AI is frequently linked to an organization's lack of preparedness to apply AI, including essential elements like the required structure and procedures (Bradley et al., 2012; Weiner, 2009). Moreover, a lot of managers make mistakes when determining if their organization is prepared to use various AI technologies (e.g., Nortje and Grobbelaar, 2020; Porcher, 2020). In fact, AI implementation frequently necessitates more significant and continuous adjustments to a company's workforce, decision-making procedures, and resource allocation. (Davenport, 2018). That's why businesses must also know how to monetize the technology with innovative AI business models since developing cutting-edge technological solutions is not as crucial as innovating the business model (Astrom et al., 2022). Brock and Von Wangenheim (2019) emphasize that significant investments and protracted development cycles are necessary to build specific competencies and resources, making the successful integration of AI applications challenging to accomplish.

Lastly, also governments play an important role in this topic. AI technologies can have negative effects on society like misuse of sensitive data or use of deep fakes to ruin the reputation of individuals. Therefore, regulations that will keep under control the use of this technology must be created (Meskys et al., 2020) and continuously updated for their efficacy and to keep up with technological changes (Fallahi et al., 2022).

The second part of the thesis will be dedicated to Generative AI, a branch of artificial intelligence that thanks to its recent development, is becoming more and more important and it is driving innovation behind goods, services, and business models. (Jorzik et al., 2023). We will present and analyse the case of Mirai, an Italian startup that offers generative AI solutions for operational efficiency and strategic innovation.

Chapter 1: Integrating AI in business: a structured literature review

1.1 Methodology

The approach used for this thesis is a structured literature review, a method that, through the examination of several publications on Artificial Intelligence, allowed us to reflect on and address specific research questions about its implementation. Additionally, we utilized a framework that facilitated a deeper understanding of each paper, ensuring a more comprehensive and reliable analysis.

1.1.1 Write a literature review protocol and define the questions that the literature review is setting out to answer

We used a specific methodology to document the procedures for establishing the literature review, ensuring its reliability. The aim of this work is to gain a better understanding of how companies can implement AI, despite its high level of complexity, to identify the types of capabilities required, and to explore the practical implications for managers.

The study examines the following research questions:

- RQ1: What are the benefits and challenges connected to the implementation of AI within a company?

- RQ2: What are the needed capabilities for an effective AI implementation?

- RQ3: How can managers, after considering strengths and weaknesses of AI, implement this technology successfully in their company?

1.1.2 Choose the appropriate sources and conduct comprehensive literature research

In order to locate pertinent contributions for the examination we used the database Scopus. The search key "artificial AND intelligence AND business AND model" in the title, abstract, or keywords, conducted on February 28th, 2024, led to 364 total contributions. Of those 364 between journal papers and conferences, 24 have been considered appropriate for the analysis while 340 have been considered off-topic. Of these, 1 source has not been retrieved.

The following Figure 1.1 shows the selection process (Page et al., 2021).

Fig. 1.1 Process of article selection following the PRISMA methodology
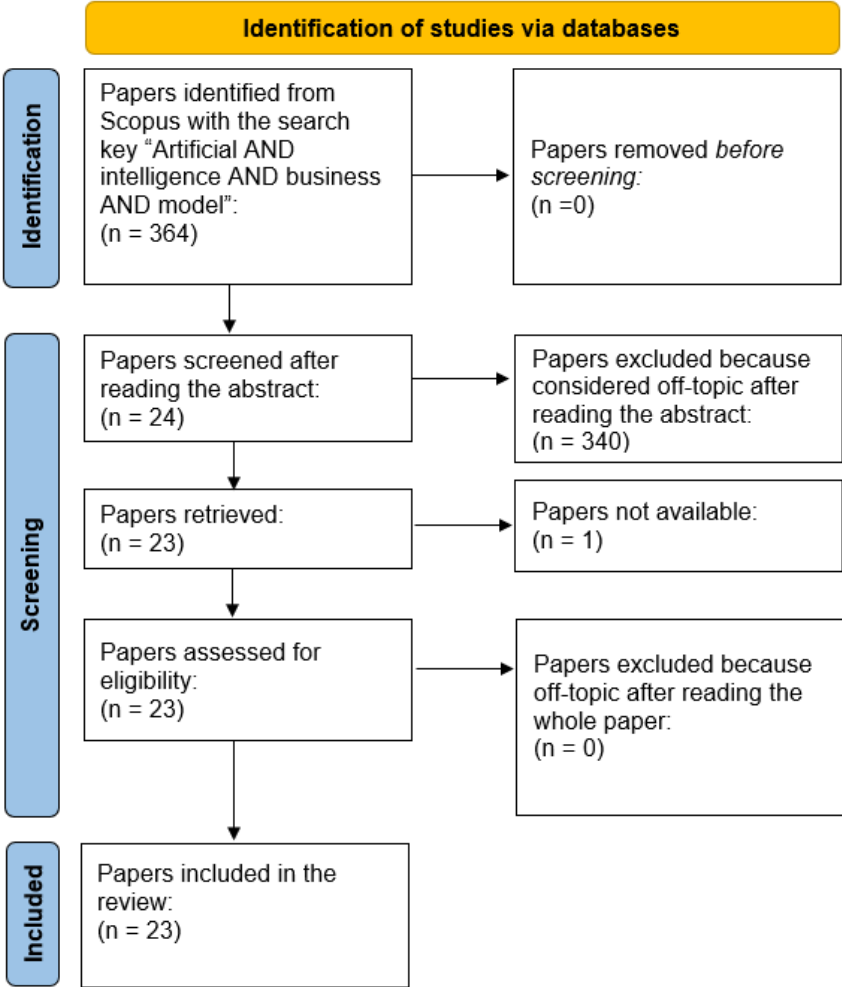
Source: The Authors following (M. J. Page et al., 2021).

1.2 Results

Table 1.1 presents the comprehensive bibliographic information for the twenty-three articles that were referenced in the literature review. Notably, 39% of these articles were published in 2024 and the oldest ones in this collection date back to 2021, underscoring the increasing relevance of AI in the business sector and reflecting its growing importance as a critical variable for the success of companies over the past years.

Tab. 1.1 Bibliographic details of the included works

#	Authors	Title	Year	Source	Ref
1	Arun Madanaguli, David Sjodin, Vinit Parida, Patrick Mikalef.	Artificial Intelligence Capabilities for Circular Business Models: Research Synthesis and Future Agenda	2024	Technological Forecasting & Social Change	(Madanguli et al., 2024)
2	David Sjodin, Vinit Parida, Marko Kohtamaki.	Artificial Intelligence Enabling Circular Business Model Innovation in Digital Servitization: Conceptualizing Dynamic Capabilities, Ai Capacities, Business Models and Effects	2023	Technological Forecasting & Social Change	(Sjodin¨ et al., 2023)
3	Daniel Belanche, Russell W. Belk, Luis V. Casaló, Carlos Flavián.	The Dark Side of Artificial Intelligence in Services	2023	The Service Industries Journal	(Belanche et al., 2023)
4	Mahipal Singh, Rekha Goyat, Renu Panwar.	Fundamental Pillars for Industry 4.0 Development: Implementation Framework and Challenges in Manufacturing Environment	2022	TQM Journal	(Singh et al., 2022)
5	Abdullah M. Baabdullah.	The Precursors of AI Adoption in Business: Towards an Efficient Decision-Making and Functional Performance	2024	International Journal of Information Management	(Baabdullah et al., 2024)
6	Shavneet Sharma, Gurmeet Singh, Nazrul Islam, Amandeep Dhir.	Why Do SMEs Adopt Artificial Intelligence-Based Chatbots?	2022	Transactions on Engineering Management	(Sharma et al., 2022)
7	Amelie Abadie, Soumyadeb Chowdhury,	A Shared Journey: Experiential Perspective and Empirical Evidence of Virtual Social Robot	2024	Technological Forecasting & Social Change	(Abadie et al., 2024)

	Sachin Kumar Mangla.	ChatGPT's Priori Acceptance			
8	Vijay Kumar, Sharma Harish Kumar.	Enablers Driving Success of Artificial Intelligence in Business Performance: A TISM-MICMAC Approach	2024	Transactions on Engineering Management	(Sharma et al., 2024)
9	Sara Fallahi, Ann-Charlotte Mellquist, Olof Mogren, Edvin Listo Zec, Peter Algurén, Lukas Hallquist.	Financing Solutions for Circular Business Models: Exploring the Role of Business Ecosystems and Artificial Intelligence	2022	Business Strategy and the Environment	(Fallahi et al., 2022)
10	Shahriar Akter, Md Afnan. Hossain Shahriar Sajib, Saida Sultana, Mahfuzur Rahman, Demetris Vrontis, Grace McCarthy.	A Framework for AI-Powered Service Innovation Capability: Review and Agenda for Future Research	2023	Technovation	(Akter et al., 2023)
11	Josep Alet	Effective Integration of Artificial Intelligence: Key Axes for Business Strategy	2023	Journal Of Business Strategy	(Alet, 2023)
12	Ully Y. Nafizah, Stephen Roper, Kevin Mole.	Estimating The Innovation Benefits of First-Mover and Second-Mover Strategies When Micro-Businesses Adopt Artificial Intelligence and Machine Learning	2023	Small Business Economics	(Nafizah et al., 2023).
13	Ali N. Tehrani, Subhasis Ray, Sanjit K. Roy, Richard L. Gruner, Francesco P. Appio.	Decoding AI Readiness: An In-Depth Analysis of Key Dimensions In Multinational Corporations	2024	Technovation	(Tehrani et al., 2024)

14	Abdullah M. Baabdullah.	Generative Conversational AI Agent for Managerial Practices: The Role of IQ Dimensions, Novelty Seeking and Ethical Concerns	2024	Technological Forecasting & Social Change	(Baabdullah et al., 2024)
15	Yogesh K. Dwivedi, Nir Kshetri, Laurie Hughes, Emma Louise Slade, Anand Jeyaraj, Arpan Kumar Karf, Abdullah M. Baabdullah, Alex Koohang, Vishnupriya Raghavan, Manju Ahuja, Hanaa Albanna, Mousa Ahmad Albashrawi, Adil S. Al-Busaidi, Janarthanan Balakrishnan, Yves Barlette, Sriparna Basu, Indranil Bose, Laurence Brookst, Dimitrios Buhalis, Lemuria Carter, Soumyadeb Chowdhury, Tom Crick, Scott W. Cunningham, Gareth H. Davies, Robert M. Davison, Rahul D, Denis Dennehy, Yanqing Duan,	"So What If ChatGPT Wrote It?" Multidisciplinary Perspectives on Opportunities, Challenges and Implications of Generative Conversational AI For Research, Practice and Policy	2023	International Journal of Information Management	(Dwivedi et al., 2023)

| | Rameshwar Dubey, Rohita Dwivedi, John S. Edwards, Carlos Flavian, Robin Gauld, Varun Grover, Mei-Chih Hu, Marijn Janssen, Paul Jones, Iris Junglas an, Sangeeta Khorana, Sascha Kraus, Kai R. Larsen, Paul Latreille, Sven Laumer, F. Tegwen Malik, Abbas Mardani, Marcello Mariani, Sunil Mithas, Emmanuel Mogaji, Jeretta Horn Nord, Siobhan O'Connor, Fevzi Okumus, Margherita Pagani, Neeraj Pandey, Savvas Papagiannidis, Ilias O. Pappas, Nishith Pathak, Jan Pries-Heje, Ramakrishnan Raman, Nripendra P. Rana, Sven-Volker Rehm, Samuel Ribeiro Navarrete, Alexander Richter, Frantz | | | | |

	Rowe, Suprateek Sarker, Bernd Carsten Stahl, Manoj Kumar Tiwari, Wil van der Aalst Viswanath Venkatesh, Giampaolo Viglia Michael Wade Paul Walton, Jochen Wirtz, Ryan Wright.				
16	Philip Jorzik, Anil Yigit, Dominik K. Kanbach, Sascha Kraus, Marina Dabi´.	Artificial Intelligence-Enabled Business Model Innovation: Competencies and Roles of Top Management	2024	Transactions On Engineering Management,	(Jorzik et al., 2024).
17	Shikha Singh, Baljeet Yadav, Roshan Batheri.	Industry 4.0: Meeting the Challenges of Demand Sensing in the Automotive Industry	2023	Engineering Management Review	(Singh et al., 2023)
18	Ashish Viswanath Prakash, Arun Joshi, Shubhi Nim, Saini Das.	Determinants and Consequences of Trust in AI-Based Customer Service Chatbots	2023	The Service Industries Journal	(Prakash et al., 2023)
19	Josef Åström, Wiebke Reim, Vinit Parida.	Value Creation and Value Capture for AI Business Model Innovation: A Three-Phase Process Framework	2022	Review of Managerial Science	(Astrom et al., 2022).
20	Shalini Chandra, Anuragini Shirish, Shirish C. Srivastava.	To Be or Not to Be …Human? Theorizing The Role of Human-Like Competencies in Conversational Artificial Intelligence Agents	2022	Journal of Management Information Systems	(Chandra et al., 2022).

21	Deborah Lef, Kenneth T. K. Lim.	The Key to Leveraging AI at Scale	2021	Journal of Revenue and Pricing Management	(Leff et al., 2021).
22	Sudatta Kar, Arpan Kumar, Manmohan Prasad Gupta.	Modeling Drivers and Barriers of Artificial Intelligence Adoption: Insights From a Strategic Management Perspective	2021	Intelligent Systems in Accounting, Finance and Management	(Kar et al., 2021).
23	David Sjodin, Vinit Parida, Maximilian Palmi, Joakim Wincent.	How AI Capabilities Enable Business Model Innovation: Scaling AI Through Co-Evolutionary Processes and Feedback Loops	2021	Journal of Business Research	(Sjodin¨ et al., 2021).

Source: Our elaboration (2024).

In this thesis, twenty-two variables were analysed to gain a deeper understanding of the context in which AI is studied, with a particular focus on identifying connected benefits, the barriers to its implementation, and needed capabilities and strategies for a successful implementation.

The first variable is related to the type of authors, distinguishing them between academics, collaborations, and practitioners. The second variable refers to the location of the study, categorizing whether it focuses on one nation, multiple nations, or no specific nation. The third variable identified different methodologies, literature review, surveys, or interviews. The fourth variable addresses the type of company involved, identifying two different groups, large companies or small and medium enterprises and startups. The fifth variable pertains to the sector under investigation, such as healthcare, automotive, and others. The sixth variable concerns the objectives to be reached or problems to be solved by the companies through the implementation of artificial intelligence. The seventh variable examines whether sustainability is mentioned, specifying the type environmental, social and lastly financial. The eighth and ninth variables identifies if a business model or a new and innovative business model are mentioned. The tenth and eleventh variable considers whether advantages or disadvantages caused by AI implementation are explained. The twelfth variable addresses the barriers and limitations that businesses must face during AI implementation. The thirteenth variable identifies

which practical solutions the members of a firm should adopt to enable the integration of the technology. The fourteenth variable notes whether challenges faced by the companies that want to implement AI are mentioned. The fifteenth variable identifies the needed capabilities that the employees of a business should possess in order to effectively implement and use AI. The sixteenth variable examines the technology related to AI that is analyzed within the paper, such as Gen AI, Big Data, Virtual Reality. The seventeenth variable considers AI's impact on employment and workforce dynamics. The eighteenth variable identifies if the article uses specific models or theories and specifies the mentioned ones. The nineteenth variable examines if the study talks about the application of AI in a specific department such as finance, supply chain, administration, or marketing. The twentieth variable considers whether the loss of jobs or job displacement problems are mentioned. The twenty-first variable identifies the policy implications to control the use of the technology and that should be adopted by governments. Finally, the twenty-second variable considers whether COVID-19 is mentioned or not.

The Table 1.2 below underlines the results of the analysis, considering the framework.

Tab. 1.2 The analytical framework.

Category	Variables	Results	%
Authors		23	
	Academics	18	78.26%
	Collaborations	4	17.39%
	Practitioners	1	4.35%
Location of the study		23	
	Not specified	11	47.83%
	One nation	11	47.83%
	More nations	1	4.35%
Research method		23	
	Literature review	19	82.61%
	Survey	10	43.48%
	Interview	8	34.78%

Company size distribution		23	
	Not specified	13	56.52%
	Large companies	7	30.43%
	SMEs and Startups	3	13.04%
Sector		23	
	Retail	10	43.48%
	Manufacturing	10	43.48%
	Healthcare	7	30.43%
	Finance and Insurance	6	26.09%
	Services	4	17.39%
	Transportation / Shipping solutions	4	17.39%
	Construction	4	17.39%
	Education	3	13.04%
	Tourism	3	13.04%
	Not specified	3	13.04%
	Automotive	2	8.70%
	Mining	2	8.70%
	Social media	1	4.35%
	Airline	1	4.35%
Problems to solve / objectives to achieve		23	
	Enhance productivity	11	47.83%
	AI competence development	9	39.13%
	Face ethical issues	8	34.78%
	Develop AI culture	7	30.43%
	Enhance decision-making	7	30.43%
	Customer integration	6	26.09%
	Preserve human jobs & interaction	5	21.74%

	Improve cybersecurity (& data security)	4	17.39%
	Overcome AI complexity	3	13.04%
Mentions sustainability		23	
	Yes	14	60.87%
	- Economical	14	60.87%
	- Social	10	43.48%
	- Environmental	6	26.09%
	No	9	39.13%
Mentions a conventional business model		23	
	No	16	69.57%
	yes	7	30.43%
	- Circular business model	4	17.39%
	- Automation business model	2	8.70%
	- Product-as-a-Service business model	1	4.35%
	- Product dominant business model	1	4.35%
	- Premium-based business model	1	4.35%
	- Advertising-funded business model	1	4.35%
	- Freemium business model	1	4.35%
	- Outcome-based business model	1	4.35%
	- Licensing business model	1	4.35%
Mentions an innovative business model			
	No	13	56.52%
	Yes	10	43.48%

	AI-driven business model	5	21.74%
	- Augmentation business model	1	4.35%
	- Chatbot business model	1	4.35%
	- Agile customer co-creation business model	1	4.35%
	- Proposed demand sensing business model	1	4.35%
Explain the advantages		23	
	Yes	23	100%
	- Optimization of resource usage (increase of efficiency)	15	65.22%
	- Prescriptive capacities (easier decision making)	14	60.87%
	- Easier customer integration / engagement	12	52.17%
	- Agility and innovation	8	34.78%
	- Predictive capacities (proactive analysis and forecasting)	6	26.09%
	- Automation of tasks	5	21.74%
	- Higher personalization and customization	5	21.74%
	- Easier data processing and analysis	3	13.04%
	- More sustainable practises	3	13.04%
	- Perceptive capacities (continuous monitoring)	2	8.70%
	- Enhanced market-oriented analytics	2	8.70%
	- Improved risk management	1	4.35%
	- Business resilience	1	4.35%
	No	0	0%

Explain the disadvantages			23	
	Yes		20	86.96%
	-	Technical challenges	10	43.48%
	-	Biased decisions & discrimination	8	34.78%
	-	Job displacement	6	26.09%
	-	Privacy concerns (customer side)	6	26.09%
	-	Cybersecurity threats	6	26.09%
	-	High implementation costs	5	21.74%
	-	Legal risk	2	8.70%
	-	Dependence on technology	2	8.70%
	-	Responsibility dilemma	1	4.35%
	No		3	13.04%
Mentions barriers for the implementation			23	
	Yes		19	82.61%
	-	Organizational AI resistance (employees & management)	10	43.48%
	-	Ethical concerns related to brand reputation	10	43.48%
	-	Lack of skilled workers	7	30.43%
	-	Data control and data security	6	26.09%
	-	Customer resistance	5	21.74%
	-	High costs	5	21.74%
	-	Inadequate AI Integration in the existing systems	5	21.74%
	-	Uncertain / restrictive institutional environment	3	13.04%
	-	Lack of infrastructures	3	13.04%
	-	Deficient ecosystem collaboration	3	13.04%

	- Insufficient business management involvement	2	8.70%
	No	4	17.39%
Mentions practical solutions		23	
	Yes	16	69.57%
	- Develop AI capabilities / invest on training and education	10	43.48%
	- Cultural shift for AI implementation	6	26.09%
	- Enhance transparency and employees' empowerment	5	21.74%
	- Invest in AI infrastructure	5	21.74%
	- Create a collaborative ecosystem with stakeholders	5	21.74%
	- Align AI adoption to business objectives and resources	5	21.74%
	- Address ethical considerations	4	17.39%
	- Perform risk assessment	2	8.70%
	No	7	30.43%
Mentions challenges		23	
	Yes	19	82.61%
	- Simultaneous integration across organizational and ecosystem dimensions	7	30.43%
	- Ensure data integration and quality	6	26.09%
	- Reduction of bias and discrimination	6	26.09%
	- Correct implementation of AI tools	6	26.09%

	- Protect data and ensure privacy	5	21.74%
	- Have an economic return or face the high costs	5	21.74%
	- Find adequate technical skills among the workforce	4	17.39%
	- Overcome user skepticism	3	13.04%
	- Ensure transparency	2	8.70%
	No	4	17.39%
Mentions needed capabilities		23	
	Yes	17	73.91%
	- AI competence (technical knowledge)	11	47.83%
	- Data capability	5	21.74%
	- AI infrastructure and platform capability	3	13.04%
	- AI ecosystem orchestration capability (value optimization)	3	13.04%
	- AI leadership capability	2	8.70%
	- Market knowledge capability	2	8.70%
	- Value realization capability	1	4.35%
	- Value discovery capability	1	4.35%
	- Process automation and augmentation capability	1	4.35%
	- Integrated intelligence capability	1	4.35%
	- Value optimization	1	4.35%
	- Model development capability	1	4.35%
	- Algorithm development capabilities	1	4.35%
	- AI democratization	1	4.35%
	No	6	26.09%

Mentioned technologies		23	
	- Machine Learning	15	65.22%
	- Big Data	12	52.17%
	- Generative AI	9	39.13%
	- Cloud Computing	3	13.04%
	- Augmented reality	2	8.70%
	- Internet of Things	2	8.70%
	- Service robots	1	4.35%
	- Blockchain	1	4.35%
	- 3D Printing	1	4.35%
Mentions AI's impact on employment and workforce dynamics		23	
	Yes	20	86.96%
	- Augmentation of human work	16	69.57%
	- Automation of organizational tasks	12	52.17%
	- Training of the workforce	7	30.43%
	- Job insecurity and anxiety	7	30.43%
	- Job displacement (high vs low skilled workers)	6	26.09%
	- Job loss	3	13.04%
	No	3	13.04%
Relies on theories or models		23	
	Yes	11	47.83%
	- Dynamic Capability View (DCV)	2	8.70%
	- Unified Theory of Acceptance and Use of Technology (UTAUT)	2	8.70%

	- Technology Acceptance Model (TAM)	1	4.35%
	- Organizational Readiness for Change (ORC)	1	4.35%
	- Technology-Organization-Environment (TOE) framework	1	4.35%
	- Work System Framework (WSF)	1	4.35%
	- Trust in Technology Model (TTM)	1	4.35%
	- Social Response Theory (SRT)	1	4.35%
	- Media Naturalness Theory (MNT):	1	4.35%
	No	12	52.17%
Company department where AI can be used		23	
	- Customer service and support	14	60.87%
	- Data Analysis and decision making	14	60.87%
	- Operations management	10	43.48%
	- Marketing	9	39.13%
	- Research and development (R&D)	8	34.78%
	- Sales and business development	8	34.78%
	- Supply Chain / logistics	6	26.09%
	- Finance and resource allocation	6	26.09%
	- Manufacturing and production	5	21.74%
Mentions job loss or job displacement		23	

	Yes	9	39.13%
	- Job displacement	6	26.09%
	- Job loss	3	13.04%
	No	14	60.87%
Mentions policy implications		23	
	No	16	69.57%
	Yes	7	30.43%
	- Regulations to avoid that AI technologies affects social equity / unethical use	6	26.09%
	- Financial support to adopt AI for SMEs / Incentives for Innovation	4	17.39%
	- Policies are necessary to protect consumers' privacy and data security	3	13.04%
	- Infrastructure development	3	13.04%
	- Collaboration with companies	1	4.35%
Mentions covid 19		23	
	No	18	78.26%
	Yes	5	21.74%
	- Increase in the use of Big Data and data collection	2	8.70%
	- Acceleration of the digital transformation phenomenon	2	8.70%
	- Increase in the use of social robots for safety reasons	1	4.35%

Source: our elaboration (2024).

Regarding the variable "authors," it is notable that the majority of contributions come from academics, who account for eighteen papers, representing 78.26% of the total. Furthermore, collaborations between scholars and practitioners make up four of the

contributions, which is 17.39% of the total. Finally, only one article was written by practitioners alone, constituting 4.35% of the contributions. This distribution highlights the importance of academics for the research in the AI field, but it also acknowledges the role that practitioners play in bringing real case studies.

The following figure 1.2 shows the author's variable results.

Fig. 1.2 The authors
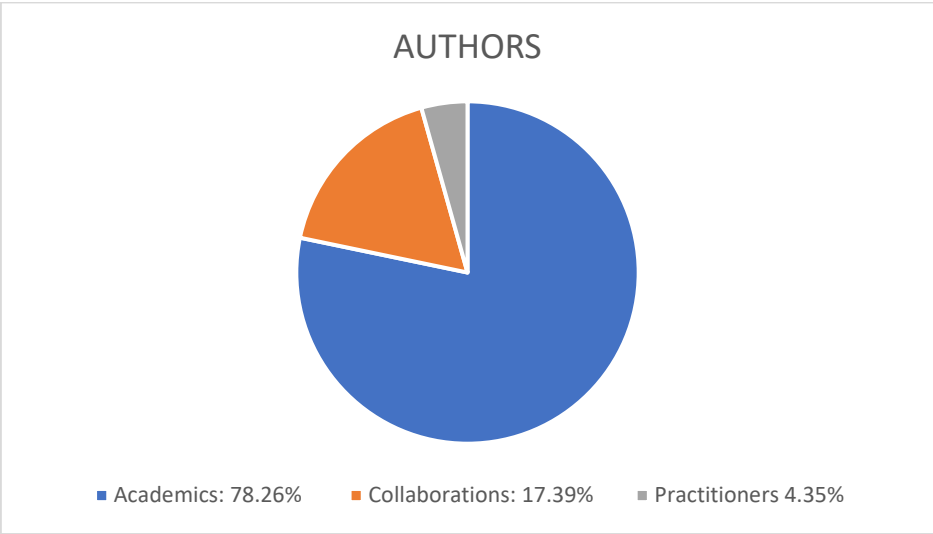
Source: our elaboration (2024).

Taking now in consideration the location of the study, among the twenty-three sources, eleven which represent 47.83% of the papers analyzed don't specify where the research was conducted. Other eleven mention only one nation while just 4.35% of the articles take in consideration more countries, in specific Scandinavia with countries like Norway, Sweden and Finland. But among the studies that mention just one location, most of them focus on countries situated in Asia with case studies from Saudi Arabia, Fiji, Singapore and India. The second continent for number of nations mentioned is Europe with Sweden and UK, both mentioned in two papers.

The figure 1.3 below shows the countries analyzed in papers that take in consideration just one location.

Fig. 1.3 Location of the study
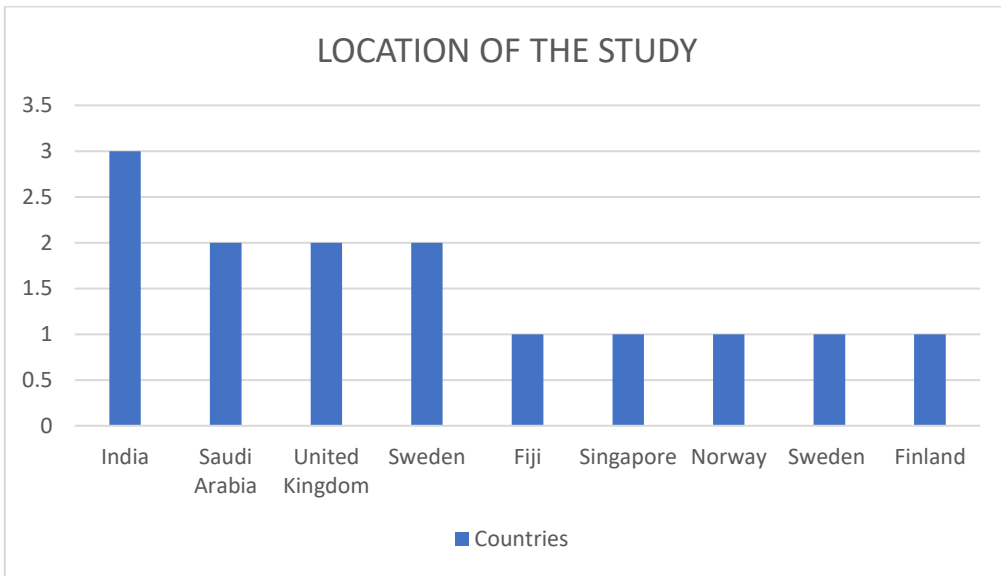
Source: our elaboration (2024).

Talking about the research methodology of the twenty-three papers the most used is literature reviews, conducted in nineteen papers, accounting for 82.61% of the sample. Furthermore, the distribution between surveys and interviews is quite balanced, with the first being utilized in ten papers, representing 43.48% of the total sample, and the second in eight papers, representing 34.78% of the sample. Those results show that in addition to literature review, both quantitative and qualitative data collection methods have been useful to better analyse the AI sector.

The figure 1.4 below shows the research methods used among the papers analysed.

Fig. 1.4 Research methods
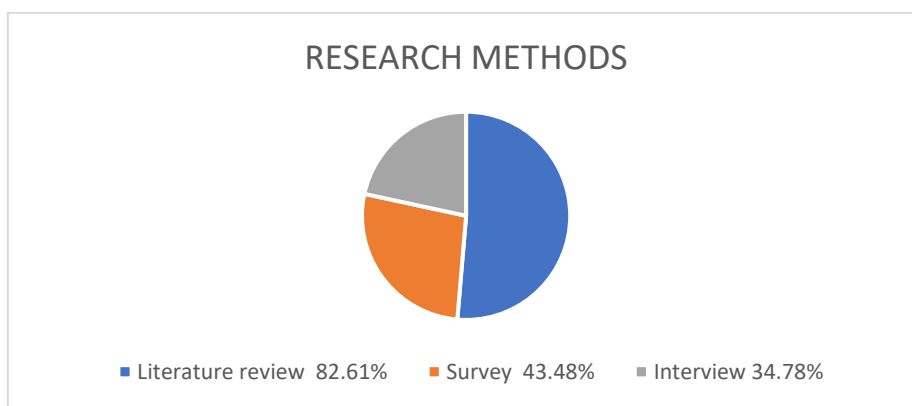
Source: our elaboration (2024).

Moving on to the size of the companies analyzed, among the twenty-three studies, a significant amount did not specify it, with thirteen papers, accounting for 56.52%. Papers focusing on large companies were the next most common, represented in seven papers, making up 30.43% of the sample. Meanwhile, research concentrating on SMEs and startups was the least prevalent, featured in only three papers, which represent 13.04% of the total sample. These results highlight that due to financial and technical limitations SMEs have more difficulties compared to large companies in the AI implementation.

Figure 1.5 below illustrates the distribution of company sizes analyzed in the papers referenced in this thesis, categorizing them into large companies or SMEs and startups.

Fig. 1.5 Company size distribution

COMPANY SIZE DISTRIBUTION

■ Not specified 56.52% ■ Large companies 30.43% ■ SMEs and Startups 13.04%
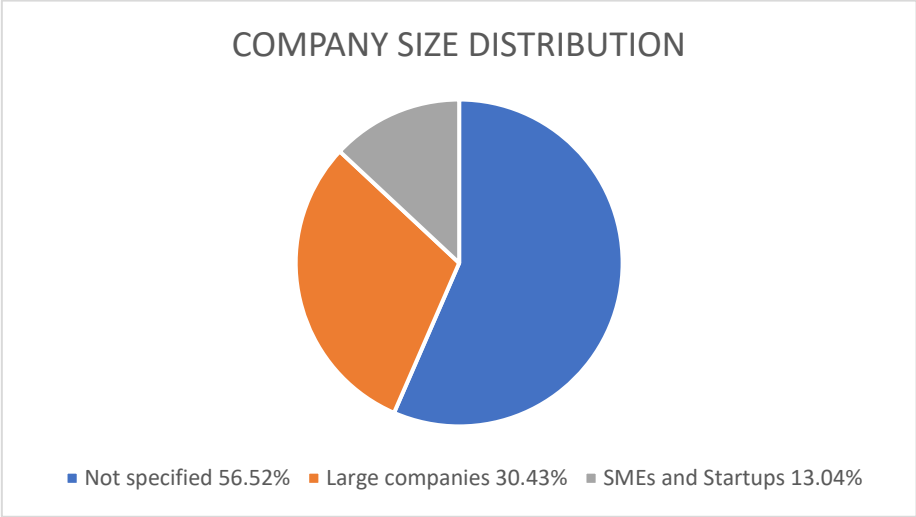
Source: our elaboration (2024).

The twenty-three publications that were analyzed for this thesis demonstrate that AI can be applied in a wide range of sectors. With 43.48% of the articles mentioning it, the retail sector is tied among the two most mentioned, underscoring high compatibility with AI technologies. Most of the studies judge positively the impact of AI on performance gains (e.g. Ashfaq et al., 2020; Luo et al., 2019) while the major downside is, based on a research of Mehta et al. (2022), the customers' perceived risk. Furthermore, thanks to one of the most advanced forms of AI, the generative one, companies can craft more effective marketing campaigns for a specific population and increase retail result (Chui et al., 2022a). Another example of the high potential of this technology is represented by the possibility of offering to digital retail clients enhanced virtual shopping experience, like

the online clothing store of ASOS, which employs a machine learning algorithm to identify customer return patterns and historical purchase data (Alet, 2023).

Manufacturing has the same percentage of mentions, 43.48%, suggesting significant developments and uses of AI in industrial processes. Manufacturers can in fact have a higher level of control of their processes thanks to artificial intelligence's perceptive capabilities. With those is possible to continuously monitor the production by using data from a wide range of connected sensors that are either within or close to the machines such as lidar, temperature, and vibration sensors (Singh et al., 2022). In this way companies can have a deeper understanding of their processes and generate a perceptual map of the facility in real time, including regions of traffic congestion and idle equipment. AI is in fact working non-stop and can capture massive data streams that humans would not be able to mentally manage, enabling the identification of irregularities and the increase of operational transparency. Another important reason for using artificial intelligence (AI) in the manufacturing sector is the higher productivity, enabled by connected equipment that can communicate across the network (Belanche et al., 2023).

Another significant industry that appears in 30.43% of the papers is healthcare, which highlights how AI can bring improvements to medical services and higher efficiency and accuracy of electronic health record systems (Sharma et al., 2024). Furthermore, thanks to this technology the health service can gain improved networking between different centers, more efficient public health systems and better patient care (Ahmed et al., 2020). Lastly with generative AI and the collaboration of qualified specialist, it would be possible to provide medical professionals in rural areas with important advice (Chui et al., 2022a).

The impact of AI on the financial sector is mentioned in 26.09% of the articles, where is stated that this technology can be very useful for risk management and detection of fraudulent activity and anomalous transactions (Sharma et al., 2024).

In 17.39% of the publications, the service, transportation and construction sectors are mentioned. In the transportation sector AI improve fleet and more sustainable operations through the use of connected vehicles and self-driving technologies thanks to analytics and sharing of data (Singh et al., 2022). Regarding the construction field, AI technology provides digitally enabled site optimization services and autonomy (Singh et al., 2022). Lastly in the service sector, the integration of AI systems makes data-driven decisions possible thanks to a more efficient processing of vast amounts of data. This allows

decision-makers also to more accurate forecasts about the future and to have highly customized recommendations that enable personalised services (Lim and Zhang, 2022; Pillai et al., 2020).

The 13.04% of the papers mention other sectors, including education and tourism. According to Zhai (2022), in the educational sector it's possible to develop AI-powered educational games and simulations but also personalizing learning, providing support to students and automating several regular administrative tasks. While the main downsides regard the difficulty of telling human contributions from machine ones (Gao et al., 2022) and that's why according to Huprich (2016), universities want to implement artificial intelligence (AI) applications only if they demonstrate a positive impact on students' learning outcomes. Talking about the tourism or hospitality sector one example might be the use of interactive robots in the hotel industry.

Finally, the sectors less mentioned are automotive and mining with 8,70% of mentions and lastly social media and airline sector with 4.35% of papers mentioning them, indicating a lesser but still substantial use of AI technologies. AI investments in the mining sector would translate in autonomous mining optimization services, predictive maintenance, and underground loading are a few example (Sjodin ¨ et al., 2023). Moving on to social media, the main topic about this field was the unethical applications of AI, like influencing political elections, harming people's reputations through, for example, revenge porn (Meskys et al., 2020) or cybercrime activities included data thefts and network breaches (Du & Xie, 2021).

Figure 1.6 below illustrates how frequently each sector is mentioned across the twenty-three papers.

Fig. 1.6 Sectors where AI can be applied
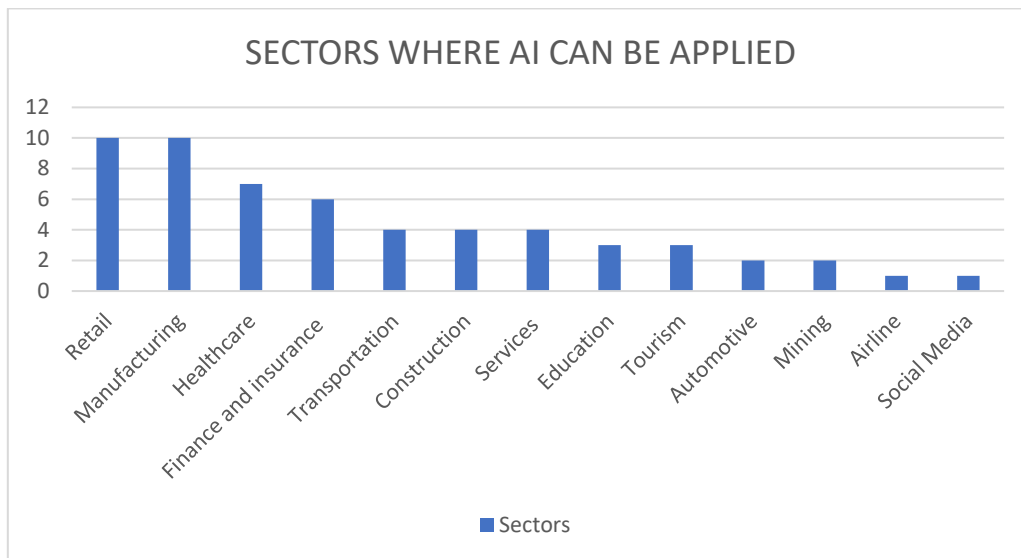
Source: our elaboration (2024).

Concerning the problems to solve and objective to achieve enhancing productivity places first, appearing in 47.83% of the articles. That's because AI enables two different functions: automation that involves using the technology to automate repetitive operations, increasing productivity, and cutting expenses. The second one is augmentation (Jarrahi, 2019; Raisch and Krakowski, 2021) which allows to increase efficiency and improve human decision-making (Jarrahi, 2019). Furthermore, AI helps also to minimize resource waste and consequently reduce the quantity of input required, making the whole supply chains more "circular".

Development of AI capability is another important area of focus, as seen in 39.13% of the publications. This shows how important is for companies to being able to bring people and processes together and establishing procedures for improving AI capability and leadership. (Mikalef and Gupta, 2021). In fact, to fully utilize this technology, a skilled workforce is necessary (Baabdullah et al., 2021). Those skills are defined as an employee's proficiency with AI and its application (Mikalef and Gupta, 2021) in a variety of fields, including algorithm creation, database administration, and data analytics (Mikalef and Gupta, 2021). This is also demonstrated by Bag et al. (2021) that found out that workforce skills are a crucial precondition for the implementation of big data-powered AI. Also, the management must possess vision and abilities needed to implement AI (Bocken and Konietzko, 2022).

34.78% of the papers address a problem that many companies have to face when they want to implement AI in their processes, and this is represented by ethical issues. Some example of this problem could be the replacement of low-skilled workforce, or the unethical control of employees enabled by the use of algorithms (Belanche et al., 2021).

Another important action that companies should implement in order that employees accept positively the implementation of AI within the company is the creation of an AI culture, factor that 30.43% of the articles discuss. Adopting a data-driven culture is in fact crucial to implement AI (Sjodin ¨ et al., 2021, 2023; Mikalef and Gupta, 2021) and to do that personnel upskilling and AI competency development are crucial (Sjodin ¨ et al., 2023).

Using AI to improve decision-making, transforming it in data-driven decision-making is another important objective of companies, as shown in 30.43% of the articles. First, decision-makers must believe in AI-enabled data-driven insights as a tool for decision-making in order to make it efficient (Raisch and Krakowski, 2021). By utilizing AI it's possible to have a bigger pool of available information sources to enhance the standard of analysis, diagnosis, and prediction and consequently also the process of making decisions (Aringhieri et al., 2016; Deveci et al., 2023; Issa et al., 2022; Li et al., 2022; Mikalef and Gupta, 2021; Wilson and Daugherty, 2018; Youn and Jin, 2021). Thanks to AI it's in fact possible to process vast amounts of data more quickly and precisely than humans. (Charles et al., 2022; Teng et al., 2023). Those factors allow decision-makers to make more accurate forecasts, enabling the top management to better anticipate changes in customer requirements and behavior, identify emerging market trends, and allocate resources appropriately (Shrestha et al., 2019). Lastly decision-makers can get highly customized recommendations, and this raises the likelihood that decisions will be successful (Lim and Zhang, 2022; Pillai et al., 2020).

26.09% of the articles discuss about customer integration, which can be easier thanks to AI. Manufacturers can, through the use of this technology, have a deeper comprehension of the behavior and preferences of their customers. Furthermore, a data-driven approach to customer intelligence allows also for the detection of new opportunities. AI, through the use big data, allows customers to learn about and compare products of different competitors giving them the opportunity to make better decisions. This technology can also track the changes of customer unhappiness with the goal of creating customized

client services and to improve customer satisfaction (Daqar and Smoudy, 2019). On the other hand, implementing AI could also cause perplexity and discontent (Castillo et al., 2021) since clients who have a close relationship with their service providers could feel betrayed if the company starts using AI to handle their needs rather than people (Belanche et al., 2020). Most customers react unfavourably to AI debuts (Flavián et al., 2022) and usually desire price reductions for completely automated/robotized services (Ivanov & Webster, 2021).

Another problem that companies face is keeping a balance between automation and employment as demonstrated by 21.74% of the studies. People are encouraged to interact socially with technology because of AI's "human" capabilities, which could eventually generate feelings of estrangement (Puntoni et al., 2021) and human jobs could be reduced because of the introduction of social robots that can for example carry out specific duties connected to patient recovery (Kipnis et al., 2022). AI-driven services could be helpful for some activities, but vulnerable populations shouldn't be made to rely solely on technological caregivers who can't offer social interactions and relationship building opportunities (Kipnis et al., 2022). Talking about the replacement of employment, the major concern is connected to low-skilled people who may be at risk from automation. The working conditions are worsening too because AI allows for non-ethical analysis of data related to employees other than the use of algorithms to exert more control over workers (Belanche et al., 2021). Lastly automation and AI could have a detrimental impact on less developed nations and regions, particularly those whose economy depend heavily on low-skilled labor (Huang & Rust, 2018) and that's why convincing workforce to adopt it represents a challenge (Raisch and Krakowski, 2021).

Enhancing data security and cybersecurity is mentioned in 17.39% of the papers, pointing out the risk that adopting AI can cause. A big threat is represented by security, which involves the use of private data by unauthorized parties, especially criminals as evidenced by the fact that in 2023 cyberattacks resulted in damages exceeding US$20 billion (The Independent, 2023). To counteract the AI strategies used by hackers, organizations need to put best practices into place (Du & Xie, 2021) and invest in cybersecurity.

Lastly another problem, mentioned by 13.04% of the publications analyzed is overcoming AI complexity, that in some cases can be so high to cause a complete adoption failure.

The figure 1.7 below shows the distribution of the objectives to achieve and problems to be solved mentioned in each one of the twenty-three papers.

Fig. 1.7 Problems to solve or objectives to achieve

PROBLEMS TO SOLVE OR OBJECTIVES TO ACHIEVE
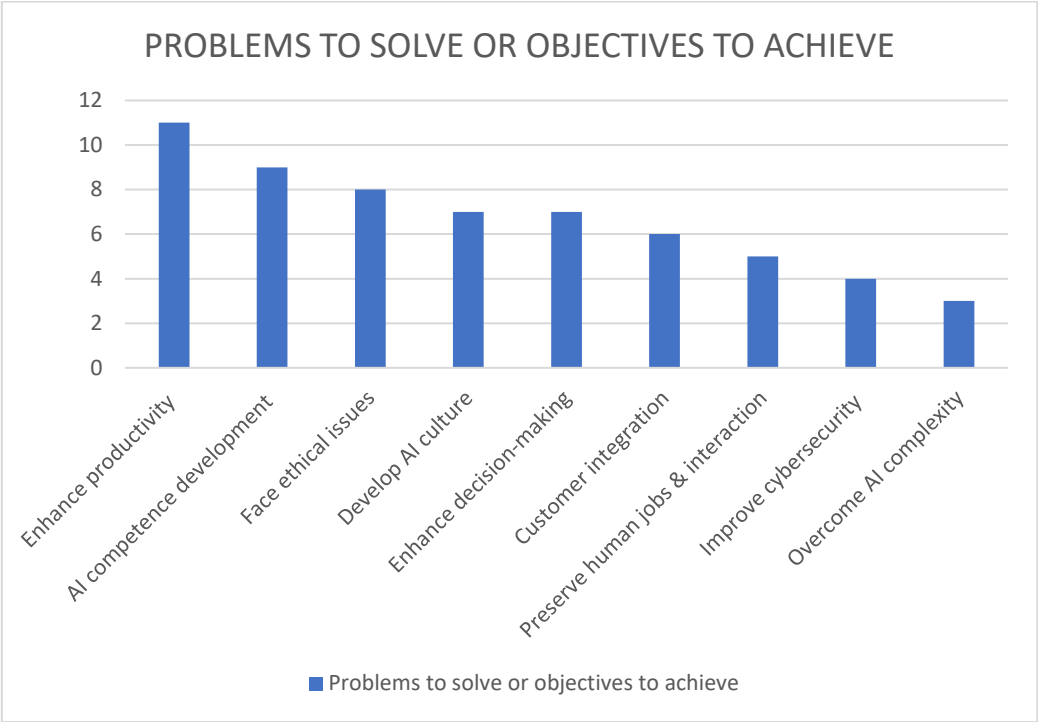
Source: our elaboration (2024).

Talking about sustainability the majority of the 23 publications, 60.87% in specific, talk about this subject. The most discussed subcategory among them is economic sustainability, which is cited in 60.87% of the publications since this technology can improve efficiency and reduce costs of companies, if well implemented and this topic has been explained in the previous paragraphs.

43.48% of the articles mention social sustainability as artificial intelligence (AI) could improve society well-being but at the same time cause problems such as job displacement and anxiety.

Lastly environmental sustainability, it's referenced in 26.09% of the publications, since AI can be used for the implementation of eco-friendly behaviours to reduce carbon footprints. AI can, through an improved business analytics given by diagnostic and predictive capacities, detect areas of resource inefficiency (Mehmood et al., 2019). Furthermore, those technologies can boost value chain efficiency by optimizing particular

components of the circular business model (Sjodin̈ et al., 2023). AI makes it also possible to improve supply chain speed (Lopez et al., 2021; Butollo et al., 2022), detect inefficiencies (Hina et al., 2022), optimize energy usage (Mehmood et al., 2019), and accomplish material efficiency, waste reduction, and circular product design. This technology allows also to increase a product's and its component's lifespan while simultaneously reducing waste by preventing early obsolescence and facilitating repairs or replacements (Bocken et al., 2016; Ritala et al., 2023) thanks to the use of machine learning on consumption and maintenance data. (Gasser et al., 2021; Sjodin̈ et al., 2023). Reducing waste, it's also possible through data analysis and machine learning, which enable to get insights about consumer preferences and market trends, (Ho and Chow, 2023) and allowing to manufacture in response to real demand as opposed to speculative projections (Amirkolaii et al., 2017).

Figure 1.8 below illustrates the three types of sustainability identified in the 23 analyzed papers: economic, social, and environmental.

Fig. 1.8 AI and sustainability
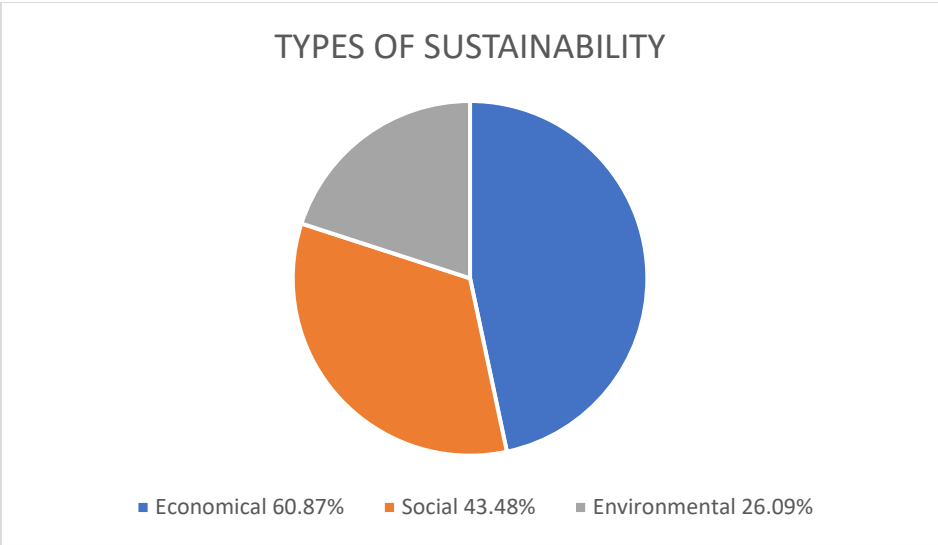
Source: our elaboration (2024).

This thesis on AI examines various business models, though it is evident that the majority of the 23 papers reviewed do not focus on this aspect. Specifically, 69.57% of the articles do not mention any business model, indicating a primary emphasis on other topics related of AI.

However, 30.43% of the papers mention this field and the most discussed is the circular business model, appearing in 17.39% of the articles. In this topic it's possible to identify three different business models thanks to previous literature: narrowing, slowing and lastly closing business model (Geissdoerfer et al., 2020). AI-enabled narrowing business model allows to utilize fewer resources for the manufacturing of a product by detecting areas of resource inefficiency through data analysis and predictive capacities of this technology (Mehmood et al., 2019). This helps companies to cut costs, connecting to economic sustainability but also to reduce their environmental impact. Furthermore, this business model allows to simplify components for a circular business model innovation (Sjodin ¨ et al., 2023). The slowing business models aims instead to increase a product's and its component's lifespan while simultaneously lowering initial consumption (Bocken et al., 2016; Ritala et al., 2023) through the use of machine learning and AI's predictive and prescriptive capabilities. In order to use this model, it's necessary to take actions such as monitoring product condition in real time and trying to detect possible problems before they arise, in order to take proactive actions and avoid them (Gasser et al., 2021; Sjodin ¨ et al., 2023). Another option it's represented by the adoption of a demand-driven production that allows to cut back on consumption and produce on demand through data analysis and machine learning, which give information about consumer behaviours and market trends (Ho and Chow, 2023). In this way businesses can avoid overproduction, cut waste, and maximize resource use by matching production to demand (Toorajipour et al., 2021). Lastly the AI-enabled closing business models focus on closing the loop of resources post-consumption. And this is possible by designing the product in a way that is easy to disassembly and disposal it (Chauhan et al., 2022; Hina et al., 2022) or by using, take-back or rental systems, and other sustainable practices (Schlüter et al., 2021; Abd Aziz et al., 2021; Kerin and Pham, 2020).

Automation business model is mentioned in 8.70% of the articles and it emphasizes how artificial intelligence (AI) has as one of the main benefits, the automation of procedures to increase productivity and lower operating costs. This business model has the potential to produce significant economic and sustainability benefits thanks to a reduction of costs, allowed by personnel reduction and higher energy efficiency. It also offers the possibility to reduce the environmental impact through practises like decrease of resource consumption, increase of asset utilization, and prolongation of product lifespan (Belanche

et al., 2023). Lastly, automation translates also in altering the product's general design for implementing more sustainably features like in the case of autonomous vehicles.

Several other business models are also discussed, each appearing in 4.35% of the papers. These include product-as-a-service business model, product dominant, premium -based models, advertising-funded models, freemium business models, outcome-based models, and licensing models. The one discussed more deeply is the Product-as-a-Service (PaaS) one, which allows for increased product usage for consumers by transferring ownership of the product from the customer to the producer. This makes possible to increase the product company's incentive to realize value from product preservation, because there is an interest in make the product available as long as possible (Stahel, 2010). The outcome-based model aims, instead of providing services under service agreements, to get revenues based on the performance under outcome-based contracts (Hou and Neely 2018). The licensing model facilitate instead, value extraction from a larger number of sources with minimal to no effort on the part of the giving firm (Moeen and Agarwal 2017). For this last model there are also downsides such as spillover effects, that make securing ownership very difficult (Pisano and Teece 2007; Teece 2018).

The figure 1.9 below shows the traditional business models that have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.9 Traditional business models
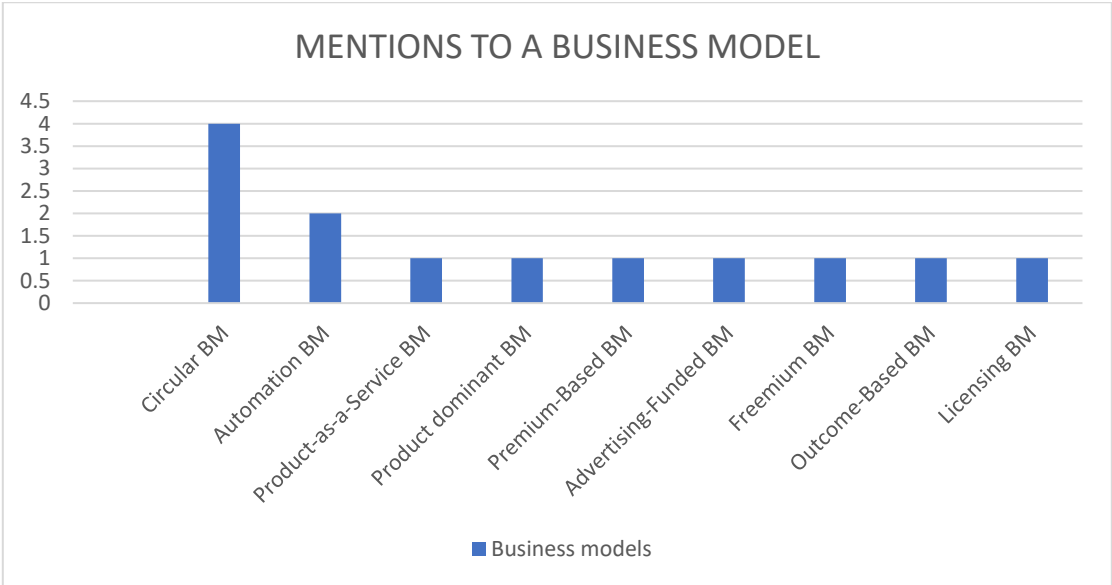
Source: our elaboration (2024).

Among the twenty-three papers reviewed also new or innovative business models were mentioned. Specifically, 56.52% of the articles do not talk about this topic while the remaining 43.48% of the papers highlight them. Among the innovative business models discussed, the AI-driven business model is the most frequently mentioned, appearing in 21.74% of the articles. This one can be divided in other sub-models that will now be explained. Companies need to create an ecosystem that is tailored to the AI-enabled business model for it to be successful in the long run (Sjodin¨ et al., 2021). So, several niche models are also explored, each appearing in 4.35% of the papers.

The augmentation business model, thanks to digital technologies, enables the optimization of solutions for individual equipment, fleets of equipment, and processes. One example might be the optimization of the processes of a production site by utilizing data from linked equipment to cut down on waste, pollutants, and inefficiencies. Thanks to AI analytics, decision-makers are supported and performances increase with a positive impact also on the environment because of the optimization of resource utilization, longer product life cycles, optimizing systems and goods. AI, through the continuous analysis of data, can lead to greater process efficiency and make it easier to identify and remove process-performance bottlenecks other than optimized capacity, and shorter time to repair malfunctioning parts (Belanche et al., 2023).

The proposed demand sensing model identifies patterns and trends through data analysis and machine learning algorithms, allowing also for more accurate forecasts. For example, in the automotive sector, with the processing of a vast range of data, including historical trends, real-time internal and external automotive demand signals, and the use of AI and ML, it is possible to develop intelligent forecasting system that could anticipate both short-term and long-term demand for car sales. The main goals of this business model are supply network stabilization, cost savings, more predictable production, and efficient resource use. This allows also workers to concentrate on more productive, high-value jobs (Singh et al., 2023).

The chatbot business model relies on generative AI, which makes it possible to create dynamic and personalized interactions, enabling businesses to automate activities like customer service and improve the user experience. The most famous example of generative AI is ChatGPT, for which there is no denying of its enormous benefits (Dowling & Lucey, 2023; Ng, Haller, & Murray, 2022). This chat-bot can provide, in accordance with

the instructions, suggestions for several needs such as designing products and test alternative keywords for marketing campaigns. It's also possible to do market analysis and compare different brands in order to better understand how to manage the positioning in the market or for new product development (Jorzik et al., 2023). Other basic functions of ChatGPT or any advanced chat-bot are answering inquiries, summarize data, and provide a thorough document in response a question. Another practical example could be Lemonade, an insurance company that uses AI as a tool to manage subscriptions and claims. It relies on a conversational chatbot to replicate the experience of texting or speaking with an agent, and this allows for personalized sales recommendations and to process payment faster. In this way the company enhanced the customer experience and lowered the customer's expense ratio, resulting in savings (Nafizah et al., 2023).

The agile business model focus on developing a form of collaboration with customers through AI-enabled customer support services while at the same time lowering complexity through a modular design. It's characterised by a co-creation and customer-centric approach to co-create AI-enabled service solutions for customers' most urgent operational needs (Sjodin ¨ et al., 2021). To do that and because of the inherent uncertainty in AI development it's important to have an agile co-creative approach, with a development logic that consists in a first launch of AI microservices before they are fully developed and tested, giving users quicker access to them and an active role in the final solution that is as close as possible to the user's needs. This business model makes the manufacturer as the customer's partner instead of just a simple supplier, fostering a deep and transparent collaboration. Another important component for innovation and value development is represented by modularity. This concept aims to reduce development complexity and increase or modify functions based on the changing needs. To do that it's important to rely on agile and flexible systems that can adapt easily to the context and that are also characterised by high modularity for an easier reconfiguration by both internal and external stakeholders (Sjodin ¨ et al., 2021).

The figure 1.10 below shows innovative business models that have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.10 New business models
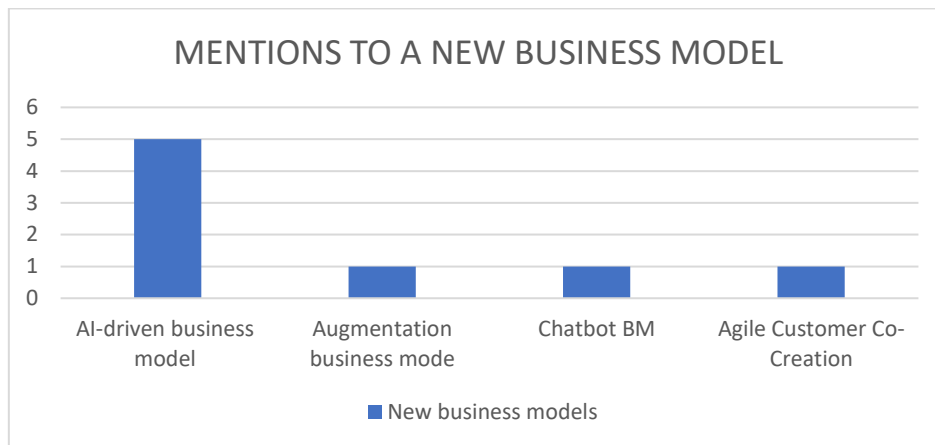
Source: our elaboration (2024).

This thesis on AI discusses in depth the many advantages of AI, and the 23 papers that were examined all touched on this subject.

The most often mentioned benefit, found in 65.22% of the articles, is the optimization of resource utilization. This demonstrates how AI may improve overall efficiency, cut waste, and streamline procedures in a variety of industries, highlighting its role in promoting operational excellence. According to Ritala et al., (2023) through AI is possible to utilize fewer resources in the production process. This allows to cut down on waste and increase efficiency by detecting areas of resource inefficiency from data analytics and predictive capacities that characterise this technology (Mehmood et al., 2019). This is for example possible thanks to algorithms and the analysis of data coming from sensors that allows to optimize energy usage, spot inefficiencies, and suggest specific energy-saving actions. Employing AI translates also into boosting value chain efficiency and simplifying components of a certain business process areas. Another technology that works closely with AI is machine learning (ML), which allows systems to be autonomous in their decisions, resulting in a system that removes need for human intervention (Ross and Taylor, 2021). In general businesses can therefore, through the use of AI, improve supply chain speed (Lopez et al., 2021; Butollo et al., 2022), detect inefficiencies (Hina et al., 2022), optimize energy usage (Mehmood et al., 2019), and accomplish material efficiency, waste reduction, and circular product design. The resource usage optimization is given also by AI ability to increase the lifespan of products as it enables to monitor product condition in real time and detect possible problems before actual damage actually arises,

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in order to take proactive actions (Gasser et al., 2021; Sjodin ¨ et al., 2023). Another advantage is demand-driven production, which exploit data analysis and machine learning to get insights about consumer preferences, behaviors, and market trends (Ho and Chow, 2023). Businesses can also limit overproduction, cut waste, and maximize resource use by matching production to demand (Toorajipour et al., 2021). To find chances for optimization and circularity, AI systems can analyze data on resource availability, usage trends, and environmental effects (Talwar et al., 2021). Data analysis makes it also possible to rely on product customisation, inventory control, and production scheduling and consequently produce only in response to real demand and not to speculative projections (Amirkolaii et al., 2017). AI has also the capacity of simulating the use of different materials to provide alternatives to the currently used (Deviatkin et al., 2022; Pyzer-Knapp et al., 2022) for a more efficient production. Businesses can, in this way achieve more effective and sustainable processes.

60.87% of the publications discuss prescriptive capacities, which help businesses to make well-informed decisions. Nowadays there is a disparity between problem-solving skills and the complexity of the market because of the enormous amount data. That is why manufacturers take advantage of the prescriptive AI capabilities that, through millions of simulations, can determine the best possible course of action. AI can therefore generate continuously data that allow the machines used to learn how to take better decisions while in operation. It's still not always simple to use AI in decision-making and according to Booyse and Scheepers (2023) this happens for reasons such as restrictive regulations, a lack of trust and transparency, uncertainty in working areas, a loss of power and control, and ethical concerns.

52.17% of the articles discuss easier customer integration for which AI assists in gathering and evaluating customer data, including demographics, preferences, and other important parameters, and makes product or service recommendations based on the users' online activities. In this way companies can offer products and services based on the needs and interests of the user, enhancing his or her experience (Fallahi et al., 2022). The collaboration between internet of things (IoT) and AI will enable companies to respond to customer demand in the most appropriate way possible, through a deep analysis of the variables that influence it. Furthermore, AI allows to have a more efficient communication with clients by becoming the primary source of information about

products and services but also by assisting them during the purchasing process (Alet, 2023). Customers could benefit from the use of AI through the offer of services in real-time and dynamic experiences by businesses. This technology accurately understand data and learn gradually for a better adaption to people needs as it finds customers and the best opportunity to connect with them effectively. A practical example is Unilever that with the use of AI, was able to evaluate songs and popular thoughts about food and discovered that ice cream was associated with breakfast on many occasions. For this reason, Unilever and ice cream producers Ben & Jerry's created a line called "Breakfast for Desserts" that quickly succeed. Internet of things combined with AI and data exploitation, will create a system able to respond to customer needs in the best possible way. Furthermore, thanks to machine learning (ML), this system will continuously train and improve itself through the interactions with clients, to predict who is more likely to take specific actions, like making a purchase or terminating a service. Furthermore, ML can help in the decision of which kind of ads to show based on user's browsing history, past purchases, and profile so that is automatically tailored to the context and preferences of consumers, allowing firms to save time and money (Nafizah et al., 2023). Furthermore, AI assistants are deeply changing how businesses interact with customers, who are now the primary source of information about products and services. They can assist and increase happiness of customers by giving them personalized recommendations and developing new product and service in line with emerging trends (Nafizah et al., 2023).

34.78% of the papers emphasize innovation and agility, highlighting the role that AI plays in improving the ability of firms to innovate, speeding up the innovation process, and producing better innovation results. According to Haefner et al. (2020), AI and ML highly assist companies in the phases of idea creation and development stages thanks to their ability of reducing obstacles related to information processing and knowledge search. The limitations of human cognitive capability in finding and analysing information are now clearer than ever because of the increasing availability of data brought about by technological breakthroughs. Thanks to these new technologies businesses can identify more issues and opportunities for developing new ideas and start to innovate (Haefner et al., 2020). This is easier also because AI makes the acquisition of outside knowledge easier and in this way it also lowers the barriers to knowledge search and helps firms to develop more original ideas (Haefner et al., 2020; Paschen et al., 2019). Through the facilitated analysis of data, enhanced market segmentation and customer choice are possible,

(Angermann & Ramzan, 2016; Farazzmanesh & Hosseini, 2017) and innovation outcome are more likely to be successful as they are based on accurate forecasting (Srinivasan, 2014). For those reasons AI combined with Machine Learning can help firms carry out internal innovation processes, produce better innovation results and also help small businesses, usually lacking financial resources to innovate (Li et al., 2018).

Predictive capacities are mentioned in 26.09% of the papers. These benefits enabled by AI, help businesses to analyze a large amount of data collected, look for anomalies and deviations from the norm, and respond to changes in the environment effectively. Using past data and predictive techniques of AI it's possible to predict what and when is likely to happen in the future and to take actions in order to prevent negative outcomes. Therefore, predictive capabilities enhance operations planning through actions such as warnings about future malfunctions and resource waste, and consequently enables businesses to take preventative measures and to increase productivity and sustainability.

21.74% of the articles discuss task automation, emphasizing AI's capacity to carry out activities without the human intervention. Some examples could be the creation of automated promotional content that appeals to consumers' context and mood or the use of chatbots (Alet, 2023). The latter is able to carry out many activities automatically such as creating marketing campaigns, coding information systems, developing simulations for R&D, or providing managers with answers to intricate risk and legal questions (Chui et al., 2022).

21.74% of the articles discuss greater personalization and customisation while 13.04% of the papers talk about the easier data processing and more sustainable practises allowed by AI. Those benefits are all explained in the previous section dedicated to the advantages of this technology.

8.70% of the studies address perceptive capacities, which consists in ongoing monitoring that allows manufacturers to better perceive what is happening to the production thanks to the analysis of data coming from connected sensors that can be inside or close to the machines such as lidar, temperature, and vibration sensors. The advantage consists in a continuous control of the equipment performance that allows to identify irregularities that would normally be challenging to find. Another benefit related to the perceptive capacities is that it allows for a greater widespread of crucial information about the equipment conditions among the personnel (Belanche et al., 2023).

8.70% of the papers discuss enhanced market-oriented analytics, demonstrating AI's capacity to offer more sophisticated form of analytics that improves a business's performance and market-oriented analytical skills (Hossain et al., 2021). Businesses can use this technology to know what their clients would purchase in order to offer them tailored promotions (Davenport et al., 2020).

One paper mention better business resilience and this is connected to the fact that AI can improve decision-making of whole value chain system. In this way the development of a resilience mechanism is possible, and it allows the company to be proactive and recover from disruptions quickly but also to react faster to any forces of change. (Fallahi et al., 2022).

Lastly another paper discusses improved risk management, suggesting that artificial intelligence (AI) has the ability to help financial players to comprehend accurately the risks associated to their business through the analysis of a large quantity of data about customers, long-term product value and market conditions (Toxopeus et al., 2021).

The figure 1.11 below shows the advantages that artificial intelligence (AI) brings to companies that adopt it and which have been mentioned in the papers taken in consideration for this thesis.

Fig. 1.11 AI advantages

MENTIONS TO AI ADVANTAGES
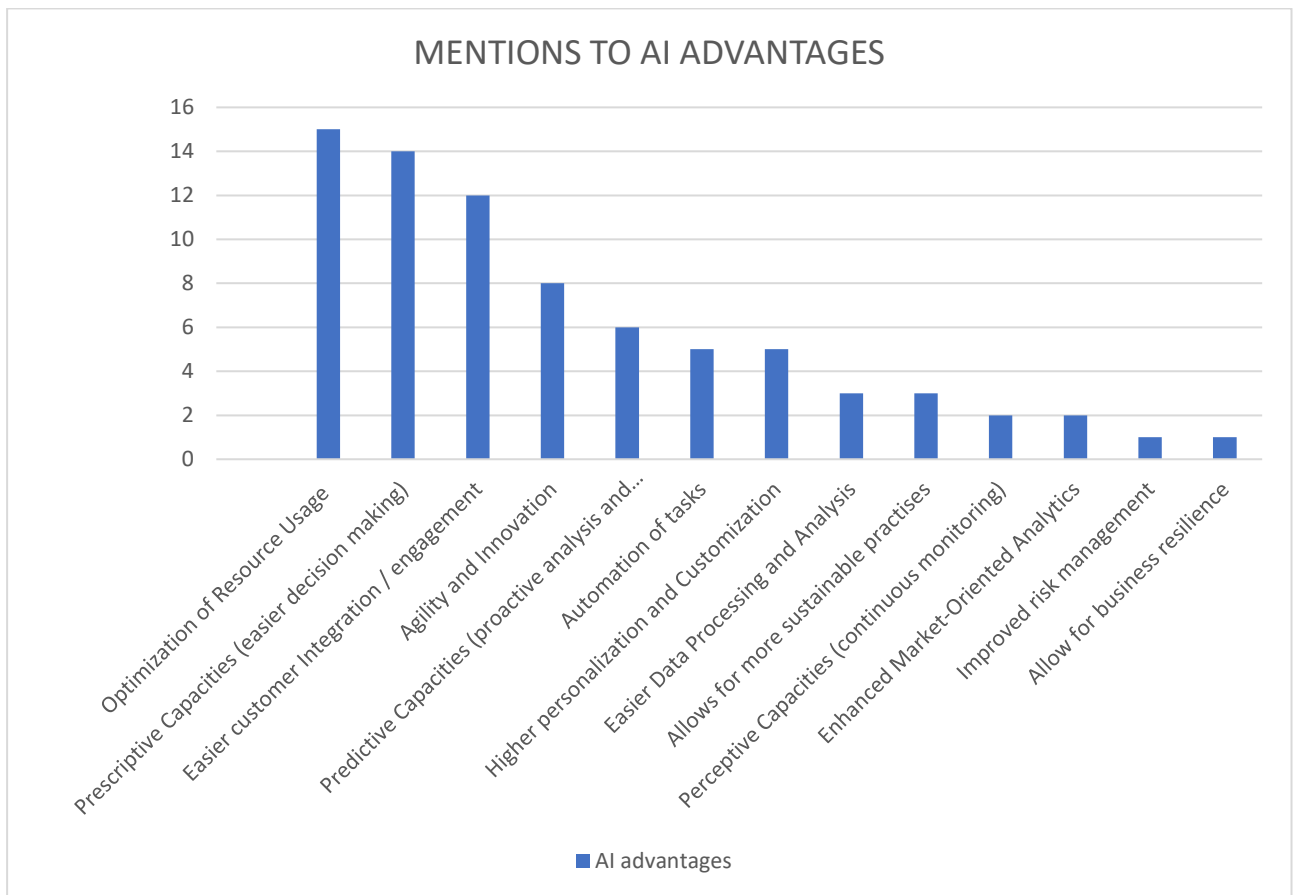
Source: our elaboration (2024).

This thesis also explores the disadvantages of AI; 86.96% of the 23 publications that were assessed addressed these issues, showing also the negative side of this technology.

Technical difficulties are the drawback that is discussed the most, since it's a topic discussed in 43,48% of the articles. It is in fact clear that because of the complexity of AI, the lack of specialized expertise within the company would make AI implementation very difficult. This is because AI resources and the business model of the company are intricately linked, and the management frequently don't know how AI-driven changes will spread throughout the company (Davenport, 2018). Furthermore, it could be that the business is already affected by problems such as skewed data or biased algorithms as a result of unsuitable machine learning models (Mikalef et al., 2022a; Straw and Wu, 2022; Tilmes, 2022) and this translates in the need of reorganizing historical silos in order to being able to exploit complimentary resources without being hindered by departmental barriers (Keding, 2021). Lastly, technical difficulties can be overcome through the

introduction of a data-driven culture, for which personnel upskilling and AI competency development are crucial (Sjodin ¨ et al., 2023).

34.78% of the publications examine discrimination and biased decisions, indicating worries about several topics related to the use of AI systems within the company. The source of data that is used to answer questions and make decisions for clients is a crucial problem when deploying AI systems. A practical example of the risk of giving racists responses is connected to Microsoft that in 2016 introduce a chatbot on Twitter which gave insight about posts made on the website. The program quickly started to provide racist statements even if it was supposed to learn from hateful remarks in order to avoid them (The Guardian, 2016). Furthermore, malicious bots can be used to propagate fake news with the intent of interfering with elections or like during the pandemic to disseminate false health information (Curry & Rieser, 2018). Another problem is related to lack of transparency, for which employees and customers mistrust decisions they do not comprehend, which mostly happens for the opacity of AI systems (Müller, 2020) (Weber et al., 2023). Therefore, even if the use of AI can make people's work more productive, inexplicable decision will be seen negatively as they may be biased and might have unintended negative effects that will need future research. This is why it's important to prevent discriminatory responses by continuously training AI with values such as accountability and justice.

26.09% of the articles discuss job displacement, suggesting that the increasing investments in AI, with a rate of 38% year, are raising concerns about how the implementation of this technology will affect employment, especially for jobs characterised by a presence of low-skilled people, who risk being fired in favour of robots (Belk et al., 2023). Modern technologies have also caused a decline in working conditions because of problems such as abuse of information asymmetries or use of algorithms to control workers in unethical ways (Belanche et al., 2021). Furthermore, jobs related to those innovative technologies are usually located in metropolitan clusters and this may result in inequality (Makridis & Mishra, 2022), especially on less developed regions, mostly characterised by low-skilled labor. Even though this technology may replace human labor there is also the opportunity of employee-AI cooperation (Huang & Rust, 2021) and US cities where concentrations of AI-related employment was higher, saw increases in well-being among residents (Makridis & Mishra, 2022).

Privacy concerns are also mentioned in 26.09% of the papers, highlighting that this is one of the most evident drawback of AI (Du & Xie, 2021). In fact, this technology has the ability to listen and assist consumers with a huge collection of data, that could be exploited unethically or that could end in a surveillance society (Puntoni et al., 2021). AI in fact allows for both direct control with methods such as like facial recognition but also indirect control through the tracking of a customer's online activities. This approach focused on the collection of data, which raises therefore privacy concerns about, among other things, the use of private information, information transfers to the business sector, and inadequate data protection laws (Chen et al., 2023). While some consumers voluntarily provide data, (Bode & Kristensen, 2023; DuFault & Schouten, 2018), others do not want to, and this is why fair policies must be implemented, to protect the consumers (Du & Xie, 2021).

26.09% of the articles address cybersecurity issues, highlighting another potential threat of AI that companies must face. Private information could be in fact used by unauthorized parties, especially criminals with malicious intentions. Most of the cybercrimes use ransomware, which was utilized in 68% of cyberattacks (Statista, 2023), resulting in damages exceeding US$20 billion (The Independent, 2023). Other cybercrimes include activities such as data thefts and network breaches (Statista, 2023), which impacted both businesses and the governmental sector. For cybercriminals it's also quite simple to purchase passwords, sensitive data, and other personal information on the dark web. The systems of many companies are not smart enough to protect sensitive information and cyber-thieves can find and process them more easily when generative AI is used. Companies are now taking 277 days on average to discover intrusions (The Independent, 2023), indicating that there still much work to do in the cybersecurity field and organizations need to put best practices into place for it (Du & Xie, 2021). On the other side, AI can also help in this by locating possible targets and weak points in the systems (Baabdullah et al., 2024).

21.74% of the articles mention high costs, which shows the significant financial commitment of companies that want to implement AI systems. Often businesses try to implement AI without a clear strategy and even if most of them anticipate a return on their AI investments, at the moment nearly 70% have reported little to no benefit (Leff et al., 2021). According to the finding of Ransbotham et al.'s and the Artificial Intelligence

Global Executive Study and Research Report (2019), 40% of respondents acknowledged that a significant investment did not translate in satisfying commercial results. It's in fact necessary to know how to commercialize AI through suitable business model in order to fully benefit from the technology (Bouncken et al., 2021). Therefore, if a company really wants to benefit from the introduction of disruptive technologies like AI, it must modify the business model according to the characteristics of the introduced technologies (Chesbrough 2007; Muhic and Bengtsson 2021).

8.70% of the articles address technological dependence, raising worries about the excessive people's reliance on this technology. According to Belk et al. (2023), current society has fully accepted technology-made environments completely managed by chatbots, experiencing events in the metaverse or following the advice of a robot-advisor to investment savings. Furthermore, businesses use artificial intelligence (AI) to create feedback loop that releases dopamine in consumers in exchange for constant updates from their networks (Brino et al., 2022). Social media are probably one of the most famous example as they can create addiction through their advanced algorithms and they are in fact connected to negative outcomes like materialism and delusions of reality (Belk et al., 2023; Brino et al., 2022). Furthermore, AI-driven services discourage users from performing tasks and risk to relieve humans of both mechanical analytical and cognitive activities (Huang & Rust, 2021), which hinders human advancement. Generative AI technologies put human capacities like summarizing text, producing music and creating art at risk. Another fear is represented by isolation from society, which is caused by the fact that some AI-based technologies replace social interactions directly, like in the case of virtual shopping assistants or also mediating human relationships like the use of dating apps to find a partner (Pantano & Gandini, 2017). People are now encouraged to interact socially with AI robots that are characterised by "human" capabilities, which might generate feelings of estrangement (Puntoni et al., 2021). AI-driven services can be useful for senior citizens but at the same time it's also important that vulnerable populations will not have to rely only on technological caregivers who can't clearly offer the same social interactions and relationship building opportunities as humans (Kipnis et al., 2022).

The same percentage, 8.70%, is related to legal risk, which refers to episodes were sensitive data protected under privacy laws like financial information and health

problems are shared without consent or when through generative AI, offensive or copyrighted content gets created.

Lastly responsibility dilemma is mentioned in 4.35% of the articles and it consists in the problem of determining the accountability of certain actions conducted by AI. An example could be an autonomous vehicle that operate according to mechanical regulations and eventually has to decide whether to run someone over or to save its own passengers from running into a wall. Furthermore, since those vehicles are not driven by humans it is unclear who will take responsibility for such accident, and potential actors to blame could be the insurance providers, car manufacturer, car owners, and machine learning (Osburg et al., 2022). According to past studies on service robots, clients tend to blame who implemented the robots rather than the robots itself when poor decisions are taken (Floridi & Sanders, 2004).

The figure 1.12 below shows the disadvantages connected to artificial intelligence (AI) that have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.12 AI disadvantages
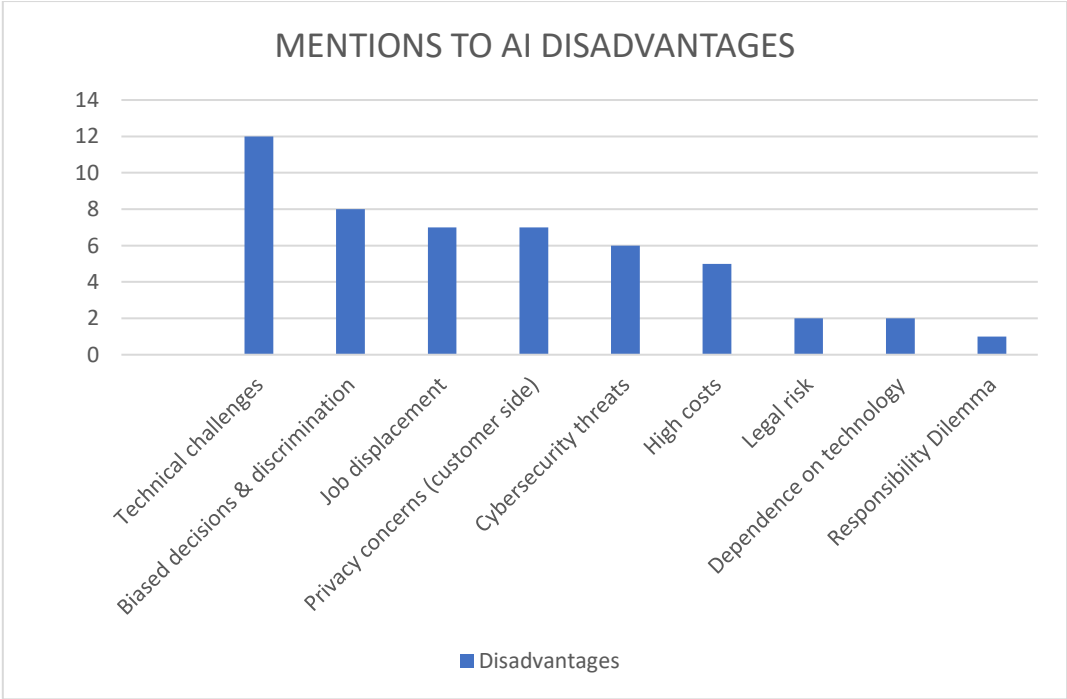
Source: our elaboration (2024).

The AI thesis goes into great detail also about the barriers to the implementation of AI, with 82.61% of the twenty-three papers that were assessed pointing the following issues.

Organizational AI resistance is the most commonly mentioned barrier among these, appearing in 43.48% of the publications. There are various types of organizational resistance, including those at the individual and management levels. The individual one could be related to an employees' reluctance to adopt AI for the fear of losing the job while the management resistance might be connected to scepticism of giving over decision-making authority to AI. This phase where adjustments of routines and structures must be made could encounter the resistance from both employees and management, which can affect a smooth integration process (Kolbjørnsrud et al., 2017; Nam et al., 2021). Automation, allowed by AI, is in fact a component that cause anxiety to workers during the implementation process (Ångstrom ¨ et al., 2023).

Within the context of brand reputation, 43.48% of the articles address ethical concerns. The use of artificial intelligence can in fact have also harmful effects on businesses, society, and individuals (Dwivedi et al., 2023). That's why businesses should take in consideration the negative AI's effects on workers such as loss of jobs and ethical issues, which influence how people view its application (Mutascu, 2021; Nguyen and Vo, 2022).

The present skills gap in the workforce is shown in 30.43% of the papers where it's specified that developing AI competences it's necessary for the implementation of this technology within the company (Sjodin ¨ et al., 2021). The lack of skills required in areas such as data science or engineering is considered a barrier and that is why companies are hiring more data scientists than ever before. The demand of this role in the last five years has increased by about 1300% and for other advanced analysts by 220% (Leff et al., 2021). The effective implementation of AI is affected also by how employees judge AI systems as helpful or not in the decision-making processes and this factor can triggered by the lack of training (Cao et al., 2021; Mikalef et al., 2019). Furthermore, it's important to view as complementary classic IT capabilities and new AI skills as the first ones are critical for the implementation of the latter (Isensee et al., 2020; Parida et al., 2019). This means that the earlier IT revolutions prepared the groundwork for businesses to implement AI (Madanguli et al., 2024) and identifying the fundamental skills for AI-powered operation breakthroughs is crucial (Akter and others, 2023).

Significant obstacles include data security and control, which are mentioned in 26.09% of the publications. These worries show the importance of having the right data architecture other than a data strategy in order to implement AI initiatives. This topic is strictly related to the one of cybersecurity, previously discussed.

Customer resistance is mentioned in 21.74% of the articles analyzed and it refers to how they react to companies' introduction of this technology. Usually, the customers' view about the use of their data will directly impact how businesses will use those information to create value. The exploitation of data is therefore limited by data sensitivity and customers' resistance to share them, and because of that AI providers should develop a clear and transparent data strategy that would make the customer less resistant to the introduction of AI (Chandra et al., 2022).

Another obstacle is the high cost that companies have to sustain when implementing AI, a factor noted in 21.74% of the publications. The entire implementation process can be very expensive, especially for smaller businesses that have limited financial resources, and this is why often companies show low or no returns on AI investments.

21.74% of the studies address the issue of inadequate AI integration in current systems. This happens because AI resources and business models are intricately linked, and the top management doesn't really know how their introduction will influence the entire organization (Davenport, 2018). This technology is introduced in a system where there could already be organizational issues, such as skewed data or biased algorithms because of unsuitable machine learning models (Mikalef et al., 2022a; Straw and Wu, 2022; Tilmes, 2022). Another component is in fact represented by the presence of many historical database providers, for which it can be challenging to effectively extract the required data. Another common problem is in fact the possible cannibalization of current products and business models when considering the riskiness of AI (Åstrom ¨ et al., 2022). For those reasons, to effectively implement AI, organizations must conduct long-term experimentations and projects (Ångstrom, 2023).

In 13.04% of the papers, an ambiguous or constrictive institutional environment is mentioned. Because of the possible negative effects of AI on the parties involved, such as unemployment (Mutascu, 2021; Nguyen and Vo, 2022) and algorithm bias feeding discrimination (Mikalef et al., 2022a; Straw and Wu, 2022; Tilmes, 2022) governments

are pushed to take no action at all or take random action that will inevitably slow down the application of AI.
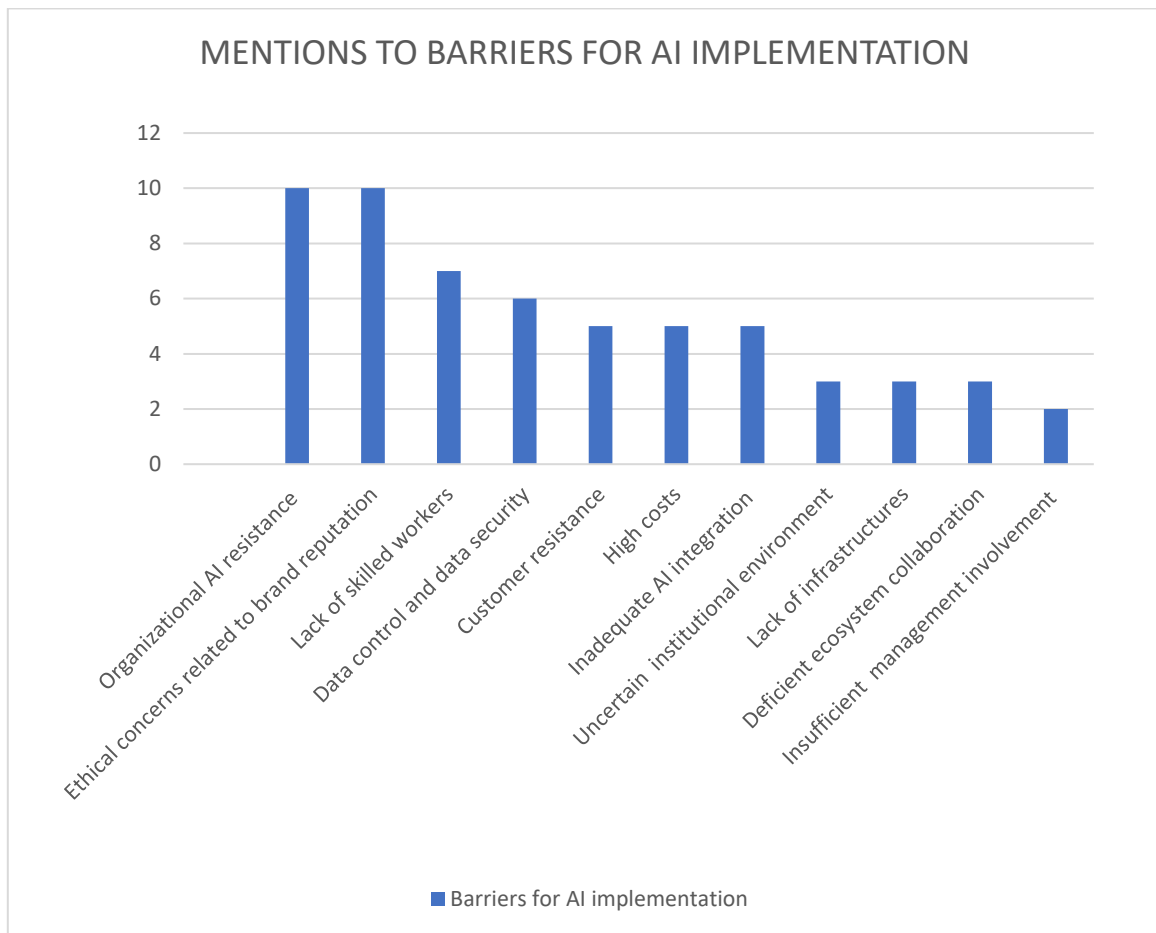
In 13,04 % of the articles, the absence of infrastructure is listed as an obstacle. This includes a lack of the technological infrastructure needed to apply AI, such as systems to manage effectively the enormous amount of data that is now present in the market.

Another barrier mentioned in 13.04% of the papers is the inadequate ecosystem collaboration, emphasizing the necessity of making sure that whole group of stakeholders is engaged. Effective implementation has in fact to be done at the ecosystem level through a cooperative collaborations between many stakeholders (Burstrom ¨ et al., 2021; Sjodin ¨ et al., 2023; Ritala et al., 2023). Therefore, the use of AI has increased the necessity for developing strong ecosystem relationships that enable superior data and cutting-edge technologies (Burstrom ¨ et al., 2021). This integration, which can be very complicated, depends on the presence of aligned goals, respectful management, sharing of intellectual property disputes, and lastly competitive dynamics. But bringing these entities' divergent interests and agendas into alignment poses significant difficulties and requires complex coordinating procedures (Madanguli et al., 2024).

Ultimately, 8.70% of the articles mention insufficient business management involvement. Often the IT department start projects without even involving the business executives sufficiently because of the lack of clear communication as managers are usually not really into data science technicalities while data scientists are maybe not aware of current financial situation of the company. For this reason, corporate leaders reject AI projects and prefer to rely on their own gut feeling. Furthermore, without the necessary funding that can only be approved by them, AI implementation projects tend to stall or even fail. (Leff et al., 2021).

The figure 1.13 below shows the barriers that companies encounter before or during the implementation of artificial intelligence (AI) within their system and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.13 Barriers for AI implementation

MENTIONS TO BARRIERS FOR AI IMPLEMENTATION

A bar chart showing mentions to barriers for AI implementation. The vertical axis ranges from 0 to 12. Bars from left to right:
- Organizational AI resistance: 10
- Ethical concerns related to brand reputation: 10
- Lack of skilled workers: 7
- Data control and data security: 6
- Customer resistance: 5
- High costs: 5
- Inadequate AI integration: 5
- Uncertain institutional environment: 3
- Lack of infrastructures: 3
- Deficient ecosystem collaboration: 3
- Insufficient management involvement: 2

Legend: ■ Barriers for AI implementation

Source: our elaboration (2024).

69.57% of the 23 articles that were examined address different practical approaches to implement AI technologies successfully.

The most often suggested among them, with 43.48% of mentions, is developing AI capabilities and training the employees. In order to successfully integrate AI, it's in fact critical to make the workforce competent and able to understand how to implement and manage effectively AI systems. Those capabilities should also be dynamic in order to enable value realization, discovery, and optimization but also to make the business ready to quickly adjust to the shifting consumer and market expectations.

Establishing a company culture that facilitates the adoption of AI among stakeholders is covered in 26.09% of the papers. Convincing employees that AI systems are compatible with the systems already used in the company is a first necessary step for the implementation of this technology. Another way it's to ensure a good technical assistance,

which should be able to help every stakeholder whenever it's needed. Managers should also rely on user-friendly design able to improve users experience and consequently encourage them to adopt AI systems (Sharma et al., 2022). Other than showing how much time and effort it can save to users, companies should also try to create a positive culture and awareness about AI through the mention of AI successful cases of other companies where this technology was implemented and where employees benefited from it (Abadie et al., 2024). Creating a positive culture around AI systems translates also in guaranteeing a high degree of transparency when those are used in the decision-making process (Shin, 2021) in a way that every decision taken and authorized by this technology is supported by precise explanations. Lastly, decision-makers should also be trained to improve their proficiency with AI (Chen, 2023) in order to maintain fairness in the decisions suggested by AI, maintain stringent data privacy policies and avoiding algorithmic discriminations.

In 21.74% of the articles, improving accountability and transparency is discussed. This is because by doing that it's easier to use AI in decision-making, where is important to give an explanation for the taken decisions (Booyse and Scheepers, 2023). It's in fact critical to make understandable the factors used for prediction, recommendation, or decision as the lack of transparency and explicability are among the biggest problems when implementing AI in decision making (OECD, 2023). By guaranteeing a high degree of transparency in the AI-powered decision-making, worries related to the quality of the decisions can be solved (Shin, 2021). Furthermore, researchers find out that AI should be continuously updated in line with the values like accountability in order to prevent discriminatory answers from the chat-bots for example. Lastly, accountability it's a very important factor now that companies use autonomous machines and vehicles for which is critical to know who should be blamed in case of incidents (Osburg et al., 2022).

21.74% of the papers mention investing in AI infrastructure, highlighting the necessity of having a strong system that includes physical computing power and skilled data handling. Developing data pipelines, it's also fundamental because of the amount of information that AI is able to process across various sources (Madanguli et al., 2024). Furthermore, investing in AI-using facilities might improve consumers' perceptions of those systems (Sharma et al., 2022).

Another action that managers should implement, mentioned in 21.74% of the papers analysed is the creation and orchestration of collaborative ecosystem, which are critical

for businesses to improve their relationships with customers but mostly to acquire AI skills from external sources such as startups (Madanguli et al., 2024). This ecosystem involves also customers with which is possible to co-create AI-enabled services that are close to their preferences but also to develop routines to share data and responsibilities among different actors, with the goal of achieving sustainability (Belanche et al., 2023). Furthermore, it's also important for companies to collaborate with companies such as OpenAI in order to fully utilize its advantages in the problem-solving and content creation field. By doing that, the decision-makers could exploit ChatGPT's capacity to generate value or address business challenges by integrating their ideas. Lastly, after a first introduction to the management of the company and consequent monitoring, the use of chatbot such as ChatGPT could be extended to the rest of the business, taking in consideration the first experience for identifying possible areas for development (Sharma et al., 2024).

21.74% of the articles mention the necessity of aligning AI adoption to firm's goals and values. The effective integration of AI systems within a company depends in fact on the alignment of this technologies with the business goals since the implementation process requires complex coordinating procedures (Burstrom ̈ et al., 2021). Furthermore, after making sure that those solutions satisfy the needs of all stakeholders, aligning the objectives of AI component and the ones of the whole organizational will be easier (van Eechoud and Ganzaroli, 2023).

17.39% of the papers address ethical considerations such as decrease of the employment rate and social inequality, highlighting the need for managers to take considerations also those negative effects of AI (Madanguli et al., 2024). Decision-makers should also make the use of AI as transparent and honest as possible by communicating with all the stakeholders which and how information have been processed. Employees' concern about AI implementation can be reduced by making them participate actively in all phases of this process, as in this way they could better understand the technology and its benefits (Van Esch and Black, 2019). Furthermore, managers should develop and follow an ethical framework for the use of AI in decision-making, which has to contain all potential risks that would harm the people within the organization.

8.70% of the articles discuss about risk assessment, a task that managers should perform in order to assess the possible problems that could derive from responses given by

generative AI systems and that could affect negatively the organization's reputations. Decision-makers should also check those responses with credible sources and validate them using their own expertise. It's also important to clarify that AI misalignment can be reduced through human input and for this reason companies should use trustworthy training data (Sharma et al., 2024).

The figure 1.14 below shows the practical solutions that companies should adopt for the implementation of artificial intelligence (AI) within their system and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.14 Practical solutions for AI implementation
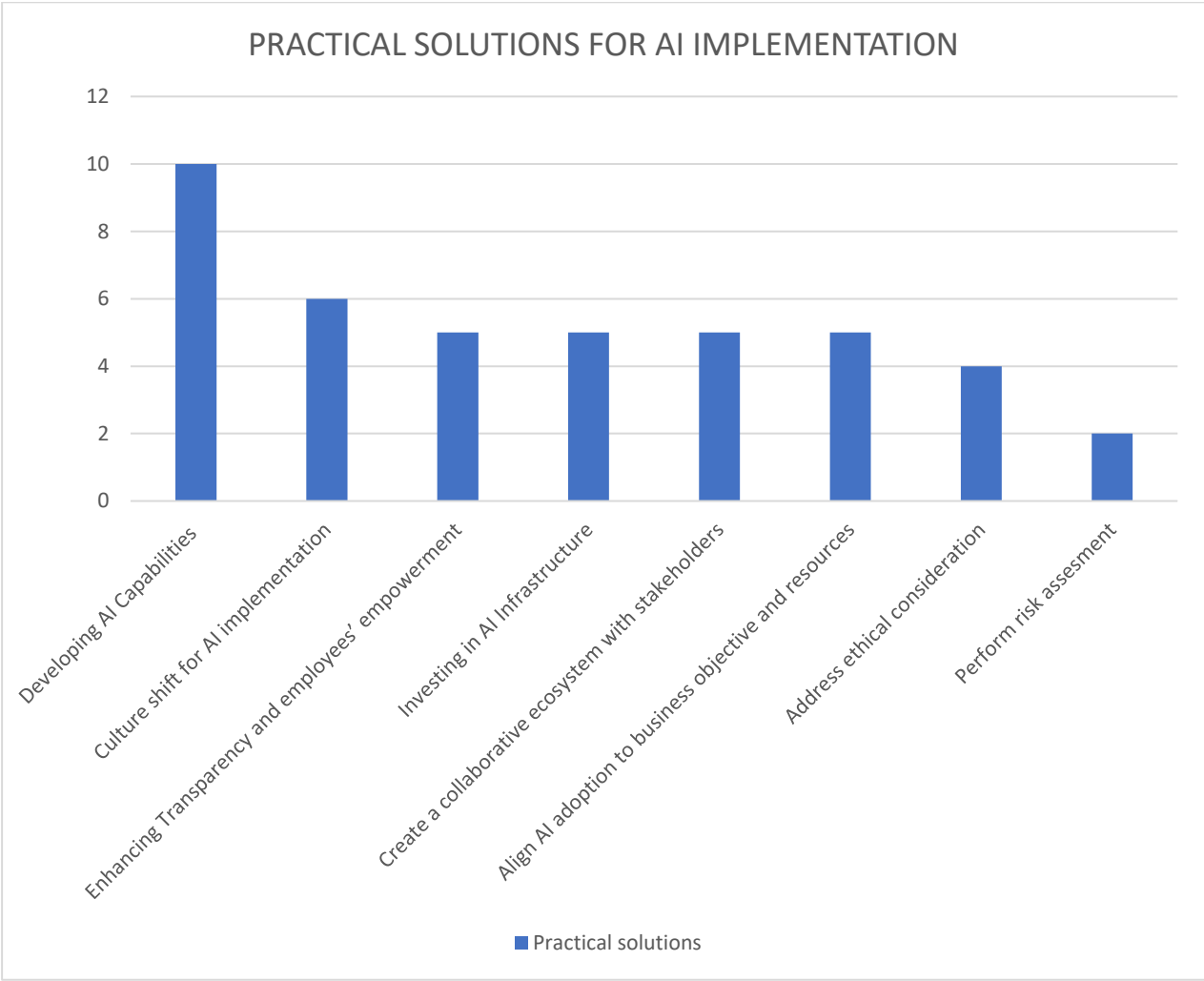
Source: our elaboration (2024).

The implementation and use of AI technology presents a number of challenges, which are the discussed in 82.61% of the 23 papers analyzed for this thesis.

The most cited challenge among these, with 30.43% papers mentioning it, is the integration across organizational and ecosystem levels. To develop an AI business model, it's necessary to make simultaneous efforts across different organizational dimensions. The obstacles that a company must face in order to implement AI successfully are frequently at many levels and in some cases they are not under the company's control as in the instance of policy actors and the community (Sjodin et al., 2023). Because of this challenge, decision-makers should adopt a multi-level and multi-actor point of view (Ritala et al., 2023) with which four different levels will be taken in consideration, the individual or team level, the firm level for the insufficient integration of AI, the ecosystem level for the inadequate collaboration and lastly the institutional level for the unclear regulations.

Assuring high-quality data is referenced in 26.09% of the publications. Data readiness is in fact an important factor for companies that want to implement AI, and this consists in the necessity for companies to have access to high quality data. This is because using information that don't satisfy requirements such as volume, quality, and availability would reduce the potential benefits in productivity and efficiency brought by AI implementation (Ghasemaghaei and Hassanein, 2019). Quality of data is a topic that is increasingly creating anxiety among companies as demonstrated by a survey conducted in 2023, which found out that the 53% of respondents working in the IT field feared that hackers may use growing version of generative AI like ChatGPT to create phishing emails that looked authentic (Statista, 2023).

26.09% of the articles address the topic of reducing bias and discrimination. Technologies like Gen AI can give great support to companies but on the other hand, the responses given could also be characterised by bias and discrimination, which could harm customers and the company itself.

Another topic, discussed in 26.09% of the articles is correct implementation of AI tools, which is highly challenged by the complexity of AI systems and the lack of skilled expertise. Establishing AI without specialized knowledge makes the implementation difficult as AI resources and the business model are intricately linked (Davenport, 2018).

21.74% of the articles discuss data protection, which highlights the necessity of having strong cybersecurity measures. This also shows that companies should preserve sensitive data, especially now that cyberattacks are increasing year after year. That is why managers should try their best to implement practices with the goal of avoiding those risks and invest in cybersecurity (Du & Xie, 2021).

It is mentioned in 21.74% of the papers that having an economic return on the high AI investments can be challenging. Often businesses decide to introduce AI without a clear strategy and despite the positive predictions about their AI investments, at the moment nearly 70% have reported little to no benefit (Leff et al., 2021). Furthermore, a research conducted by Ransbotham et al. (2019), showed that almost half of the respondents that committed significantly from a financial point of view, did not have satisfying commercial results.

Another important challenge faced by companies when implementing AI is mentioned in 17.39% of the papers and consists in finding adequate technical skills. There is in fact a positive relationship between workers' perceptions of their IT skills and the firm intention to invest in AI technologies such as chatbots (Eze et al., 2021). Therefore, if organizations want to successfully implement AI, their workforces must possess enough skills and capabilities to do that (Fallahi et al., 2022).

Overcome user skepticism is mentioned in 13.04% of the papers and it refers to questions and doubts about the practicality and effectiveness of this technology in customers' mind (Bergstein, 2020) which heavily affects the diffusion of conversational AI as a business solution (Beane et al., 2019).

A key additional problem that is mentioned in 8.70% of the papers is ensuring transparency, for which in order to gain users and stakeholders' trust it's necessary to invest in the openness of AI decision-making and processes. This is strictly related to the "black box," problem, for which users' willingness to interact with a technology is based on the level of trust in it. And if companies want to create trust in customers towards AI, they should be transparent and declare that they are using this tool.

The figure 1.15 below shows the challenges that companies encounter before or during the implementation of artificial intelligence (AI) and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.15 Challenges for AI implementation

CHALLENGES FOR AI IMPLEMENTATION
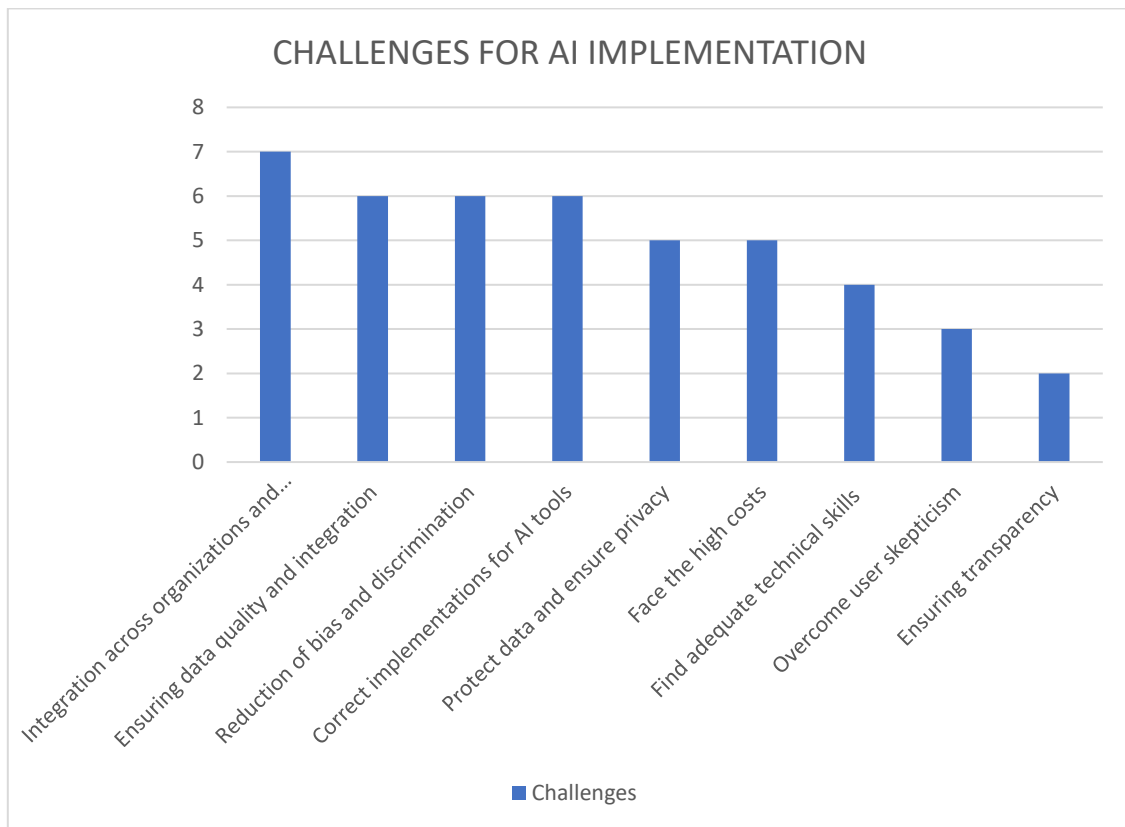
Source: our elaboration (2024).

The thesis on artificial intelligence (AI) examines the capabilities needed to use AI effectively, subject covered in 73.91% of the 23 publications that were assessed.

The most often cited of these competencies, found in 47.83% of the articles, is AI competency development, which encompasses technical knowledge. For the top management of a company is very important to know and comprehend AI technology. This means to know the prerequisites and competencies needed to successfully apply AI within a business and for this exact reason, the top management should have a strong aptitude for learning deeply how this technology works. This doesn't mean that the decision-makers should be IT specialists that know how algorithms function but rather just professionals who know how to implement AI, its potential benefits but also potential drawback. Those people should then be open-minded and ready to implement new and agile strategies that favour the development of innovative ideas. Therefore, to be competitive in the long-term the management and the rest of stakeholders should understand how to use AI effectively and keep in mind that AI is still in a phase of

development, so they should be patience and focus initially not only on the return of the investments but rather on the grow of essential competencies and adoption of new business models, which focus on innovation and that are more suitable for AI use (Jorzik et al., 2023).

Another crucial skill that is mentioned in 21.74% of the studies is data capabilities. Nowadays business have to compete in a data-driven business environment where information are a fundamental component for AI innovation (Yablonsky, 2020; Sjodin, et al., 2020). According to Sjodin et al. (2020), data capabilities are among the most important AI competences because current businesses require systems and processes that are able to adapt quickly and take decisions autonomously through the use of predictive informatics in a big data environment (Lee et al., 2014). It's also important to develop data processing pipelines to handle high-volume of data, to prevent data loss (Cohen et al., 2009) and also to exploit as many data sources as possible for data aggregation and acquisition (Akter et al., 2020). Furthermore, with technologies like internet of Things (IoT) is easier to gather detailed data from several connected devices or objects (Coetzee and Eksteen, 2011) and machine learning (ML) allows for data-driven innovation when dealing with large amounts of information (Hartmann and Henkel, 2018). Therefore, data capabilities are also strictly connected to data pipeline capabilities that allow businesses to generate new insights and to have a panoramic of the market where they are located through the analysis of information from multiple sources. Another action that IT employees should take is the creation of a centralized data warehouse that in this configuration would make more effective the use data to identify improvements (Sjodin ̈ et al., 2023). Lastly, managers should develop procedures for obtaining and working with data but also to protect them. It in fact might be challenging to process massive amount data securely and this is the reason why some companies don't allow to move their data across national borders.

13.04% of the papers discuss AI infrastructure and platform capabilities, which refer to the ability of maximizing value through the AI ecosystem in a way that different systems work together to reach the best possible outcome (Akter et al., 2023). Those capabilities are critical to enable AI value creation, and they are strictly related to digitalization capabilities that represent a precondition for the adoption of AI (Bag et al., 2021). AI infrastructure capacities are characterised by the development of three different

components: the AI platform architecture, the data pipeline, and the AI data allocation and management routine (Baabdullah et al., 2021; Bibri, 2021; Chauhan et al., 2022; Kusiak, 2022). This translates in the creation of processes for making easier data access and reuse inside the company and to create data pipelines able to store information (Sjodin¨ et al., 2023). Those capabilities include the firm's total assets and ability to collect and process data for decision-making (Mikalef and Gupta, 2021; Sjodin¨ et al., 2021) and they can bring benefits such as optimization of resources use, increased cost effectiveness, decreased waste, and increased customer value because of increased customizability from improved customer insights (Butollo et al., 2022; Chauhan et al., 2022). Despite that the platform infrastructure is not enough because without useable data is difficult to create value (Ben-Israel et al., 2020), so it is crucial to implement the right procedures to assist in organizing this data and use AI models (Sjodin¨ et al., 2023).

AI ecosystem orchestration capabilities are discussed by 13.04% of the papers and they consist in the ability, allowed by AI, to create value through collaborations with other entities. Companies have then to find the right partners and know how to collaborate with them in the long-term view and when client need a change, new partners should be taken in consideration (Kolagar et al., 2022). According to Nishant et al. (2020), if a company implements AI for sustainability reason there is a need for multi-level strategy that involves several players at numerous levels. There is also the possibility that the needed AI capabilities might not be present within the company so in this case businesses should exploit their ecosystem capabilities to identify the best partners for implement innovative technologies and reach objectives (Sjodin¨ et al., 2021, 2023). Furthermore, there should also be a cross-functional integration between employees from various departments for an increase in the overall organizational efficiency as this is allowed by AI. This technology is able to combine data that become useful to cross-functional teams, facilitating strategic work and effective decision-making. It also allows for practical and economical scaling throughout the company to improve competitive advantage (Crunchbase News, 2021). AI ecosystems can also be defined as the cyber-physical infrastructure required to use big data and machine learning models which can for example provide enhanced virtual shopping experience to users thanks to cloud-enabled and data-driven intelligent self-service systems. (Demirkan and Spohrer, 2014). According to Helfat and Raubitschek (2018) digital platforms should be characterised by the presence of employees with platform leadership and integrative capabilities in order to manage ecosystems and to

enable superior agility in the context of AI powered service innovation (Helfat and Raubitschek, 2018; Schilke and Helfat, 2018).

8.70% of the papers address AI leadership capabilities. Those capabilities divide in three subcategories, AI ethics, AI orientation and organisational learning innovation. The first regards the potential of AI to have a huge impact on society, with effects that can be both positive or negative. For this reason, moral guidelines to sustain the positive benefits of AI on society are being develop. However, the majority of those guiding principles are industry-specific, so they might be difficult to apply (Hagendorff, 2020). Because of that and according to Floridi and Cowls (2019) there are some values that managers and developers should follow when implementing AI. Beneficence to preserve human dignity and the environment; non-maleficence to ensure information security and privacy; autonomy to allows for decisions-making; credibility to prevent injustice caused by biases; and explicability to ensure openness and responsibility. Companies, in order to enable an ethical use of AI-powered innovations, should implement a more geographically, culturally, and socially diverse point of view (Floridi and Cowls, 2019). Secondly, AI orientation refers to the ability of managers to use AI effectively based on the market demand as businesses can achieve great results from the market-oriented direction of artificial tools (Mikalef and Gupta, 2021; Wamba-Taguimdje et al., 2020). The current market is now a dynamic business environment where customers now expect real-time solutions, and AI is a sophisticated technology able to offer tailored promotions to them (Davenport et al., 2020) and to improve a business's performance and market-oriented analytical skills (Hossain et al., 2021). Lastly, organizational learning refers to the critical component necessary to gain competitive knowledge (Patky, 2020). Managers must provide organizational learning facilities for all employees, such as AI and robotics, field that require higher competences (Fountaine et al., 2019).

8.70% of the papers address market knowledge capability, which consist in applying techniques such as industry, customer, and cross-functional integration to the businesses' market applications. Those methods allow to understand more deeply customers, the market and also to develop strategic marketing capabilities thanks to the growing computing power and greater use of big data analytics and machine learning algorithms (Huang and Rust, 2021). Industry orientation, a factor that can bring stronger competitive edge, gets even more important with the use of Artificial intelligence (AI). This technology

is in fact applied to industrial functions, technologies, and solutions with the goal of making the whole value chain more intelligent and productive (Zheng et al., 2018). Furthermore, by focusing on industry-oriented solutions like predictive maintenance (Immerman, 2020) through AI, it's possible to improve asset efficiency, process and output quality, new product creation and innovation, and increase employee productivity.

Process automation and augmentation capabilities are mentioned in 4,35% of the papers analysed. Artificial intelligence (AI) is a valuable resource because it can, through the processing of data, speed up and improve resource loops within an organization. This can become possible thanks to the automation of processes or the enhancement of human labour with the use of better data in the decision-making (Thomson et al., 2022). For companies is challenging to achieve both goals and to find a balance but prioritizing one over the other could cause negative long-term effects on the company itself and also on society (Raisch and Krakowski, 2021). In order to find a balance, it's necessary to invest in intelligent task distribution, computerized decision assistance, and ongoing stakeholder involvement. Intelligent work allocation is connected to the use of AI in relation to the automated and planned distribution of tasks and it is essential for maximizing resource usage and improve efficiency (Sjodin et al., 2021). The other great advantage of AI is that it can allow for an automated decision-making system by spotting trends and chances through the analysis of enormous volumes of data. Furthermore, the outputs of generative AI, can be implemented to enhance human decision-making (Thomson et al., 2022; Ross and Taylor, 2021) and increase agility by increasing workers' duties and decreasing their workloads (Shollo et al., 2022). Lastly it's also important to implement routines to increase stakeholder integration because this makes easier to align AI goals with the overall organizational goals (van Eechoud and Ganzaroli, 2023) and helps to make successful the commercialization of AI-enabled business model (Sjodin et al.,2023). Lastly, enhancing the integration with customers and ecosystem partner can also help overcoming multi-level and multi-stakeholder obstacles connected to AI implementation (Toorajipour et al., 2021). To do so it's necessary to carry out a stakeholder identification and mapping by identifying their roles, responsibilities, and levels of influence (Sjodin ¨ et al., 2023).

Integrated intelligence capability is mentioned in 4.35% of the articles and refers to the ability of a firm and its management to merge people and operations in order to enable

the implementation of AI. In order to achieve this, it's necessary to establish procedures for creating a data-driven culture, improving AI leadership, and increasing AI competency (Gupta and Mikalef, 2021). Therefore, in order to fully exploit AI capabilities, it's critical to swift from the traditional culture to a more innovative and data-driven one that promotes the use of data at all levels to utilize their full potential (Ångstrom¨ et al., 2023; Baabdullah et al., 2021; Spataro, 2023). One of the most important factors is the leadership support, (AlSheibani et al., 2020) which is able to convince employees of the benefits of this technology and to reduce the concern regarding downsides such as job loss and fear of change (Mutascu, 2021; Nguyen and Vo, 2022). Furthermore, a great coordination of personnel, routines, structures, procedures, and leadership is needed to implement effectively this integrated intelligence culture (Sjodin¨ et al., 2021, 2023; Mikalef and Gupta, 2021). Overcoming the historical silos it's then fundamental to use complementary resources and collaborate across departements (Keding, 2021). The usage of AI should then be made democratic and easily accessible within the whole company (Sjodin¨ et al., 2021) and consequently also at lower organizational levels. Lastly the leaders of the company must accept and believe in AI-enabled data-driven insights as a tool for decision-making. (Raisch and Krakowski, 2021) as they are also critical for the creation of an organizational environment that supports data-driven decision making in order to maximize the benefits of AI for the business.

Value discovery capability is mentioned in 4.35% of the papers and refers to the capacity to carry out customer intelligence and research of ecosystem solutions, which makes it easier to develop new AI-enabled business model opportunities. In order to develop this capability, it's necessary to create procedures such as active listening and operational data analysis. These routines are aimed to obtain knowledge about operating behaviour, weak spots, and objectives of their clients (Sjodin¨ et al., 2023). Operating procedures and customer preferences might in fact change significantly between markets or even sectors, requiring a data driven approach to new opportunities other than a close collaboration to know if the solution founded is aligned with the needs of the intended audience (Sjodin¨ et al., 2023). To understand the real ecosystem value is then necessary a certain degree of transparency and the establishment of collaboration with complementary partners, with which it's possible to exchange commercial details and knowledge.

4.35% of the papers mention then value realization capability, which refers to the organization's capacity to implement co-creation solution configurations and ecosystem value alignment, which allow to develop and use AI in industrial settings (Belanche et al., 2023). For this capability it's then critical to work in a co-creative configuration, factor that makes it possible to identify, create, and implement solutions for the most urgent needs of clients. Customers should be taken into account for the creation of the final product by incorporating them in the development process as they often don't know what AI can and cannot offer. In this way manufacturers and customers work together to create a more agile approach in which every option is tested to find the perfect solution in a more regulated, small-scale, and low risk setting that allows to spot and fix problems in the earliest phases of the process (Belanche et al., 2023).

Value optimization, mentioned in 4.35% of the papers, is crucial in guaranteeing the reconfiguration of routines and solutions as new innovations are introduced. It's a necessary capability for an effective implementation of AI solutions and the long-term value generation. The two fundamental actions that a company should take are platform value expansion and evolutionary solution optimization. AI is a solution that will keep changing and evolving within the company like in the case of sensors that produce an increasing amount of feedback and data over time, which could be used to improve the initial model. Also, customer expectations will change over time so it's necessary for companies to collaborate with them in order to align goals and maximize customer value. A way to do this is to take advantage of current ecosystems and infrastructures to create new goods and services that meet changing consumer demands. Lastly another reason to keep up a consumer interaction is to evaluate whether complimentary partners might offer greater value.

Model development capability, mentioned in 4.35%, refers to the ability of creating models where technologies like machine learning (ML) are used to carry out tasks without the need to be trained to do so. (Davenport, 2018a; Syam and Sharma, 2018). ML can be used with big data to find accurate market segmentation (Ahani et al., 2019) and to classify and create customer profiles in order to provide them with substantial value (Kiron et al., 2014). Despite that, ML techniques can be also dangerous like in the case of unfairness concerns arising from unprecise data (Chouldechova and Roth, 2020) and possible blind spots in the setting of reinforcement learning may have a negative effect on

the final item (Sun et al., 2020). That is why, managers that want to maximize the performance of ML models, should carefully consider bias risk and adjust the model and input characteristics after carrying out a deep error analysis.

Algorithm development capabilities, mentioned in 4.35% of the papers, refers to the ability of enabling fundamental cognitive functions of artificial intelligence such as forecasting the future state of the business activities through the use algorithms. To achieve AI capabilities is first of all necessary to create processes for AI development. Relying on algorithm development only externally through IT providers can be a risk due to a lack of industry-specific operational understanding. Therefore, identifying the internal scope of AI use and creating knowledge about algorithms demands procedures is fundamental. To set up AI models is therefore critical to have personnel with knowledge about AI but also about the area of application.

The last capability, mentioned also in this case in only one of the twenty-three papers is AI democratization. It has as main objective making the benefits of AI available to the entire company because this allows to produce data-driven insights and improve organizational operations. IT figures are not enough and that's why it is also important to let other employees to identify and test useful AI applications in order to enable the businesses to generate AI value for clients in a variety of application areas. Therefore, firms must exploit business and technical competencies to leverage as much as possible AI benefits and discover different use cases with a "learn fast and fail fast" approach that increase and foster AI experimentation culture. Establishing processes for cooperative application and collaboration with clients it is also needed to create future solutions and continuously improve the current offer services. Therefore, companies should invest in procedures to enable AI democratization with the aim of making the potential of AI analytics accessible and tailored to the specific needs of each user group. Establishing transparency and trust in AI among employees, teaching how this technology works, is another crucial component. This is possible through basic training and the appropriate support resources, like user-friendly systems and creation of procedures to enable non-experts to comprehend the insights that arise from the technology.

The figure 1.16 below shows the needed capabilities that the components of a company should possess for an effective implementation of artificial intelligence (AI) within their

system, and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.16 Needed capabilities for AI implementation

NEEDED CAPABILITIES FOR AI IMPLEMENTATION
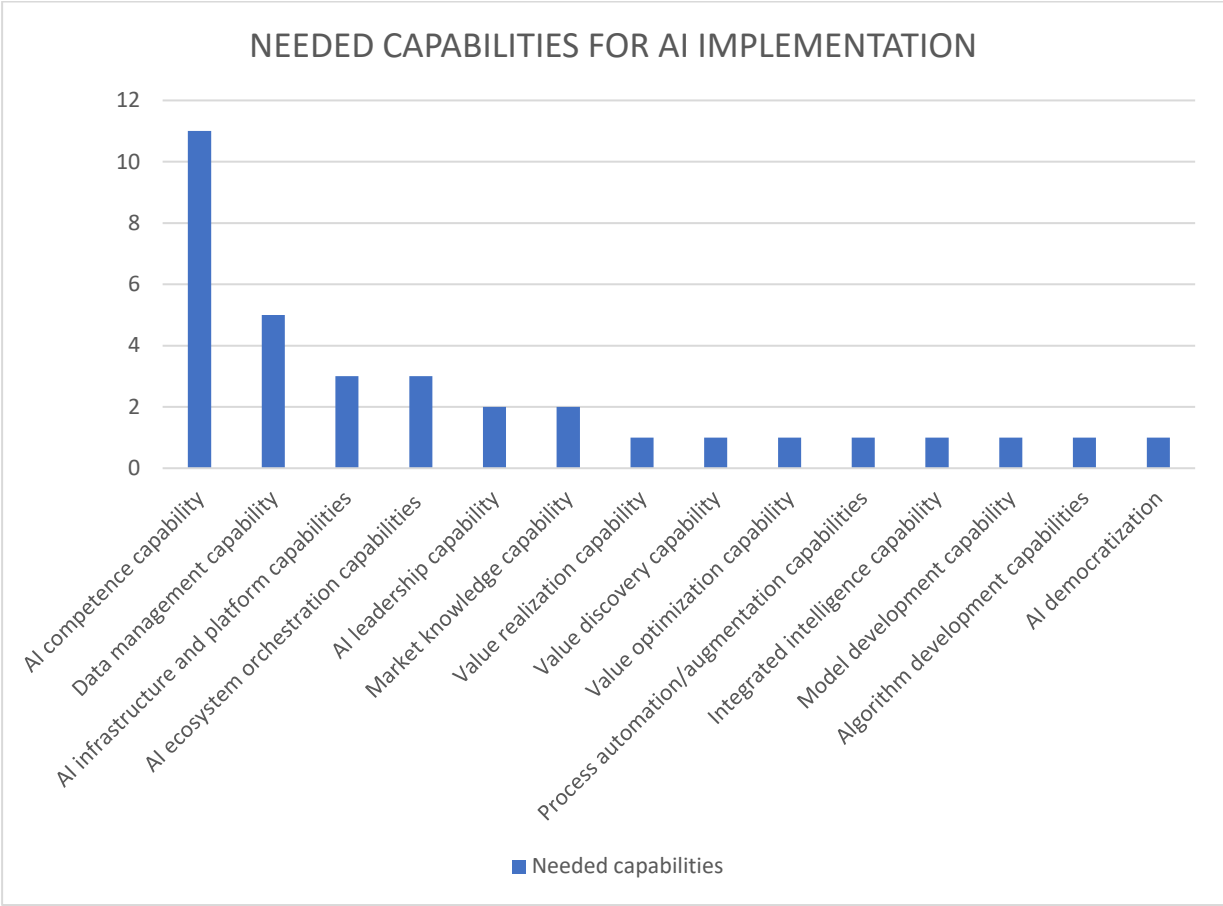
Source: our elaboration (2024).

Among the twenty-three reviewed papers several AI-related technologies have been mentioned.

With 65.22% of appearance in the papers, machine learning is the most often examined technology. It's a branch of AI that allows machines to learn and behave like humans when making decisions. ML assesses the real-world situation, identifies the trend, and provides a suitable solution for a wide range of problems but to do that it also needs ongoing practice in order to learn and produce good results (Rao et al., 2022). This technology can be useful in several industries, such as finance, telecommunication and manufacturing, and it has also been used for the identification and prediction of COVID-19 and other viruses (Sommer and Stjepandic, 2022).

With 52.17%, big data is the second most mentioned technology as it plays a critical role in finding and processing the incredible volumes of data required for AI model training. More in specific this technology can be defined as the assemblage of vast and heterogeneous data sets produced by multiple independent systems. The data-processing is extremely complex and at the same time useful because it allows to create valuable insights for making informed decisions by identifying patterns in the data and visualizing them (Wu et al., 2014).

39.13% of the papers discuss generative AI, a technology that through the use of an input is able to deliver different type of content such as text, images, and audio. This technology is able to deliver real-time responses to inquiries and cover themes similar to those of a human expert by combining supervised fine-tuning with unsupervised pre-training to clients (Kushwaha and Kar, 2021).

Furthermore, 13.04% of the papers discuss cloud computing, a technology that makes it easier to do utility computing in real time with minimal intervention from service providers by utilizing computational power, storage, and different networking resources without excessive user commitment or forecasting of critical resources (Kaur and Chana, 2014). In this way it's possible to avoid problematics such as delays, computational cost, and complexity (Xu et al., 2018).

In 8.70% of the publications, augmented reality (AR) and the internet of things (IoT) are both mentioned. Internet of Things can be defined as vast network of geographically dispersed sensor used to detect particular physical activities (Manavalan and Jayakrishna, 2019). So, it's a technology with great potential for carrying out activities such as real-time data monitoring, information extraction, and low-cost maintenance prediction. Furthermore, by communicating with other smart objects, IoT-based smart devices can gain much information for decision-making (Trappey et al., 2017).

A technology mentioned in only 4.35% of the papers is represented by robotics, machines that are able to carry out human duties in contexts like customer service or healthcare environments.

4.35% of the papers investigate blockchain technology, that offers a decentralized collection of distributed digital transactions. It enables a collection of unchangeable

records for each contributor and it could serve as the foundation for automated production and processes (Chen et al., 2022).

Similarly, 4.35% of the articles discuss 3D printing, also known as additive manufacturing, which facilitates the construction of a variety of intricate structures and geometries utilizing metal, iron, and plastic. This technology reduces manufacturing costs while at the same time produces high-quality items, is flexible, and speeds up the production process. Other advantages could be decrease of transportation costs and lower production waste (Pajpach et al., 2022).

The figure 1.17 below shows the technologies that have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.17 Mentioned technologies
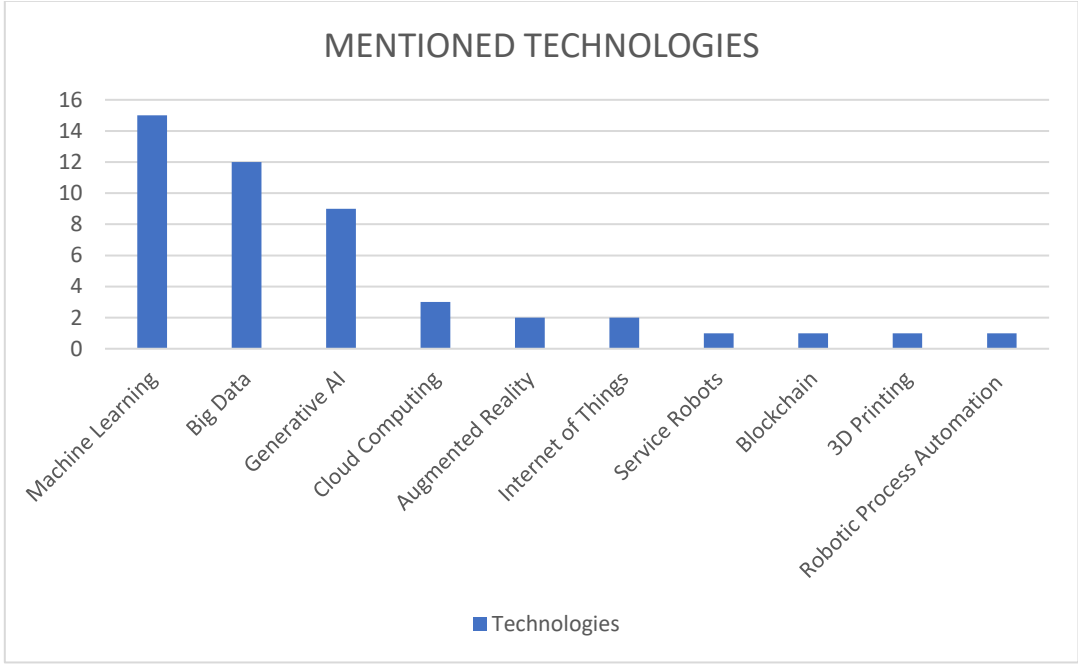
Source: our elaboration (2024).

The topic of changes in the workforce caused by the implementation of AI was covered by 86.96% of the 23 publications analysed.

With mentions in 69.57% of the articles, the topic of enhancement of human labor, is the most talked-about. This suggests that AI, despite the many side effects, has the ability for example to assist humans in increasing productivity and improving the quality of decision-making.

At the second place with 52.17% articles mentioning, there is automation of organizational tasks, emphasizing artificial intelligence's ability to automate and consequentially simplify repetitive and administrative tasks. In other words, artificial intelligence (AI) can be used for activities like the automation of decision-making through the use of machine learning or the use of AI-based chatbots to answer to clients' inquiries and requests 24/7.

30.43% of the articles discuss workforce training, indicating the importance of preparing employees for the implementation of AI. If people receive AI-based recommendations to enhance their performance, they are also more likely to find value in AI. Connected to that, companies with employees who judge positively this technology are more likely to see financial gains from its introduction (Ransom & Associates, 2022). Furthermore, usually employee resistance to using those solutions is a result of the organizations' ignorance about AI and IT knowledge acquisition could solve this problem (Jarrahi et al., 2022).

The psychological and social effects of AI implementation are underlined in 30.43% of the publications, with a focus on job insecurity and anxiety. People are now worried about the safe and moral application of AI technology like generative AI bots, and they emphasize how crucial it is to take into account the moral implications of those technologies, which should also be regulated by governments (Paul et al., 2023; Yilmaz and Yilmaz, 2023). Regulations should prevent unethical use of these technologies following an ethical framework and foster values such as information security and confidentiality. Lastly, as shown in previous paragraphs, AI systems are a useful tool to speed up decision-making but there could be ethical issues like biases, fairness, internal transparency, and interpretability (Kar et al., 2021).

26.09% of the papers mention job displacement, which consists in the gap between highly and lowly skilled workers. The latter is more likely to be automated. For this reason, leaders should give employees the chance to advance their skills and be transparent when AI will be implemented.

13.04% of the publications also discuss job loss, highlighting the possibility that AI will automate tasks and make some jobs obsolete. AI is in fact able to mimic human thought processes and through its perceptive, predictive, and prescriptive capacities, it can replace human involvement (Collins et al., 2021) (Sjodin ̈ et al., 2023). The topic of job

loss and job displacement will be discussed in the next part dedicated to those negative effects.

The figure 1.18 below shows possible impacts caused by artificial intelligence (AI) on employment and workforce dynamics, which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.18 AI's Impacts on employment and workforce dynamics
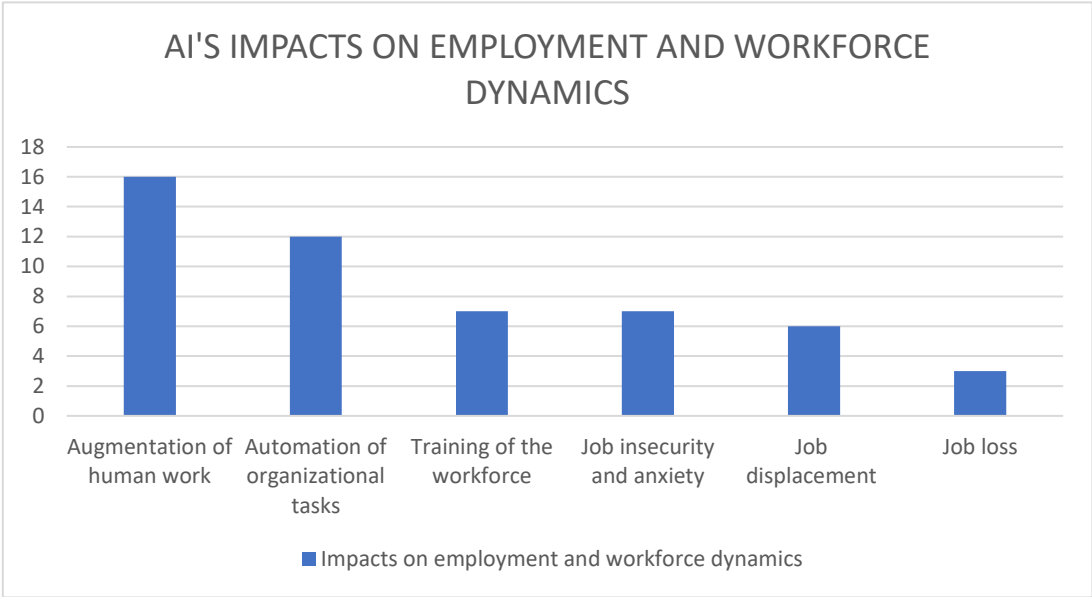
Source: our elaboration (2024).

Out of the 23 papers that were examined, 47.83% address theories or models.

The most stated theoretical framework among those is the Dynamic Capability View (DCV), which is referenced in 8.70% of the articles. This model aims to provide an explanation about how competitive advantage is created and maintained in unpredictable environments and may lead to dynamism in the external business environment (Matysiak et al., 2018; Teece, 2007). The factors that cause this environmental dynamism are intense competition, rapid technological changes, changes in customer preferences, and regulatory changes (Teece, 2009; Pavlou and El Sawy, 2011; Zhou and Wu, 2010; Qiu et al., 2020; Giniuniene and Jurksiene, 2015; Zhou et al., 2019). Dynamic capabilities are able to modify the organization's values in response to environmental changes by transforming organizational resources and capabilities in a repeatable routine using an evolutionary approach (Schilke et al., 2018; Helfat, 2007; Winter, 2003; Helfat and Winter

2011; Teece, 2009; Wang and Ahmed, 2007). According to Eisenhardt and Martin (2000), competitive advantage in dynamic markets is fragile and this is why an evolutionary reconfiguration of the organizational resource is needed.

8.70% of the papers cover the Unified Theory of Acceptance and Use of Technology (UTAUT). While (TAM), technology acceptance model is mentioned 4,35% of them. Those two models are considered as the foundation for research on robot acceptance. According to the technology acceptance model, the intention of consumers to adopt a technology is influenced by the perceived cost-benefit ratio (Shin and Choo, 2011). According to Kelly et al. (2022), the UTAUT model contends that performance and effort expectancies, as well as social influence and facilitating conditions from the user's environment have an impact on the intention to use or not a technology (Venkatesh et al., 2003). Lastly, variables such as gender, age, technological experience, and voluntariness of usage act as moderators in influencing the intention to use technology.

Another model mentioned in 4.35% of the articles is the Organizational Readiness for Change (ORC) which helps to understand how ready an organization is to make changes. Organizational readiness for change can be defined as the state prior to the start of an activity, where the level of cognitive, emotional, and behavioural preparedness for a change have been attained (Weiner, 2009). Another definition is the one of Clark et al. (1997), for which this term refers to the capacity and readiness of a company to carry out initiatives, such as innovation or general transformation. This status must be reached before starting any task within the business (Weiner, 2009) and for this reason the assessment should be done before trying to implement AI, in order to lower the likelihood of failure (Bharadwaj, 2000; Yen et al., 2012).

The Technology-Organization-Environment (TOE), mentioned in 4.35% of the articles, allows to understand the organizational, environmental, and technological elements that encourage or hinder businesses' adoption of a technology. It is in fact used to assess the differences between adopters and non-adopters of technology. The technology perspective refers to the innovative IT features that influence a company's capacity to implement novel technologies. The organizational perspective pertains to the company's characteristics that influence the capacity to implement innovations. Lastly, the environmental perspective refers to the context where the firm operates. Furthermore,

the TOE analyses factors such as relative benefit, cost, top management support, financial resources, and personnel capability (Belanche et al., 2023).

Another model mentioned in 4,35% of the articles is the Work System Framework (WSF), which examines the IT-reliant work system in an organisation (Alter, 2015). This model takes in consideration variables such as people, information, technologies, processes, products/services, customers, strategies, environment, and infrastructure.

The Trust in Technology Model (TTM), mentioned in 4,35% of the articles investigates how trust in a new technology influences its successful implementation. When unfavourable outcomes are possible, trust is essential (Belanche et al., 2021a; Mcknight et al., 2002). Trust can be based on the degree of humanness related to the technology (Lankton et al., 2015) and in the case of chat-bots for example, the presence of human-like traits, appearance, and communication qualities are judged positively by users (Belanche et al., 2021b; Cheng et al., 2022; Yen & Chiang, 2021).

Social response theory, mentioned in 4,35% papers, analyses how user react to the introduction of a new technology. According to the model people see computers as social actors even if they are aware about the machines being emotionless (Nass & Moon, 2000). This explains why using social features in chatbots, like name and avatar increase user's intent to use the technology (Gnewuch et al., 2022).

Lastly, another model used is one of the paper, which consists in 4.35% of them, is the Media Naturalness Theory (MNT), for which in-person interactions are the most desired for people to communicate as many aspects of them are lost in digitally mediated interactions. This explain why when using conversational AI bots that can effectively imitate humanized interactions with a sense of naturalness, better results are achieved. According to this model, media naturalness can be achieved through a reduction in cognitive effort, which refers to mental energy used by the user to interact with technology. Then there is the reduction in communication ambiguities as they lead to misunderstandings, and lastly an increase in physiological arousal that refers to the excitement experienced when interacting with the technology (Chandra et al., 2022).

The figure 1.19 below shows theories and models to analyse the impact of AI introduction on company and society, and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.19 Theories and models mentioned

THEORIES AND MODELS MENTIONED
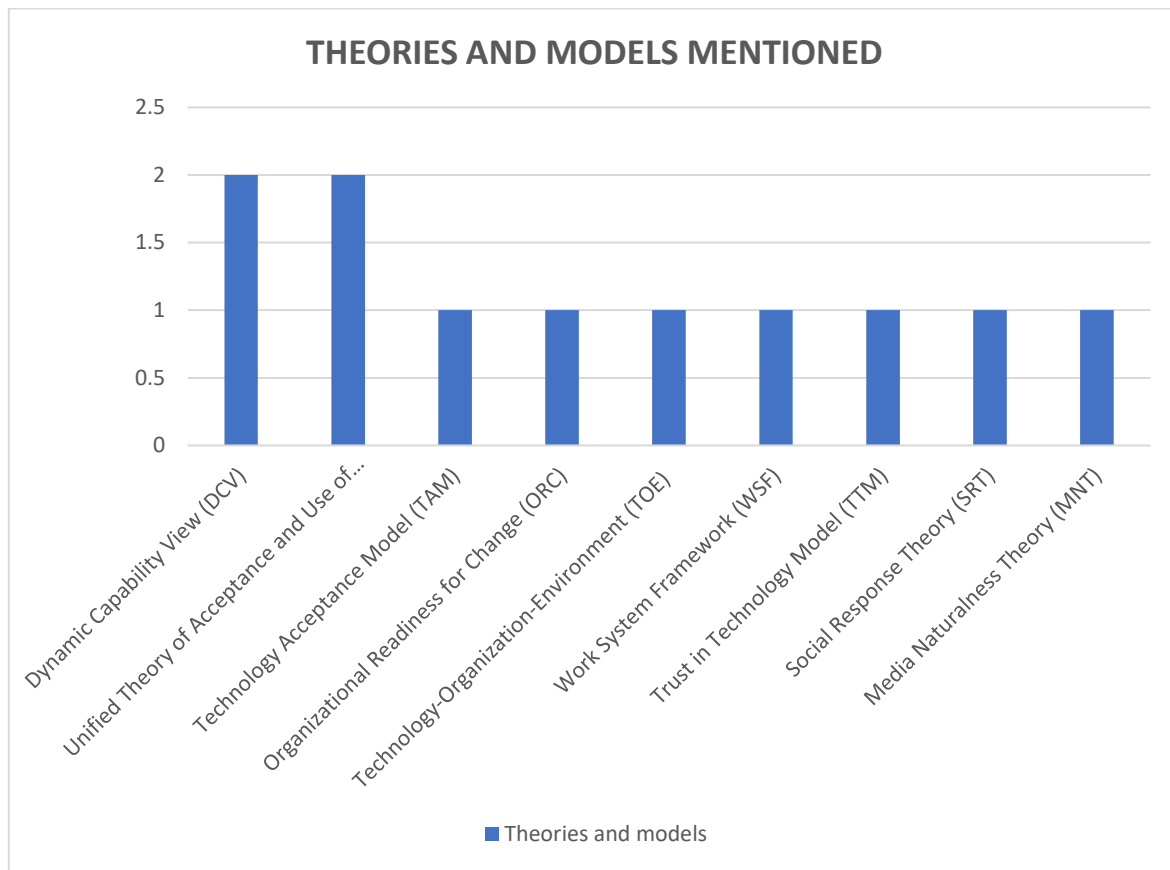
Source: our elaboration (2024).

This thesis on AI examines how AI is applied in different company departments and most of the twenty-three papers discuss about this topic.

Customer service and support, is the most mentioned function, appearing in 60.87% of the articles. AI can, other than increasing output while lowering costs, also improve the customer service. Through the ability of AI of gathering and evaluating customer data, businesses can enhance user experience by developing products or services based on their online activities and preferences (Fallahi et al., 2022). Furthermore, thanks to generative AI, companies can provide after-sales support, offering customized services, and raising customer engagement (Marr 2022). This is also possible by involving and co-creating with customers during the development process of new services (Sjodin ¨ et al., 2020; Gustafsson et al., 2012; Edvardsson et al., 2012) or adopting customer-oriented techniques to create superior services (S. Akter et al. Technovation, 2023). Furthermore, another technology like service robots, according to Borghi and Mariani (2021), enables

for higher levels of customer engagement and satisfaction compared to humans. Customer-orientation strategies exploit conversational AI customer service platforms like chatbots and AI-enabled customer services like welcome social robots (Huang and Rust, 2021). Latly, AI design tracks indications of customer unhappiness, which is critical for a customer orientation strategy that allows for the development of individualized customer support services (IBM, 2018).

In 60.87% of the papers, the topic of data analysis and decision-making are covered. AI opens up to new opportunities for the optimization of decision-making by improving a machine's capacity to learn, comprehend, and make decisions similar to those of a human brain (Yablonsky, 2020). This technology is in fact used to build systems able to stimulate intelligence with just little human intervention and turn traditional machines into intelligent machines that can take decisions about the production autonomously and with fewer errors compared to humans. AI also helps managers to handle business difficulties with a more efficient data management and by assisting them in figuring out how to best implement cutting-edge technologies to quickly enhance business processes and increase customer reliability (Fallahi et al., 2022).

Operations management is covered in 43.48% of the articles. AI-based strategies can improve operational performance and allow businesses to produce at the lowest possible cost and in a more innovative manner. Operational efficiency translates also in higher profitability and better customer experience and satisfaction as a company is more profitable the more efficiently it operates. Thanks to AI , organizations can create value by automating business processes and generating knowledge from data to support automated decision-making (Fallahi et al., 2022).

Marketing appears in 39.13% of the articles as AI can be used to process enormous quantity of data about customer preferences in order to improve understanding about them and apply the insights to create marketing campaigns. Furthermore, this technology is always more important in addressing marketing challenges to comprehend consumer psychology (Chung et al., 2016; Mende et al., 2019; Huang and Rust, 2021). A practical example could be the use of Generative AI as a tool used by companies in the creation of automated and scalable marketing personalization (Chui et al., 2022).

Research and Development (R&D) was mentioned by 34.78% of the 23 articles that were analyzed. AI can contribute also to this area through, for example, generative AI that

allows to expand research and development simulations and experiments (Chui et al., 2022). Thanks to the analysis of data on millions of customers' tastes and purchases this technology enables to develop and create new products and services that are aligned to emerging trends among customers (Nafizah et al., 2023). This technology allows in fact to create a close relationship between the customer and the business, which provides the desired products or propose new ideas based on the latest trends. According to Haefner et al. (2020), AI can support significantly the process of idea creation and development by overcoming the obstacles in information search and processing.

The sales department appears in 34.78% of the articles. AI and ML can identify intricate patterns and trends through data analysis and use the results to forecast future sales. Furthermore, algorithms can be trained leading to more accurate projections by analysing real-time sales data and creating insights about how client behaviour changes over time (Prakash et al., 2023). An example could be the use of AI in the automotive sector where cross-correlations are used in order to understand which variables, such as unemployment and inflation, impact the demand (Singh et al., 2023).

In 26.09% of the articles, finance and resource allocation are mentioned. AI allows to achieve the full potential of resources and consequentially boosts the financial performance and competitiveness. This technology can be used for example to predict residual value data, to know at which price point and speed products should be sold by analysing continuously data about different products and industries (Akter et al., 2023). In this field AI can also be used to detect more efficiently fraudulent activities and anomalous transactions.

Supply chain and logistics is mentioned in 26.09% of the papers analyzed. Through AI and the higher amount data analysed and use of algorithms, forecasts have been significantly improved and discovering opportunities in the market became easier. This technology enables better predictive models, used to adjust channel supply decisions and to maximize efficiency and minimize costs. Through prescriptive capabilities it's possible to know in advance the quantity of products that will be bought and consequentially to respond ahead of schedule and with minimal stock levels (Singh et al., 2022).

Manufacturing and production are mentioned by 21.74% of the papers. AI can be used to increase the efficiency the production in various way. One of those can be through its predictive capability that allows to know in advance the quantity to produce, to reduce

wastes or to predict possible problems to the machines for a timely maintenance. Furthermore, AI enables to increase the lifespan of machines and to detect problems in the production to ensure higher levels of quality.

The figure 1.20 below shows the possible departments where AI can be used, and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.20 Business departments where AI is used
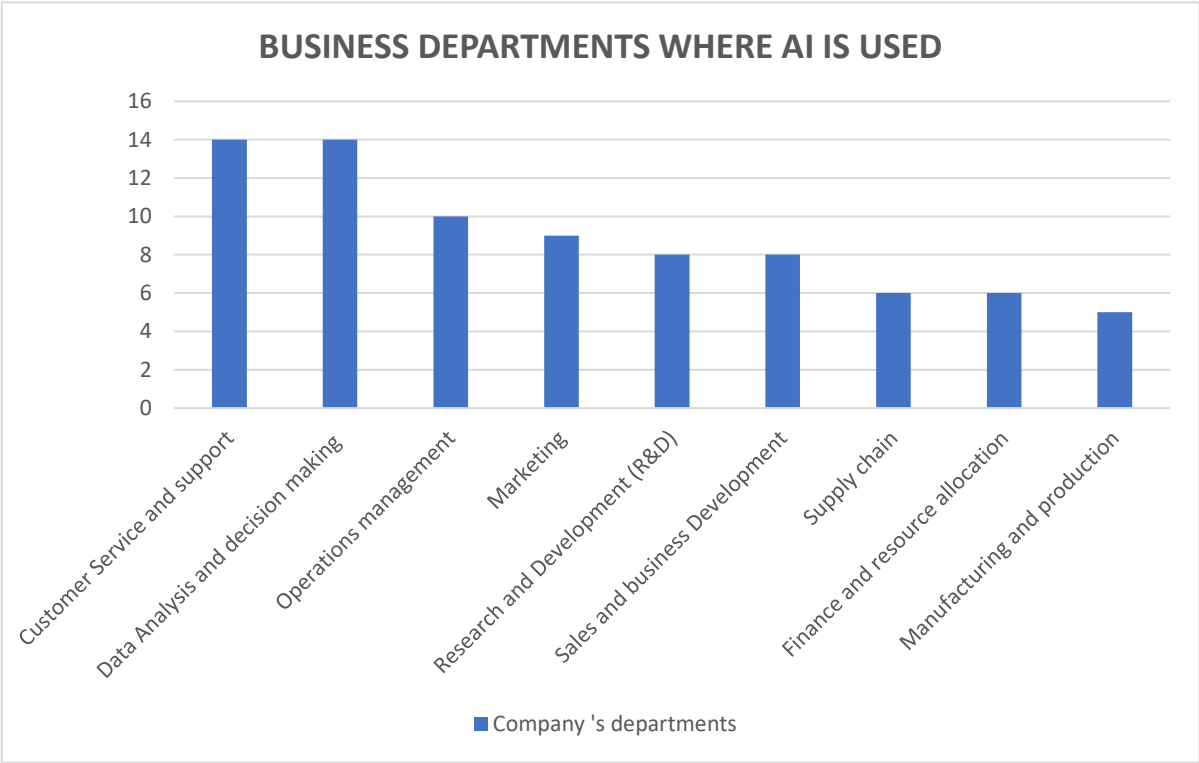
Source: our elaboration (2024).

The thesis analyses also two negative effects of artificial intelligence, employment loss and job displacement.

Notably, 26.09% of the papers address the topic of job displacement in particular, which is one of the biggest worries regarding AI's effects on workers. This technology requires in fact personnel upskilling and AI competency development (Sjodin ̈ et al., 2023) in fields like algorithm creation, database administration, and data analytics. (Mikalef and Gupta, 2021). So, this could cause a problem for unskilled workers that risk to lose their automatable jobs since AI has the potential to replace human labor. This is why, encouraging the workforce to adopt this technology can be a challenge (Raisch and

Krakowski, 2021). Therefore, workers need specialized upskilling to fully maximize their potential (Plastino and Purdy, 2018) and companies must organize training to implement new technologies (Sjodin ¨ et al., 2021). In emergent countries, characterised mostly by unskilled workers, the introduction of AI and the consequent disruption and automation of repetitive and routine tasks (Agarwal et al., 2022) could cause mass unemployment and the need for reskilling (Jorzik et al., 2023).

Secondly, employment loss is mentioned in 13.04% of the articles, and it's considered by Kar et al. (2021) as one of the major barriers to the implementation of AI. This is because an increasing number of jobs will be threatened by the automation allowed by this technology (Agrawal et al., 2022; Dwivedi et al., 2021). But even if language models can decrease the need for human labour, also new jobs will be created. Researchers are worried that chatbots may eventually take the place of human workers that have occupations less likely to be mechanized till a few years ago, but that now may become more automatable for the advancements of the technology (Bates, 2019). Managers should in fact invest time and resources in convincing the employees about the benefits of AI technology and removing their concerns about their job loss since employee trust in AI is a crucial concern.

The figure 1.21 below shows the distribution of two possible effects of artificial intelligence (AI) on employment mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.21 Mentions to job displacement or job loss
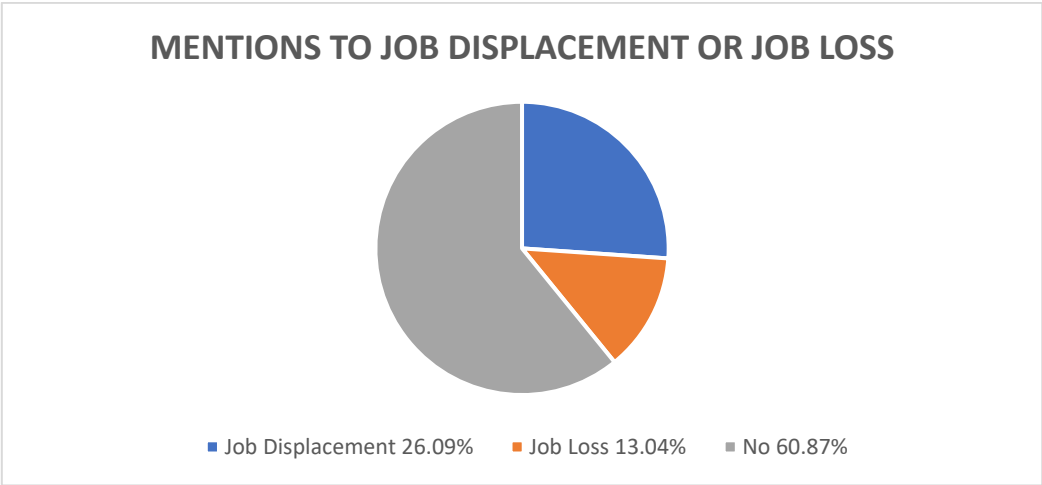
Source: our elaboration (2024).

Less than half of the evaluated publications, 30.43% of the 23 studies, explore the policy implications related to the use of AI.

The most often mentioned regulations, which appear in 26.09% of the articles, are those that prevent AI technologies from negatively impacting social equity and acting unethically. Among the possible cases of unethical use of AI, in specific of the generative one, is the use of deep fakes, which can seriously undermine the legitimacy of individuals, organizations, and governments. For these reasons, governments should create laws that will keep under control the use of this technology (Meskys et al., 2020). With technologies such as social robots it became important for policymakers to provide clear guidelines and policies to ensure responsibility and ethics in their application. The laws should aim for bias reduction, increase liability and data protection when dealing with those types of technology, in order to help organizations and individuals in understanding their responsibilities when using social robots like ChatGPT (Budhwar et al., 2023). Furthermore, governments, through a deep examination of the technology effects on the economy and society, would better comprehend how they work and how to implement strategies to mitigate any adverse effects while at the same time taking advantage of the benefits (Sharma et al., 2024).

Incentives for innovation and financial support for small and medium-sized businesses (SMEs) to use AI are covered in 17.39% of the publications. Policy makers should in fact give importance also to microbusinesses because at the moment the focus is frequently only on bigger types of firms. Policies should boost digital skills, technological awareness, and digital adoption through non-financial support like counselling or mentorship services, tax breaks for technology investments or direct financial support like grants for firms that want to adopt cutting-edge technologies. National policies should also encourage creativity by supporting the innovation process through the creation of data access rules and digital technology adoption promotion policies (Nafizah et al., 2023). The regulatory environment where an organization operates has a direct impact on that company's innovation (Fast et al., 2023) and most nations do not really have developed legal frameworks to regulate this innovative technology. In general, for emerging technologies like generative artificial intelligence there aren't many established networks of regulatory authorities (Kshetri & Dholakia, 2009) and to close this regulatory gap, industry groups and professional associations can offer a certain level of institutional

coordination (Kshetri, 2018). The European Union with the EU's AI Act, for example, targeted "high risk" applications of AI, and artificial intelligence (AI) systems that produce complex text, like chatbots, have been inserted in this category.

13.04% of the articles stress the policies that are required to safeguard the privacy and data security of consumers. The use of AI raises concerns also in the privacy area for which private and sensitive data could be used, for example, to establish blacklists based on variables such as education level ratings and past behavior (Chen et al., 2023).

Another area of policy that is referenced in 13.04% of the articles is infrastructure development, which have as main goal providing the needed technological foundation to support the AI adoption by businesses (Sharma et al., 2022). Governments can in fact assist companies by investing, for example, in 5G and broadband networks.

Lastly governments, according to Sjodin (2021), should also work closely with researchers and business professionals to gain knowledge about positive and negative implications and potential uses of AI social robots. Regulations should try to reach a balance between fostering innovation and guaranteeing responsible implementation. And this is possible through the collaboration between policy makers and developers with frequent dialogues and information sharing for well-informed decision-making (Sjodin ̈ et al., 2021). Policymakers should also establish industry standards and certification procedures that developers have to follow and that would guarantee values such as security, clarity, and system dependability. Those certifications, if the AI technologies meet the required criteria, can reduce possible hazards and foster confidence in their use. Lastly, gaps in the policies should be find and corrected, as well as routinely assessed for their efficacy and to keep up with technological changes (Fallahi et al., 2022).

The figure 1.22 below shows the possible policies that governments should adopt in relation to AI use and, which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.22 Policy implications related to AI use
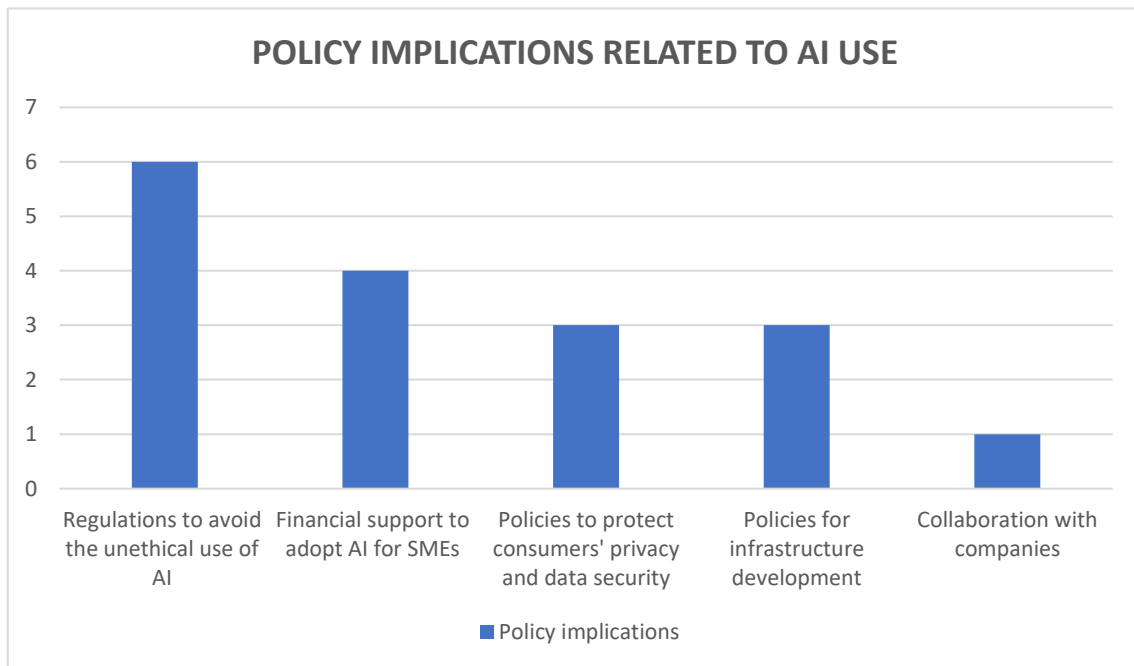
Source: our elaboration (2024).

The pandemic COVID-19 is discussed in just 21.74% of the 23 publications that were reviewed.

In 8.70% of the publications, it is mentioned that the pandemic has accelerated the phenomena of digital transformation. COVID-19 has for sure increased the interest in the use of innovative digital technologies like artificial intelligence (AI). This happened in sectors like education where the disruption heavily affected practitioners, students, and educational institutions (Williamson et al., 2020b; Watermeyer et al., 2021).

With the same number of mentions, also the increase in the use of Big Data has been mentioned. In case of pandemics, technologies like AI and Big data are very helpful as they allow to gather great amount of data produced by multiple independent systems. Three important areas where big data is becoming always more crucial are viral prevention, virus transmission, and COVID-19 infection monitoring (Oatley, 2022). Furthermore, Machine learning, which helps machines learn and behave like humans when making decisions, has been used in the identification and prediction of COVID-19 and other prevalent viruses (Sommer and Stjepandic, 2022).

In 4.35% of the articles, the employment of social robots for safety purposes is discussed. This technology was used as supportive aid in healthcare services because of pandemic-

induced restrictions such social separation and quarantine (AymerichFranch, 2020). They carried out duties like patient monitoring and supporting medical staff, contributing to the containment of the COVID-19 pandemic (Javaid et al., 2020). Social robots can therefore take care of people well-being in the event of a pandemic (Yang et al., 2020) as it has been demonstrated that isolation and quarantine policies have a negative impact on people's general and mental health (Violant-Holz et al., 2020). Social robots have also been fundamental for facilitating the connection between patients and caregivers, monitoring of the risk of infection and restoring minimal social interactions to support the effective enforcement of the social distancing during the Covid-19 pandemic (Yang et al., 2020; Aymerich, 2020).

The figure 1.23 below shows some of the effects of Covid 19 in the use of new technologies like AI and which have been mentioned or analyzed in the papers taken in consideration for this thesis.

Fig. 1.23 Mentions to covid 19
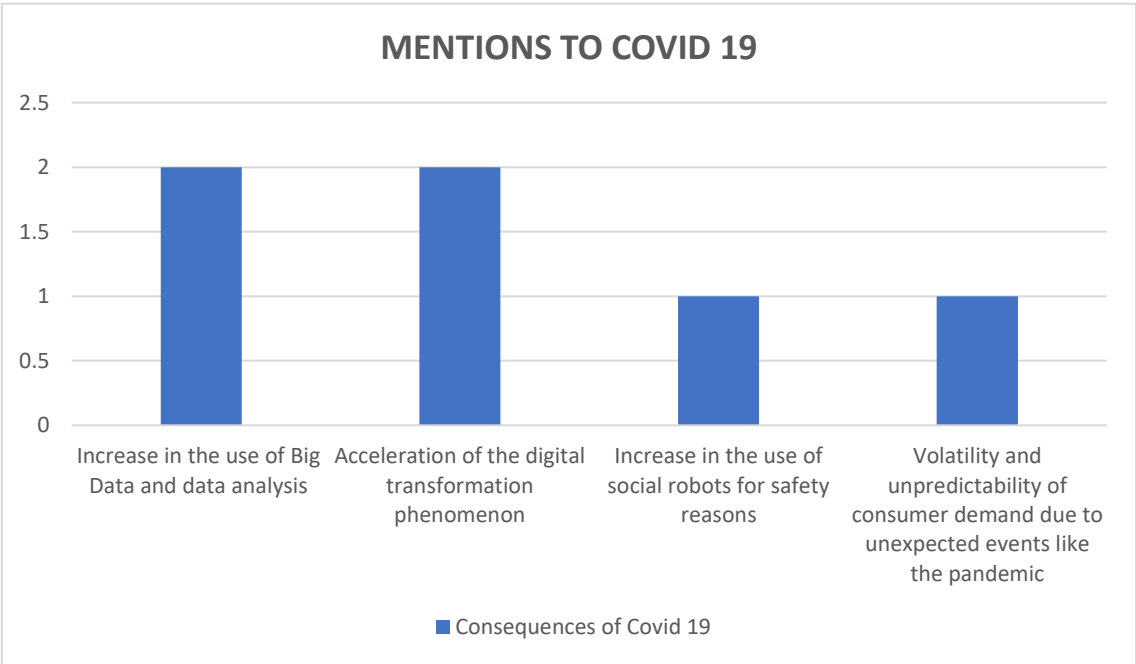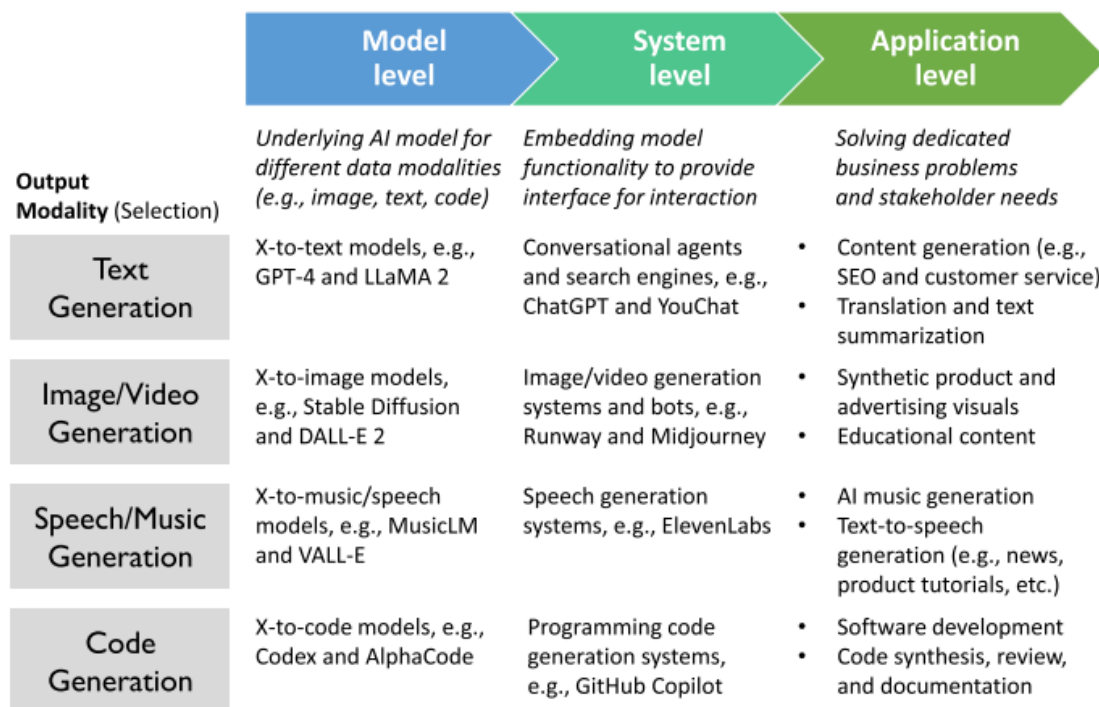

Source: our elaboration (2024).

Chapter 2: the Mirai case

2.1 Chapter introduction: Generative AI

Generative AI is one of the branches of artificial intelligence that can provide business organizations with enhanced computational and problem-solving abilities compared to humans (Abadie and others, 2024). The term generative AI encompasses computational techniques that can generate new and meaningful content such as text, images, or audio from training data (Feuerriegel et al., 2023). In ten years, this technology might raise global gross domestic product (GDP) by 7%, increase productivity growth by 1.5% and replace 300 million jobs according to a report of Goldman Sachs (2023).

The following image 2.1 shows possible applications of the technology and the platforms that offer those kinds of services.

Fig. 2.1 Possible applications of Gen AI

| Output Modality (Selection)	Model level *Underlying AI model for different data modalities (e.g., image, text, code)*	System level *Embedding model functionality to provide interface for interaction*	Application level *Solving dedicated business problems and stakeholder needs*
Text Generation	X-to-text models, e.g., GPT-4 and LLaMA 2	Conversational agents and search engines, e.g., ChatGPT and YouChat	• Content generation (e.g., SEO and customer service) • Translation and text summarization
Image/Video Generation	X-to-image models, e.g., Stable Diffusion and DALL-E 2	Image/video generation systems and bots, e.g., Runway and Midjourney	• Synthetic product and advertising visuals • Educational content
Speech/Music Generation	X-to-music/speech models, e.g., MusicLM and VALL-E	Speech generation systems, e.g., ElevenLabs	• AI music generation • Text-to-speech generation (e.g., news, product tutorials, etc.)
Code Generation	X-to-code models, e.g., Codex and AlphaCode	Programming code generation systems, e.g., GitHub Copilot	• Software development • Code synthesis, review, and documentation

Source: Feuerriegel et al. (2023).

The most famous example of this technology is without a doubt ChatGPT, the AI language model that is quickly and profoundly changing the working and educational sector. Its importance is proved by the fact that in just two months after its introduction it reached

over 100 million users (Belanche et al., 2023). This provider, through the use of generative AI, is able to generate complex content such as marketing campaigns or programming software in answer to user prompts (Chui et al., 2022; Abadie et al., 2024). Within organizations and across a wide range of industries, this tool can be used to facilitate automated marketing, expand experiments for R&D, or to provide employees with answers to intricate risk and legal questions (Chui et al., 2022). Lastly, managers by embracing this technology within their organization can increase productivity and competitive edge while at the same time changing a customer's service interaction with innovative interactive experiences. (Abadie and others, 2024).

Figure 2.2 below shows the result of a McKinsey research (2023), for which generative AI can have a positive impact on several business functions, but just four stand out for the technology's impact as they could achieve 75% of the total annual value from this technology: customer operations, marketing and sales, software engineering, and lastly research and development.

Fig. 2.2 Gen AI impact on different business functions
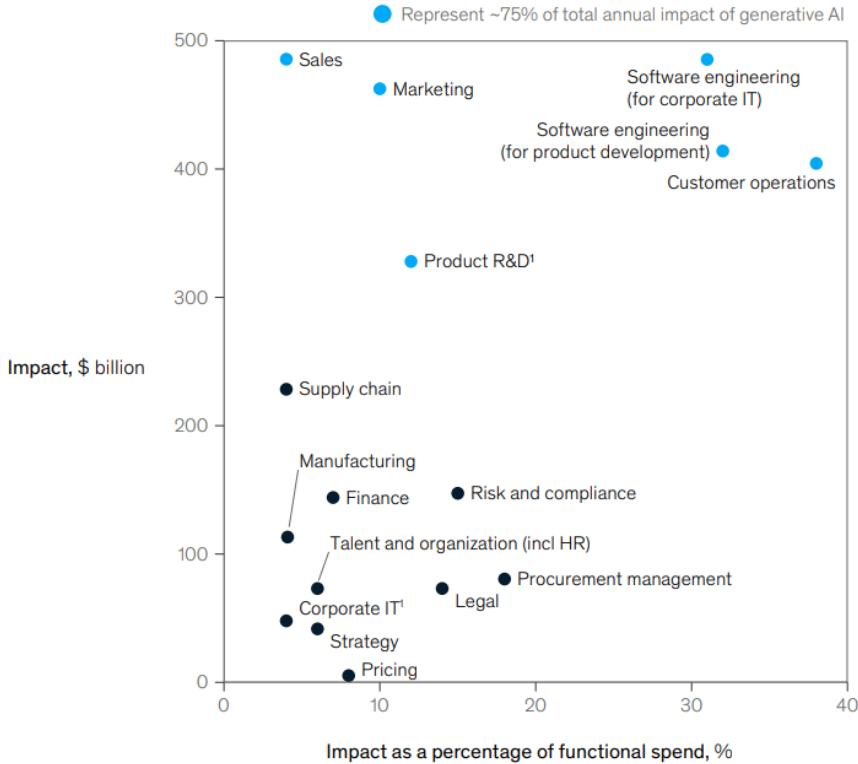
Source: Chui et al. (2023).

The business sector is therefore a field that can really benefit from such emerging systems (Adiguzel et al., 2023; Dwivedi et al., 2023) as proved by the fact that almost half of US companies have started using ChatGPT because they see generative AI, as a new way of information sourcing for decision-makers with higher interactivity, responsiveness, and accessibility (Kanitz et al., 2023). The difference is notable as historically data were found through different sources of information (Dwivedi et al., 2023a; Dwivedi et al., 2023b; Korzynski et al., 2023) and with restrictions connected to human barriers such as cognitive limitations, lack of information, and time pressure (Cristofaro, 2017; Dwivedi et al., 2023a; Dwivedi et al., 2023b; Kanitz et al., 2023). This technology can therefore assist employees at all organisational levels, enhancing their productivity and quality of decisions (Dwivedi et al., 2023; Kanitz et al., 2023; Mich and Garigliano, 2023; Yilmaz and Yilmaz, 2023).

Despite the benefits, there are also controversial issues of generative conversational AI, such as the credibility of the sources of information and safety of data (Dwivedi et al., 2023). This last factor is even more critical if we consider that companies, in order to increase decision-making efficiency, divulge a considerable amount of confidential organisational information (Biswas, 2023). This was demonstrated by a research of Statista (2023) where it was found out that 3% of employees inserted sensitive data on ChatGPT. Therefore, other than great opportunities, this branch of AI presents also ethical and legal challenges that may lead to disastrous results. But despite that, refusing to use this innovative technology translates in renouncing to business development and rapid scientific advancement (Biswas, 2023a; Calvillo, 2023; Dwivedi et al., 2023; Duan et al., 2019).

2.1.1 Importance of Gen AI in operational efficiency and strategic innovation

Generative Artificial Intelligence can, as mentioned in the previous paragraph, produce original content such as text, images, or videos. But it can also be used for more important tasks like assist the management in the decision-making process and improve the efficiency in multiple areas. An example could be the use AI chat-bots based on Generative AI technology, which can enhance the shopping experience of customers and allow to have higher control levels on the supply chain through increased tracking and visibility (Al-Khatib, 2023). Gen AI is a new application of AI that can also favour innovation

through the development of virtual business environment where complex scenarios can be simulated and tested (Bilgram & Laarmann, 2023).

2.1.2 Practical implications for Gen AI providers

Providers of solution based on Gen AI should highlight the benefits and limitations of this technology. Since complexity is a negative factor connected to the adoption of this technology, developers should also invest in the user experience and provide the necessary training and continuous assistance to the personnel that deal with AI, in order to reduce the possibility of malfunctions or problems (Al-Khatib, 2023). On the other side, companies that implement the technology should invest time and resources to increase employees' awareness about the importance of Gen AI over previous technologies in the way it can help to improve daily operations. It's also important to provide the appropriate infrastructure to utilize such technology and develop an organizational culture that incentives employees and decision makers to see positively and support AI. Lastly managers must also consider the perception of customers to understand their expectation from firms they trust, as it in this way it's possible to implement Gen AI more effectively and get more customer data to create new insights about their needs and desires. Lastly, investing in the infrastructure is not enough as organizational capabilities are required to integrate this technology and to fully exploit its advantages (Al-Khatib, 2023).

2.2 Case study: MIRAI

2.2.1 Company presentation

Mirai is a technology start-up, as explained by CEO Matteo Rizzo, founded in March 2024 and specialized in the development of solutions based on generative artificial intelligence for operational efficiency and strategic innovation.

It was initially started with the idea of accompanying companies in the adoption and use of artificial intelligence. After an initial analysis carried out in various companies to understand what was actually useful to improve their performance, a common denominator was discovered, which was the deep analysis of data. The company also found out that to facilitate the adoption of AI it is important to offer a training path that explains the lights and shadows of the technology within the company itself. The focus

was then concentrated on a branch of artificial intelligence, which was strongly pushed by the release of chat GPT, which is generative AI. Subsequently, a first beta was developed, which is precisely a tool based on generative artificial intelligence that allows through the use of natural language, to obtain insights on the company thanks to an in-depth analysis of the data provided.

The company with its service aims to cover two main areas: the one dedicated to operational efficiency, which is reachable through the prediction of results, process optimization and lastly image recognition. The latter is connected to the fact that among the documents provided by the client there are also tables, images, and through the system it is possible to extract information from these graphic elements. The other area focuses on the strategic innovation of the company's product, processes and lastly business model.

2.2.2 MIRAI Business Model

Mirai's business model therefore aims to support client companies in pursuing both operational efficiency and strategic innovation.

The company uses a proprietary database that is the result of an in-depth and constantly updated analysis of over 650 startups worldwide, which covers every sector of artificial intelligence (AI), with a particular focus on generative AI.

Through this careful examination, Mirai is able to understand the current market offer and the potential of AI in the various sectors and then subsequently adapt the advantages of generative AI to the specific needs of companies. It also allows Mirai to analyze companies and optimize existing solutions starting from those already in use.

The start-up offer to its clients is composed of six phases in which the database is continuously queried to understand which are the most innovative and efficient solutions to guarantee the integration of business processes with the use of Gen AI. The first phase is the introduction to generative Gen AI for which an introductory lesson is held on the possible applications of the technology within the company in order to provide a complete overview of how it can represent a fundamental tool for the optimization of processes and promoting innovation. The second phase consists in interviewing the managers of the business units (BU) in order to identify the business areas that could benefit most from the adoption of this technology AI Gen. The third phase consists in brainstorming sessions

organized with the managers of the business units to develop the ideas related to the use cases identified, which are then inserted into a matrix to analyze their impact and feasibility. In the fourth phase, the projects are presented to the CEO / board in order to show them the benefits that Gen AI could bring to the company. In the fifth phase, there is the development of the custom proposal. More specifically there is the implementation of the selected project and the creation of a pilot project that will concretely demonstrate the potential of AI Gen applied to business processes starts. The sixth and final step consists in the formulation of a strategic plan to make the company AI Gen driven.

2.2.3 The company's mission and vision

The current mission of Mirai is to consolidate itself as a company capable of providing high-quality products in terms of generative AI, relying heavily on research to have strong academic foundations and at the same time accompanying companies in its adoption. The vision is to become a long-term leader at a national level and with respect to medium and large companies for the implementation and production of systems based on generative artificial intelligence. The company is currently aiming to use more manpower than necessary to create a high-quality project that can then be reused, consolidated and resold.

2.3 Methodology

This case study relies on a qualitative methodology based on a semi-structured interview on a single case study to evaluate how generative AI can impact positively the performance and quality of decision-making of a company. To understand that a semi-structured interview to Matteo Rizzo, the CEO of Mirai, was carried out as reported in the following Table 2.1

Tab 2.1 Data collection process

Methodology	Object
Semi-structured Interview	CEO of Mirai

Source: our elaboration (2024).

The table 2.2 below shows the eight semi-structured interview questions. Every question is connected to references from the literature analysed in the previous chapter and to potential response of the person interviewed. An interview with the CEO of the company has been carried through a remote call that lasted 1 hour. Furthermore, the interview has been recorded and transcribed, in order to highlight the main findings.

Tab. 2.2 Research protocol and semi-structured interview questions.

Interview question	Potential/Expected answer	Reference(s)
1) What are the main advantages that a company obtains by adopting Generative AI technology?	1. Enhanced productivity 2. Enhanced decision-making 3. Automatic creation of marketing campaigns	(Dwivedi et al., 2023)
2) What are the key challenges faced when a company adopts Generative AI technology?	1. Data quality and bias 2. Interpreting and understanding the model's output 3. Privacy and security 4. Ethical concerns	(Dwivedi et al., 2023)
3) Does Mirai consider the quality and credibility of generated content important? How is it maintained?	1. Critically reviewing and assessing the content 2. Seeking authenticating evidence from trustworthy sources 3. Defining the key standards that determine the feasibility and usability of generative AI.	(Baabdullah et al., 2024)

4) How can generative AI technology support decision-making?	1. Through the expanded information sources enabled by AI	(Xuan, 2024)
5) What are the main barriers which hinder the Generative AI technology implementation?		
6) What are the determinants for trust in generative AI technology services?	1. The interaction between conversational cues and perceived functional and social attributes. 2. 'Humanness' of chatbots	(Lankton et al., 2015)
7) How do you see Generative AI disrupting current business models and creating new opportunities in your industry?		
8) What is Mirai mission and vision?		

Source: our collaboration (2024).

2.4 Findings

Table 2.4 summarizes the responses provided by the CEO Matteo Rizzo during the interview.

In the first question about the main advantages that a company obtains when it adopts Gen AI, the respondent explained that this technology has among its most interesting benefits, that of offering the possibility through a natural language interface to perform complex operations that would normally require specific knowledge, in a simpler way. Through this technology, a multitude of data is processed to help managers make decisions. According to the CEO of Mirai, the most interesting element at the moment of Gen AI and linked to the start-up is data management, a transversal factor since companies in any sector require it.

In response to the second question about the challenges companies face when adopting Gen AI, the respondent noted that the first one is represented by the training obstacle for which it is necessary to make people understand that despite possible prejudices this technology has many benefits. It is in fact common to associate AI with certain worrying aspects such as the creation of deep-fakes or the elimination of certain jobs. The latter is considered untrue by the respondent because this technology allows for automation of tasks and processes that however do not completely replace humans. In conferences on Machine Learning, it is increasingly emphasized that artificial intelligence must be supported by human presence since there is no 100% autonomous tool that does not require human supervision. Human workers will continue to be important both in the development phase and in the maintenance and assistance phase. Furthermore, artificial intelligence will not completely replace a certain job but will rather require specialization of the worker who will be asked for greater skills, and this is why it is important to invest in training.

In the third question regarding the quality and credibility of AI-generated content, the respondent affirmed that Mirai believes that both the quality of the output generated by artificial intelligence and all the various concerns related to privacy and content bias are very important. As for the quality of the output, this is directly proportional to the research and development that is done in this area, where investments are increasing more and more and consequently the quality of the contents produced by generative artificial intelligence will continue to improve. It is also considered very important to

reduce the gap between the output that the company can guarantee in terms of quality and the customer's expectations. This is possible through the training that is offered by Mirai, through which it is made clear how artificial intelligence works, its benefits, and its limitations. Mirai also focuses much on customer involvement in the development of its services in such a way as to have continuous feedback through the user's questioning on the perceived quality of the answers provided by generative artificial intelligence. In this way it is possible to understand how to satisfy their expectations not only from the point of view of user experience but also on a technological level, allowing to refine the models and techniques of this technology.

In the fourth question about how Gen AI can support decision-making, the respondent explained that this technology allows for an in-depth analysis of all the data provided by the company, which would be very complicated if not impossible if done by humans. Through this analysis, the company's management has an overview of the company's situation and is able to make more targeted and effective decisions.

In response to the fifth question regarding obstacles to the implementation of Gen AI, the respondent noted that among the factors that hinder the implementation of the technology within the company, there could be resistance from management or the company's employees. But despite that, the company has not noticed, at the moment, any particular obstacles in this area, but rather there is a lot of enthusiasm in the adoption of artificial intelligence by management because adopting AI can translate into greater process efficiency. It was just possible to notice, although very slight, some resistance by the operational staff who may see the introduction of this technology as a threat.

In answering the sixth question about consumer trust in Gen AI-based chatbots, the respondent emphasized that one of the determining factors for customer trust in this technology is represented by their awareness of how artificial intelligence works and about what security and quality of content mean within an AI system. Once the user is aware of these aspects, then it is possible to reduce the gap between expectation and reality, and consequently increase trust in the technology.

In the seventh question about how Gen AI can revolutionize business models and create new opportunities, the respondent explained that this technology offers great opportunities in terms of generating completely new products or even making existing procedures more efficient or actually usable. An example is chatbots, which have existed

for many years even if they were initially quite lacking tools from the point of view of user experience, which gave limited answers and only through correct and very precise inputs. Through generative AI it has been possible to make these chatbots much more useful since they are able to provide much broader and more correct answers even if the input contains grammatical errors. Furthermore, this technology makes certain operations more accessible to companies with limited resources. An example could be that of a start-up that is able to replace figures such as the copywriter and create images for promotional campaigns through generative AI without the presence of specialized professional figures who are much more expensive. We are therefore talking about a very important advantage of accessibility because within a company it will no longer be strictly necessary to know in depth how certain tools work, but it will only be enough to know what to ask the model, to then obtain a certain output.

In the eighth and final question about Mirai's mission and vision, the respondents outlined that the current mission is to consolidate itself as a company capable of providing high-quality products in terms of generative AI, relying heavily on research to have strong academic foundations and at the same time accompanying companies in successful adoption of the technology. The vision is to become a long-term reference at a national level and with respect to medium and large companies for the implementation and production of systems based on generative artificial intelligence. In order to allow that, Mirai is currently aiming to use more manpower than necessary to create a high-quality project that can then be reused, consolidated, and resold.

Tab. 2.3 Analysis and summary of the responses provided

Interview question	Answers
1) What are the main advantages that a company obtains by adopting Generative AI technology?	• Simplifies complex operations through natural language interfaces. • Processes large volumes of data for better decision-making. • Document management is a key cross-industry application for Mirai.

2)	What are the key challenges faced when a company adopts Generative AI technology?	• Overcoming educational barriers and misconceptions about AI. • Concerns about AI replacing jobs are often unfounded because AI complements human work. • Emphasis on human supervision in AI development and maintenance. • Workers will need to specialize and acquire new skills, making training essential.
3)	Does Mirai consider the quality and credibility of generated content important? How is it maintained?	• Mirai prioritizes both output quality and concerns like privacy and bias. • Quality improves with ongoing research and development. • Customer expectations are managed through training on AI's capabilities and limitations. • Continuous customer feedback helps refine AI models and improve user experience.
4)	How can generative AI technology support decision-making?	• Enables in-depth analysis of data, providing insights that would be difficult for humans alone. • Helps management make more targeted and effective decisions.

5) What are the main barriers which hinder the Generative AI technology implementation?	• Some resistance from employees, though management is generally enthusiastic. • Operational staff may see AI as a threat, but overall resistance is minimal.
6) What are the determinants for trust in generative AI technology services?	• Trust is built through raising awareness of how AI works, particularly around security and content quality. • Educated users are more likely to trust and accept the technology.
7) How do you see Generative AI disrupting current business models and creating new opportunities in your industry?	• AI creates new products and improves existing processes (e.g., chatbots). • AI makes certain tasks more accessible to companies with limited resources. • Lowers barriers to entry for startups, enabling them to perform tasks like creating marketing campaigns without specialized professionals.
8) What is MIRAI mission and vision?	• Mission: Establish leadership in high-quality generative AI products, supported by strong academic research.

	• Vision: Become a national reference for medium and large companies in generative AI implementation.

Source: our collaboration (2024).

2.5 Discussion

In this part of the thesis, we will compare the responses obtained during the interview with the CEO of Mirai Matteo Rizzo and the information gathered through the literature review of the first chapter.

The results of this thesis show that Generative AI is revolutionizing how modern businesses operate and offer value to all stakeholders. Mirai, the company analysed in the case study, uses Gen AI solutions to foster operational efficiency and strategic innovation. This is consistent with the literature analysed that highlights the use of this technology through AI chatbots, for example, which are tools able to improve customer experiences while offering organizations features like analysis of data and creation of marketing campaigns from scratch. This also aligns with what the CEO said about AI's role in simplifying complex operations like data management through natural language interfaces. For him, companies use AI to not only enhance productivity but also to gather and process large amount of data with the goal of assisting decision-makers with taking the best possible decision and with all the needed information.

Mirai was founded with the mission to guide companies in adopting AI technologies with a focus on the importance of deep data analysis for successful integration. Mr. Rizzo explained that Mirai developed a tool that uses generative AI to analyze company data through natural language inputs, allowing businesses to obtain actionable insights. This aligns with what was discovered through the literature review, for which data-driven insights that can be used for multiple activities within the company, are among the most important benefits of AI. Other fields such as content creation in areas like marketing and R&D were not featured in the CEO's statements, who focused more on data management.

Furthermore, Mirai's business model revolves around the secure and effective use of generative AI, and the CEO Matteo Rizzo acknowledged the importance of cybersecurity, especially when handling sensitive data. However, he appeared optimistic compared to what is underlined by the literature, for which AI systems can be exploited also for malicious purposes, such as phishing and data leaks. The reason is that for him, privacy and safety of data is an important topic for the company, but it is strictly connected to the provider, as could be Open AI. So, the safety of the model is mostly given by the licenses and policies relevant to the company that offers the service rather than Mirai itself.

Mirai offers an in-depth training pathway to facilitate AI adoption, with a focus on educating companies about the benefits and limits of the technology. This aligns closely with academic perspectives that emphasize the importance of investing in training all the stakeholders to reduce workforce resistance and anxiety while also convincing customers that AI is a tool that can improve their experience. However, the CEO interview downplays the anxieties and fears of job loss often associated with AI implementation and highlighted in a considerable number of articles considered for this thesis. According to the CEO, in fact, artificial intelligence must be supported by human presence, which will continue to be important both in the development phase and in the maintenance and assistance phase because the technology will not completely replace a specific job but will rather require specialization of the worker.

Mirai's six-phase business model, which includes brainstorming sessions with business unit managers, underscores the importance of involving employees in the AI adoption process. This is aligned with one of the practical implications underscored in this paper, that is the management and employees involvement in the adoption as key to overcome the resistance. However, while Matteo Rizzo was optimistic about this process, the literature stresses that resistance from both employees and management can still pose significant challenges.

In the interview, the CEO of Mirai touched upon the ethical concerns of using AI, particularly with regard to privacy and the responsible use of AI. This perspective is in line with the literature, where problems related to privacy, bias, and data governance were mentioned. On the other hand, the CEO focuses more on transparency in AI decision-making as he consider it really important to give an explanation to the decisions taken by the technology also as a way to build trust within the organization.

The CEO of Mirai did mention the importance of high-quality data for AI systems, which aligns with the literature's emphasis on data accuracy as critical for Gen AI success implementation. In a good number of papers analysed for this thesis, there is a focus on the development of AI systems on robust data sets and this view is in line with the CEO's comments about the need for quality data for optimal AI success. However, the CEO's comments on the risks of bias were relatively limited while the literature acknowledged the importance of designing and continuously monitoring AI systems to ensure they are free from bias.

CONCLUSIONS

This thesis explains how artificial intelligence (AI) can be a powerful tool to revolutionize the way companies compete in the market, while also highlighting that its implementation can be challenging due to barriers and the necessary capabilities. It can in fact be defined as the most sophisticated type of digitalization (Parida et al., 2019; Kohtamaki ¨ et al., 2019), able to transform businesses' value propositions of organizations. (Iansiti & Lakhani, 2020; Lenka, Parida, & Wincent, 2017; Sjodin ¨ et al., 2020a).

This technology has clear benefits such as the capacity to process vast amounts of data (Alet, 2023) and automate processes with a consequent reduction of costs and increased revenues (Ransbotham et al., 2017), but it also represents a critical asset that allows to learn continuously and change position in the market (Jarrahi et al., 2022). Based on the literature analysis, the most discussed reason for AI implementation is the enhancement of productivity since this technology allows to increase efficiency and automate repetitive operations (Jarrahi, 2019; Raisch and Krakowski, 2021). Another advantage of this technology consists in the improvement of decision-making and forecasts through its capacity to process large quantity of data more quickly and precisely than humans. (Charles et al., 2022; Teng et al., 2023). Customer integration can also be improved as manufacturers can better comprehend the behaviour and preferences of their customers thanks to a data-driven approach (Daqar and Smoudy, 2019), which allows also to offer products and services based on the user's needs, enhancing the purchasing experience (Fallahi et al., 2022).

Despite those advantages, AI implementation involves also drawbacks such as technical difficulties, the most discussed problem within the analysed articles. This is because the technology is characterised by high levels of complexity and without specialized expertise within the firms the implementation becomes very difficult. (Mikalef et al., 2022a; Straw and Wu, 2022). Other disadvantages are discrimination and biased decisions caused by unreliable sources of data and the risk of job displacement, for which the implementation of this technology can affect employment, especially for low-skilled jobs. Lastly, its integration could raise privacy concerns since this technology is able to collect large quantities of data, that could potentially be exploited unethically (Puntoni et al., 2021).

Furthermore, AI implementation also involves barriers such as organizational resistance to the technology, which can exist at various levels. Employees can be reluctant to adopt AI for fear of losing their jobs while the management of a firm could feel scepticism about giving over decision-making authority to a computer rather than a human (Ångstrom ̈ et al., 2023). Another barrier is represented by the ethical concerns of using artificial intelligence, which can have also harmful effects on the firm itself and society (Dwivedi et al., 2023). Also, the lack of skills within the company can complicate or even compromise the implementation process because its effectiveness is influenced also by the knowledge and perception of the employees of the company (Cao et al., 2021; Mikalef et al., 2019).

AI implementation involves then a big challenge which is the integration across different organizational and ecosystem levels. Managers have in fact to consider factors connected to their own company and employees, the ecosystem for the various stakeholders, and lastly the institutional level because of the regulations for which the firm must be compliant (Ritala et al., 2023). Assuring high-quality data is another field that decision-makers should take care of because using information that doesn't satisfy requirements such as volume, quality, and availability can compromise potential benefits and cause damage to the company (Ghasemaghaei and Hassanein, 2019).

Decision makers, in order to overcome the mentioned barriers and challenges, should adopt several measures such as the development of AI capabilities through training that make the workforce competent and able to understand how to implement and manage effectively AI systems (Abadie et al., 2024). Another important step is represented by the establishment of a company culture that facilitates the adoption of this technology among all the stakeholders, by convincing them that AI is compatible with the systems already in use. Managers, in order to encourage customers, should also adopt user-friendly design, allowing an improved user experience (Sharma et al., 2022). Furthermore, in this field, factors such as accountability and transparency are very important to use AI in decision-making, for which is important to make understandable the decisions (Booyse and Scheepers, 2023). Lack of transparency and explicability are in fact among the biggest problems faced by companies during AI implementation in decision making. (OECD, 2023). Lastly, it's also important to invest in AI infrastructure and create a collaborative ecosystem, since it's critical to have a strong computing system and create relationships with customers to co-create AI-enabled services (Belanche et al., 2023) and with other

stakeholders to exchange knowledge and align AI adoption to firm's goals and values (Burstrom ¨ et al., 2021).

Therefore, companies should spend time and resources for the development of capabilities needed to use AI effectively. A fundamental capability is connected to the technical knowledge that consists of knowing the prerequisites and competencies needed to successfully integrate AI. Employees don't have to know every detail about the technology but rather they should be open-minded to implement AI. Data capabilities are also important because businesses now have to process a high volume of data (Lee et al., 2014) to have a better view of the market characteristics and to generate new insights to reach the objectives. To process the high quantity of data AI infrastructure and platform capabilities are necessary and consist in enabling AI value creation (Bag et al., 2021) through the development of an AI platform architecture, the data pipeline, and processes for AI data allocation (Baabdullah et al., 2021; Bibri, 2021; Chauhan et al., 2022; Kusiak, 2022). Lastly, AI ecosystem orchestration capabilities should also be considered because they allow to create value through collaborations with the best commercial partners in the market for implementation of innovative technologies (Sjodin ¨ et al., 2021, 2023). Furthermore, the collaboration regards also employees from different departments for a continuous exchange of knowledge and an increase in the overall organizational efficiency (Helfat and Raubitschek, 2018).

The case study of Mirai, a start-up specializing in generative artificial intelligence (Gen AI), provides a practical illustration of opportunities and complexities associated with AI implementation. Mirai's approach highlights the importance of getting insights from data, which are processed through the use of Gen AI, in order to enable operational efficiency and strategic innovation of their clients. Lastly, both the literature and the company Mirai acknowledge the need for training the employees of a company to increase their knowledge about AI and simplify the integration of this technology. Furthermore, another factor that aligns with the analysis made in the first chapter and with the results of the interview with the CEO Matteo Rizzo, is the importance of transparency and customer involvement in service development to allow effective implementation of the technology.

In conclusion, the successful implementation of AI is influenced by several factors and requires companies to develop critical capabilities that allow them to overcome several challenges. This technology has the potential to increase productivity and improve fields

such as decision-making and customer integrations, but managers should carefully plan the implementation, by investing in both IT infrastructure and training of employees. It's in fact critical to create an environment where all the stakeholders are ready and open to implement new technologies by developing data-driven competencies and fostering collaboration within the company or with external partners.

Figures and tables index

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