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Abstract:

This study examines the human-robot interaction in the hospitality industry by investigating hotel employees' perceptions of collaborative robots (cobots) in hotel operations. While robotic technologies are often introduced to enhance service efficiency and customer satisfaction, their impact on internal work dynamics and human resource management remains underexplored. Through qualitative research involving interviews with hotel staff, this study investigates the social dimensions of working alongside cobots. The data analysis is based on the ARPACE model that explores the 6 dimensions of interaction between human employees and cobots: actor, partner, relationship, activities, context, and evaluation. The results obtained concern both opportunities, such as improved task allocation, reduced workload, and enhanced job satisfaction, and challenges, including communication barriers, job insecurity, and emotional disconnect. The findings offer practical insights into how hospitality organizations can foster smoother integration of cobots, emphasizing the importance of employee training, ethical considerations, and inclusive HR strategies to support the integration of robots and artificial intelligence in the workplace.

Keywords: Human–Robot Collaboration, Social Interaction, Employee Perception, Hospitality, Hotel.

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1 Introduction

The ongoing transition to Industry 5.0 represents a significant shift in the relationship between humans and intelligent technologies, emphasizing collaboration, sustainability, and human-centric innovation (Leng et al., 2022; Gangwar & Reddy, 2023). As the European Commission outlines, this evolution aligns with strategic priorities such as "an economy that works for people," the "European Green Deal," and "Europe fit for the digital age" (Cotta et al., 2021). Industry 5.0 promotes a paradigm where advanced technologies, including Artificial Intelligence (AI) and collaborative robotics (cobots), are not only tools of automation but key drivers of socio-economic transformation that include enhancing digital competencies, fostering inclusive work environments, and supporting the development of sustainable, circular, and innovation-driven economies. While much of the existing literature has focused on the industrial sector, the implications of this shift for the service sector (in particular hospitality) remain underexplored (Pillai et al., 2021). The hospitality sector is undergoing a profound transformation as it begins to integrate intelligent systems into customer-facing and operational functions. In this context, human–robot collaboration is emerging as a hybrid model of work that redefines the principles of service delivery and organizational behavior (Reis et al., 2020; Javaid et al., 2022). Moreover, it is important to consider that collaborative robotics promises not only to improve operational efficiency but also to enhance personalization, adaptability, and customer engagement, perceived as core elements of emerging service business models (Gangwar & Reddy, 2023; Reis, 2024).

A majority of the literature tends to adopt a predominantly technological determinist lens, emphasizing automation and efficiency while overlooking the affordance potential of AI-enabled systems (Fusté-Forné & Jamal, 2021). The concept of affordance (Norman, 1999; Gibson, 2014) in this context refers to the actual and perceived possibilities for action that a technology offers to hospitality staff. Within the context of an AI-powered service economy, robotic affordances go beyond task execution to enable new forms of interaction with employees and customers. When viewed through the lens of socio-materiality (Giddens, 1984; Orlikowski, 2007), these technologies are not isolated artifacts but deeply embedded in the social and organizational fabric, influencing and being influenced by human agency, institutional structures, and cultural norms. In this light, the hospitality sector serves as a compelling site to examine how cobots, when integrated thoughtfully, can contribute to sustainable innovation, improved employee experience, and more inclusive service design—supporting the UN Sustainable Development Goals, particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure).

This study aims to explore the intersection between technological innovation and human experience in hospitality by investigating employee perceptions of collaborative robots in hotel operations. Through a qualitative inquiry, it examines how hotel employees interpret, adapt to, and co-construct their work alongside cobots. The paper integrates a dual theoretical lens: first, by framing the changing nature of work through the Industry 5.0 lens; second, by analyzing human–cobot interaction through the ARPACE model of social interaction (Hoppler et al., 2022), affordance theory, and socio-material perspectives. Following this introduction, the paper outlines the theoretical framework, presents the empirical findings from interviews with hotel employees, and discusses the implications for HRM strategies and organizational transformation in service-based economies. The paper concludes by identifying opportunities for future research that can help organizations keep pace with the rapidly evolving landscape of AI and robotic integrated hospitality.

2 Theoretical Framework

2.1 Industry 5.0 and its Impact on the Work

Currently, several research areas address issues related to the transformation processes from Industry 4.0 to Industry 5.0 and the digitalisation of the labour sphere in general (Golovianko et al., 2023; Saniuk et al., 2022), as well as the introduction of service robots, particularly in the hotel industry (Choi et al., 2020; Rosete et al., 2020; Wu & Huo, 2023). Industry 5.0 is regarded as a revolution where humans and robots collaborate to enhance production methods and increase efficiency (Mourtzis et al., 2022). Moreover, the human elements and technology within the production process are the primary focus of Industry 5.0, driven by a diverse range of industry technologists and ideologies (Maddikunta et al., 2022). In other words, Industry 5.0 complements the industrial revolution with human-centric, resilient, and sustainable values (Adel, 2022). It is expected to transform global production processes by eliminating repetitive tasks performed by humans (Javaid et al., 2020), thereby enhancing creativity and innovation potential (Machado & Davim, 2023). While

Industry 5.0 proposes a strategy for businesses that goes beyond prioritising productivity and efficiency, it enriches the function and value of the industry in society (Banholzer, 2022). The Industry 5.0 concept places employee well-being at the heart of workplace operations (Alves et al., 2023; Khaled & Fedorova, 2022; Davila-Gonzalez & Martin, 2024). It employs innovative technology to promote prosperity beyond employment and development while respecting the planet's production limitations. Industry 5.0 is anticipated to integrate high-speed, sophisticated cobots with the cognitive and rational thinking capabilities of humans. Industry 5.0 is expected to foster adaptability between humans and cobots, enabling seamless interaction and ongoing monitoring responsibilities (Waheed et al., 2022). The goal of human-cobot collaboration is to accelerate operations (Ojstersek et al., 2023). By delegating monotonous and repetitive tasks to cobots and critical thinking tasks to humans, Industry 5.0 can improve the quality of both products and services (Ordieres-Meré et al., 2023). The primary objective of Industry 4.0 was, instead, to favour smart production through technological elements such as CPS, AI, IoT, robotics, edge computing, cloud computing, big data, ambient intelligence, cybersecurity, and virtual reality to reduce production, transportation, and quality control costs. However, despite lowering production costs, Industry 4.0 has overlooked the human costs by focusing solely on process optimisation. This unintended consequence has led to a decline in employment opportunities and increased opposition from labour unions, hindering the complete acceptance of Industry 4.0. This issue is anticipated to be resolved by Industry 5.0, which emphasises greater human involvement (Khan et al., 2023), integrating human intuition and knowledge in Artificial Intelligence to augment organizational knowledge (Harfouche et al, 2023). The changes in production processes, service delivery, and value creation have led to significant shifts in work approaches. Recently, a new work philosophy has emerged, referred to as Work 5.0 or Employment 5.0 by various scholars (Kolade et al., 2022; Grocc-Golacka et al., 2023). This concept represents a radical redefinition of traditional notions of labour and the workplace. Advanced technologies, the global economy, and evolving societal values have converged to create a more flexible, human-centric, and purpose-driven work environment (Swann, 2017; Wadhwa et al., 2024). This paradigm involves the transformation of traditional job roles, the creation of new forms of employment, and the reconfiguration of work processes to adapt to the ever-changing technological landscape (Volberda et al., 2021; Aroles et al., 2021). Work 5.0 signifies a fundamental shift in how work is conceptualised and executed, with far-reaching implications for labour markets, organisational structures, and societal dynamics (Kolade & Owoseni, 2022). Work 5.0 focuses on reimagining how work is conducted, emphasising workplace innovations such as AI, robotics, and digital automation (West, 2018; Dodel et al., 2020). It highlights the importance of creating a flexible workplace that caters to the diverse needs of stakeholders, including employees, clients, partners, and society. Another essential aspect of Work 5.0 is its emphasis on fostering a more human-centred workplace. This includes cultivating a culture that prioritises and promotes employee well-being and personal development, ensuring that work is both meaningful and fulfilling. Companies invest in workforce engagement initiatives such as health and wellness programmes, professional development opportunities, and support for achieving a healthy work-life balance. Furthermore, organisations aim to establish an inclusive and diverse workplace where employees from all backgrounds are valued and respected. Work 5.0 also heralds a transformation in the perception of work environments. Individuals are encouraged to identify and articulate their values, seeking meaning and purpose in their professional lives. These values inform their career choices and help them navigate the evolving job market. Consequently, organisations must focus on creating a supportive, collaborative, and inspiring work environment to attract and retain talent. Preparing the workforce for future developments is crucial, necessitating the retraining of employees to meet the changing demands of the external environment. The soft skills required for effective collaboration in teams composed of both humans and robots will differ significantly from those needed in the past (Grobbelaar & Verma, 2024).

2.2 New Ways of Collaboration and Human-Robot Interaction

As previously described, emerging technologies have a significant impact not only on the organisation of work and the redefinition of work environments but also on the social aspects of work, such as relationships, collaboration, and cooperation. Cobots, or collaborative robots, are designed for direct human-robot interaction in a shared environment or situations where robots and people are in close contact (Maddikunta et al., 2024). A proper understanding of the human-robot interaction process can help make robotics effective by solving numerous real-world challenges (Farouk, 2022). Unlike traditional industrial robots, which operate in isolation, cobot applications encourage human engagement with robots. The process of human-robot interaction is also associated with the communication process between humans and robots, facilitated through the application of various techniques, including artificial intelligence and computer modeling. The safety of cobots is enhanced through features such as soft edges, lightweight materials, speed and force limitations, as well as software and sensors that ensure safe behaviour. Cobots are highly

sensitive to unexpected impacts, enabling them to stop autonomously when human workers detect any misplaced items along their route. This makes them, in most cases, more reliable than traditional industrial robots (Simões et al., 2020).

Cobots are intended to assist humans with functional tasks by interacting with them both physically and socially. From previous studies, it has been found that for improving the process of human-cobot interaction, it is essential for cobots to communicate and establish a set of shared beliefs. In this regard, previous studies have claimed that trust is a crucial factor in the field of automation that determines the success of the collaboration (Grech et al., 2024). The level of trust between a human and a robot can influence the human's willingness to communicate knowledge, interact, provide support, and cooperate with a robot. As per the opinion of Esterwood & Robert (2020), the challenges associated with the human-cobot interaction process also include the way people share and interpret information with the cobots. Cobots are designed for mutual and direct interaction with humans. Because they are equipped with safety assurance mechanisms, cobots assist operators by delivering and handling objects in a fenceless and confinement-free environment. Direct human-robot interaction aims at incorporating the unique advantages of humans and collaborative robots by combining the skills and abilities of both parties to achieve a common goal in a temporospatial overlap (Colim et al. 2021). Cobots take on strenuous and repetitive tasks, while human operators are responsible for handling unexpected events due to their resources of flexibility and cognitive and soft skills. Hence, human-cobot interaction results in a synergic combination of the capabilities of humans and their robotic counterparts (Paliga, 2023).

Cobotic technologies and service automation have been integrated into the tourism and hospitality industries, managing various areas and operations. The hospitality industry is rapidly moving towards digitalization, which requires employees to upgrade their knowledge and skills. Cobots currently used in hotels perform a wide range of functions, including greeting customers, preparing meals, providing room service, handling check-in and check-out operations, offering information about destinations, cleaning rooms, pools, and public areas, mowing lawns, carrying baggage, and delivering food and other items. Cobots can operate 24/7, far exceeding the standard 40-hour workweek of human employees. Furthermore, cobots are capable of serving multiple clients simultaneously and repeating these activities countless times without fatigue or complaints (Zhong et al., 2020).

The evolution of artificial intelligence cobots with social competence enables individuals and cobots to interact in ways that enhance encounters in frontline service. Due to these interactions, people often perceive cobots as social beings. Consequently, potential issues arising from this unique social element extend beyond the cobot's functionality or the basic logistics of integrating software, hardware, and other capabilities. They also include user behaviours and personal psychological challenges (Kunz et al., 2018). Some employees, in fact, resist those changes and refuse to upgrade their knowledge, skills, and ways of doing things. Therefore, there is a need to understand employee intentions to embrace cobots, as any other digital technology, from the perspective of upgrading their skills and knowledge. This makes the relationship between humans and cobots a significant challenge within the service environment (Chi et al., 2020): from the employees' perspective, tasks, activities, and responsibilities are changing, requiring the definition of new and different job profiles.

Although automation and cobotics are becoming increasingly prevalent in the hospitality industry, the use of cobots to perform human tasks may face resistance from society. Studies indicate that this resistance is often driven by concerns over the loss of human contact, fears of increased unemployment, and anxiety about the dominance of machines in the labour market (Hou et al., 2021). Cobots replacing human employees may introduce psychological challenges to the traditional concept of service. For example, human interaction with a cobot might be avoided if it induces anxiety. In the hotel industry, which relies heavily on personal contact, replacing human employees with cobots could alter the nature of the guest experience by introducing human-cobot interactions, thereby affecting user attitudes and behaviours. Furthermore, technological anxiety is identified as a significant socio-psychological factor influencing the adoption of new technologies (Huang et al., 2021).

While there are numerous positive cases of robots supporting human partners, not everyone holds favourable attitudes towards them. Negative perceptions of cobots reduce the likelihood of their adoption. Attitude is defined as an individual's acquired judgement, encompassing positive or negative emotions regarding service robots, and significantly influences their intentions and behaviours. Attitudes develop through complex psychological processes and act as motivators for behavioural responses. They are crucial factors in determining whether cobots are adopted (Cha, 2020).

Some scholars (Ivanov et al., 2017) conducted surveys to explore how young people perceive the use of cobots in hotels. Their findings revealed variations in how individuals evaluate innovative technologies. People will either accept or reject the adoption of such technologies, with their acceptance or rejection depending on personal characteristics and contextual factors. Other researchers (Meidute-Kavaliauskiene et al., 2021) examined the extent to which hotel guests are aware of the benefits and drawbacks of cobots and how this awareness influences their willingness to interact with them. The results indicated that awareness of benefits and perceived value positively and significantly impact guests' intentions to use cobots. Conversely, awareness of disadvantages has a negative and significant effect on the willingness to interact with cobots.

Some findings emphasised the impact of automated services on customer experience. Researchers claim that customers are proactively seeking opportunities to communicate and interact with cobots to build a relationship with them (Tung & Au, 2018). However, other scholars (Yu, 2020) found that potential consumers' attitudes towards human-like cobots are more likely to be unfavourable.

Based on the literature review, we can highlight that, on the one hand, several studies have focused on analysing the introduction of cobots from an organisational perspective, examining the benefits, obstacles, and some application practices (Ghanghorkar & Pillai, 2024; Demir et al., 2019). Generally, the surge of interest in collaborative robots stems from the fact that they are seen as technological solutions for improving performance. On the other hand, the perception of interaction with cobots from the customer's (guest's) perspective has also been studied (Tung & Au, 2018; Yu, 2020). Previous researches advocate for the need to consider human factors, as they are requisite conditions for human-robot interaction to be fruitful. Focusing on factors such as perceived safety, trust, anxiety, mental strain, stress, or robot acceptance can help understand what makes operators feel comfortable and efficient (Faccio et al., 2022). Contrarily, the omission of these elements can result in operators' frustration and failure of human-robot system performance (Colin et al., 2021).

However, it emerges that the analysis of employees' perceptions of cobots is currently limited.

The objective of this study is to analyse the key social factors that influence workers' perceptions of cobots in the hotel sector, to create a model that can help overcome obstacles related to negative perceptions of cobots. This would facilitate a faster and more sustainable integration of humans and cobots in the workplace.

Within this framework, human-cobot collaboration remains a critical factor influencing the success or failure of adopting new AI-based technologies in the workplace (Michaelis et al., 2020). Nevertheless, there is a lack of research addressing employee-related issues and the social aspects that shape interactions between hotel workers and cobots. A significant number of recent studies have focused on the costs and benefits of introducing cobots into the workplace, changes in service quality, and customers' perceptions of cobots. Yet, cobots used to deliver services interact not only with consumers but also with employees (Mühlemeyer, 2020; Picco et al., 2024). Employing cobots as service agents requires essential consideration of not only cost-benefit analysis but also the social dynamics that define employees' attitudes towards collaborating with "artificial colleagues" in hybrid workplaces (Verma & Singh, 2022).

The objective of this paper is to investigate workers' perceptions of cobots as collaborators/colleagues to gain a deeper understanding of the types of social relationships that can be established between the two parties. To analyse these relationships, the ARPACE model will be utilised as a generalisable tool for the comprehensive, parsimonious, and systematic description of social interactions between human employees and cobots through six components (Figure 1): Actor, Partner, Relation, Activities, Context, and Evaluation (Hoppler et al., 2022). For the "Evaluation" component, cost-benefit analysis could be integrated into employees' perceptions to better understand the analytical process of comparing the benefits and costs of introducing cobots into work processes (Mishan & Quah, 2020). The research questions we aim to address are as follows:

RQ1: "What is the perception of employees regarding human-cobot interaction?"

RQ2: "What are the opportunities and critical issues that emerge from the ARPACE model when applied to analyse human-cobot interaction?"

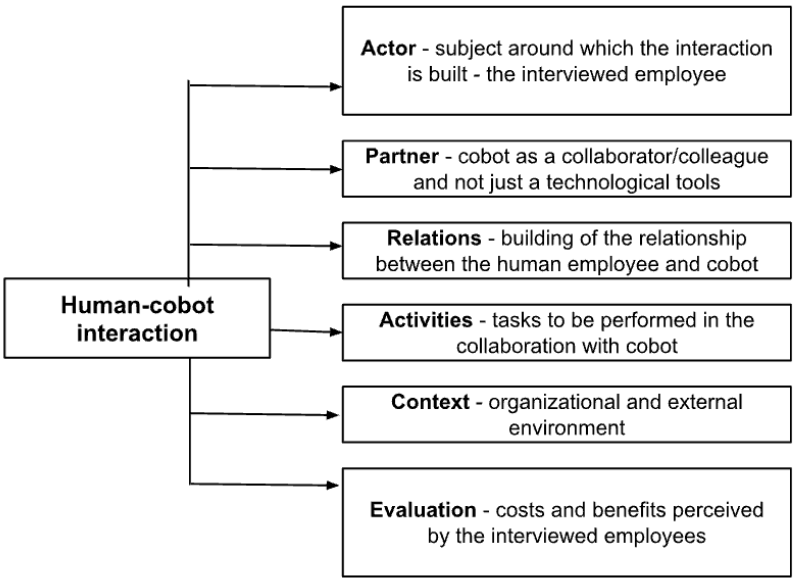

Figure 1. Analysis of the "Human-Cobot" Interaction in the Hospitality Sector According to the ARPACE Model (Source: Authors' Elaboration)

3 Methodology

A qualitative analysis of the human-cobot relationship in the hotel industry was conducted using semi-structured interviews. The semi-structured interview method imposed fewer restrictions on respondents, allowing for the collection of richer information and enabling a deeper understanding of the research questions. The employee sample was formed through non-probability purposive sampling, involving individuals familiar with the subject of the study. To ensure transparency and the quality of the results, all participants were fully informed of the research's objectives. Empirical data were collected during interviews with hotel employees in Yekaterinburg, Russia. Twenty face-to-face, semi-structured interviews with employees were conducted between September 2022 and March 2023. The interviews were carried out in four- and five-star hotels, as luxury hotels are typically the first to adopt recent technologies and innovations in the hospitality industry. The profile of the interviewed participants, as outlined in Table 1, represents a diverse range of hotel employees across various departments. The participants included 20 individuals, with a nearly equal distribution of gender (11 females and 9 males), aged between 21 and 39 years. Their educational backgrounds ranged from high school diplomas to master's degrees, with the majority holding bachelor's degrees. The departments represented in the sample included front office, housekeeping, food and beverage, marketing, IT, concierge, room service, and security. Professional experience varied significantly, from as little as 1 year to as much as 14 years in their respective roles. The selection of participants ensured insights from both junior staff and senior professionals, providing a comprehensive understanding of the human-cobot relationship in the hotel industry.

Table 1. The interviewed employees (Source: Authors' elaboration)

N.	Gender	Age	Education	Experience	Department
P1	Female	24	Bachelor's degree	3	Front office
P2	Female	31	High school	6	Housekeeping
P3	Male	26	Bachelor's degree	4	Front office
P4	Female	34	Bachelor's degree	10	Food & Beverage
P5	Male	30	Bachelor's degree	9	Food & Beverage

P6	Female	25	Master's degree	4	Marketing
P7	Female	22	Bachelor's degree	1	Front office
P8	Male	33	Bachelor's degree	9	IT
P9	Male	29	Bachelor's degree	7	Concierge
P10	Female	29	High school	11	Room service
P11	Male	26	Bachelor's degree	5	Marketing
P12	Female	36	Bachelor's degree	13	Housekeeping
P13	Male	28	Master's degree	5	Front office
P14	Female	22	Bachelor's degree	2	Front office
P15	Female	25	Bachelor's degree	4	Housekeeping
P16	Male	39	High school	14	Security
P17	Male	24	Bachelor's degree	4	Front office
P18	Female	24	Bachelor's degree	3	Marketing
P19	Female	21	Bachelor's degree	1	Front office
P20	Female	25	Bachelor's degree	4	Food & Beverage

During the in-depth interviews, respondents were asked to provide detailed answers to questions developed based on the literature review and related to the different aspects of relationships with cobots in the workplace. Each interview lasted between 25 and 40 minutes, with conversations recorded after obtaining the participants' consent. All responses were transcribed and subjected to thematic analysis to facilitate data interpretation and identify relevant insights corresponding to the research questions.

4 Results

The content generated from the interviews was transcribed and coded into the following thematic blocks related to the ARPACE model described in the previous section:

- Relationship between actor and partner (analysis of actor, partner, and relations between them);
- Activities performed working with cobots;
- Organizational context;
- Evaluation of the costs and benefits in the human-cobot interaction.

Table 2 presents the results obtained from a thematic analysis of employee responses to the question: *"What do you think about the relationship between human and cobot?"*

Table 2. Thematic Block "Relationship Between Actor and Partner" (Source: Authors' Elaboration)

Evaluation	Keywords	Quotes

Positive sentiments	• Interesting • Enjoyable • Good • Fun • Excitement • Comfort • Easiness • Innovation and development	*"Thinking about cobots feels fun and super interesting for me."* *"We live today in an era of huge technological progress, and our lives are full of technology; we cannot live without it, and cobots are a kind of innovation and technological development."* *"Cobots are very smart devices that can move and take action, and I think dealing with them will be a good and enjoyable experience."* *"I am not against cobots; I know they will make our lives easier and more comfortable."*
Negative sentiments	• Boring • Wired • Feel lonely • Confusing • Fear • Isolated • Depressing • Anxious • Emotionless	*"It feels a bit emotionless and isolated." "When I think of cobots, I imagine an unknown world that invites anxiety and fear." "It feels so weird." "It sounds boring."* *"It feels really empty, and it lacks warmth." "Imagine 20 years from now, and how advanced and improved these cobots will be. It's scary to think about this life and work situation."* *"I think it looks like such a confusing and depressing environment. It's nice seeing all the people around me."*

The actors are human employees from different hotel areas (reception, food & beverage, housekeeping, room service, and administrative staff) who reflect on their current experiences with cobots in the workplace. Their answers reveal a mix of emotions, ranging from excitement and curiosity to discomfort and concern. The majority of the interviewees expressed positive feelings towards the relationship with cobots, describing them as pleasant, helpful, and interesting partners for completing work tasks. Additionally, cobots are seen as examples of technological advancement and innovation that can contribute to making employees' lives easier and more comfortable. In this case, cobots are perceived as valuable collaborators, facilitating tasks and evoking positive emotions during interactions with them. However, in some cases, the interviewees reported negative feelings that emerge in the relationships between employees and cobots, including anxiety, boredom, isolation, lack of emotions, and concerns about the future development of cobots in the workplace. Therefore, it is possible to claim that cobots (partners) are perceived in dual ways: 1) innovative, helpful partners that bring comfort, efficiency, and a sense of modernity, and 2) cold, emotionless entities that risk creating isolation and emotional detachment. In positive cases, cobots are viewed as smart, capable colleagues that support human work. In more negative interpretations, they are seen as unfamiliar, alienating agents that disrupt social dynamics at work. According to the interviewees' answers, in fact, the relationship "actor-partner" is ambivalent. On one hand, it is described as *interesting*, *enjoyable*, and a source of *comfort*, suggesting openness to collaboration. On the other hand, it can evoke *fear*, *loneliness*, and *depression*, reflecting anxiety about a dehumanizing or isolating work environment.

When asked, *"What types of rules should be observed and what activities should be performed when working with cobots?"*, based on the responses received, we have identified 2 distinct categories of rules to be respected when carrying out activities together with cobots: 1) technical aspects; 2) moral and ethical aspects (Table 3).

Table 3. Thematic block "Activities to be Performed and Rules to be Respected Working with Cobots" (Source: Authors' Elaboration)

Rule category	Keywords	Quotes
Technical approach	• Maintenance • Right to have necessary updates • Loading not more than the capacity • Charging stations • Right to have daily cleaning	*"Well, cobots should be considered an asset. They should be maintained periodically and not overloaded with more than their capacity. Charging stations should be located in different places in the hotel."* *"They should be provided with the necessary updates whenever possible... they should be cleaned daily."*

Moral and ethical approach	• Inadmissibility of vandalism of the robot • Avoidance of abuse and destruction • Right to have a uniform • Right to have a union	*"Humans should deal with cobots ethically... cobots should not be used for anything* *outside the jobs designed for them."* *"Cobots should be maintained and not destroyed... they should not be hit or kicked* *if they do not respond…"* *"Cobots should have a special uniform…"* *"It would be important for cobots to have their own representation or a department of artificial resource management instead of human resource management…"* *"With the increasing role of cobots at work,* *We can find a union to organize their activities…."*

All interviewees highlight that when working with cobots, it is essential to follow a set of rules and activities that ensure both operational efficiency and an ethical approach. From the technical point of view, cobots should be treated as valuable assets within the workplace. This means they must undergo regular maintenance to ensure their functionality and longevity. It is crucial not to exceed their designed capacity during operations, as overloading could lead to malfunction or damage. In addition, cobots require proper infrastructure, such as charging stations placed strategically across the work environment to allow easy access and efficient energy management. Daily cleaning was also mentioned as a necessary practice to maintain hygiene and operational performance.

On the other hand, the moral and ethical approach emphasizes the importance of respectful and appropriate human behavior toward cobots. Although cobots are not alive, their increasing integration into human workspaces calls for ethical considerations. Participants strongly condemned any form of abuse, vandalism, or destruction. Cobots should not be mistreated physically—kicking, hitting, or damaging them is seen as unacceptable behavior. Moreover, it is important to collaborate with them for tasks for which they were specifically designed; assigning them inappropriate duties is viewed as unethical. As one interviewee stated: "Humans should deal with cobots ethically... they should not be used for anything outside the jobs designed for them." Moreover, the interviewees also highlighted the importance of a standardized uniform for cobots, which serves both functional and symbolic purposes, enhancing their recognizability and integration within the work team. Interestingly, some participants even advocated for a form of representation or union for cobots, suggesting a symbolic acknowledgment of their growing role in the workplace. As one respondent put it: "Cobots should be considered an asset. They should be maintained periodically and not overloaded... they should be cleaned daily."

These two perspectives illustrate that working with cobots is not just a matter of technical coordination but also of fostering a respectful and responsible environment. Cobots, though non-human, are increasingly becoming integrated members of the workforce, and their presence demands both practical management and ethical awareness.

Appendix A presents a proposal outlining the potential changes in the job descriptions of several hotel job positions following the integration of cobots into the hotel workforce (See Appendix A). The job descriptions before the cobot introduction were extracted from job postings published in 2025 by a luxury hotel (5 stars), either on Indeed or the hotel's official website. The post-cobot job descriptions were developed by the authors based on the findings of the present study.

A thematic analysis of hotel employees' responses to the question *"What changes have you noticed in the organisational context with the introduction of cobots?"* Three main areas have been identified: 1) reputational, 2) operational, and 3) HRM (Table 4).

Table 4. Thematic Block "Changes in the Organisational Context" (Source: Authors' Elaboration)

Type of changes	Keywords	Quotes

Reputational enhancement	● Enhancing hotel reputation ● Incrementing competitive advantage ● Increasing demand ● Keeping pace with progress ● New experience ● Customer satisfaction	*"Of course, the introduction of cobots in our hotel will have effects in several directions. For example, it will improve the hotel's reputation and create a competitive advantage, which will increase the hotel's reservations." "It is suitable for our business to keep pace with new technology to satisfy guests." "Cobots will take over many tasks, allowing us to serve a large number of guests."* *"Also, this will lead to guest satisfaction by providing a new experience."*
Operational changes	Providing standard services Decreasing employee costs Decreasing errors Incrementing the speed of service provision Increasing productivity Enhancing the work environment	*"I note how some activities change (e.g., check-in and check-out, cleaning on floors and in rooms) and become faster and safer for the guests. The guest is not embarrassed in front of the cobot and is not afraid, for example, of being infected if we talk about situations like a pandemic…"* *"I think they will help us to provide standard and high-quality services in addition to minimizing errors."* *"The introduction of cobots can also help reduce employees' costs, as they do not require long vacations, daily meals, incentives, overtime, etc."*
HRM changes	● Training and upskilling/reskilling ● Tasks and roles redefinition ● Partial reduction of staff ● Evaluation and performance management	*"I see that cobots will control many positions, but I think that they cannot provide the service without the human element, especially in hotels… This is important for managing people, training them, and motivating them."* *"I assume that the number of workers in each department will decrease, and we will need more training in dealing with cobots."* *"From my point of view, the introduction of cobots is a double-edged sword. On the one hand, they will reduce workloads, and on the other hand, they will control many jobs, so our managers have to be good at finding us the right place in the company. "* *"My manager should understand that now we do the tasks together, sometimes the cobot helps me, sometimes I help the cobot, especially when it gets stuck and can't solve some unexpected problem... obviously I waste time on this and my manager must consider this aspect…"*

The content analysis of the responses identifies three main areas of change in the organizational context: i) cobots are considered a factor that improves efficiency and standardization of service, reduces errors, lowers operating costs and creates a safer and more productive organizational environment; ii) the interviewees believe that cobots contribute to improving the image and reputation of the hotel, to increasing the competitive advantage in the context in which it operates. By integrating cobots into its operations, the hotel can attract more guests by offering a more innovative, fun, and satisfying customer experience; iii) the interviewees underline how the integration of cobots affects human resource management practices by requiring the redefinition of job roles, tasks, and duties, underlining the need for training and updating skills, and reviewing performance evaluation processes.

In addition to the analysis of the changes in the organisational context, changes were also observed in the work activities of employees who interact with cobots in the workplace, analyzing the employee responses to the question, "Has the interaction with cobots changed your work activities? If so, how?"

Analysis of the interviewees' answers to the question reveals a dual perspective that reflects both positive impacts on workers' activities and tasks, as well as negative impacts. On the positive side, several interviewees highlighted that the introduction of cobots has enabled human workers to shift their attention from repetitive or physically demanding tasks, allowing them to devote themselves to more meaningful and cognitively stimulating activities. For example, one interviewee noted: "Cobots will help serve a large number of customers, especially during peak periods, so this can help manage uncertainties, conflicts, and reduce stress at work." Furthermore, cobots were recognized for carrying out dangerous and heavy tasks, such as special kitchen work or night work. These tasks performed by cobots were perceived as beneficial for health, safety and job satisfaction: "Cobots carry out dangerous tasks without problems and without risks to their well-being, such as cutting meat, using ovens or cleaning the exterior of buildings, especially in very tall buildings"; "If cobots replace all night shifts, which many workers do not want, we, workers, will certainly be more satisfied with our jobs". The collaborative dynamic between human and artificial intelligence was also framed positively, with several interviewees highlighting the improvement of the organizational climate and

offering learning opportunities: "Working with cobots improves the work environment... it increases the pleasure of being at work..."; "working with intelligent devices such as cobots teaches me many things, I am happy with the opportunity to learn and increase my skills".

However, some critical voices emerged from the analysis. One of the main concerns expressed due to the introduction of cobots in the workplace was the reduction of social interaction between human colleagues. In fact, some interviewees fear a decline in interpersonal relationships and a potential impact on psychological well-being: "Working with cobots reduces social interaction between employees"; "I cannot spend most of my time without communicating with colleagues... it is negative for me psychologically".

To investigate more in depth the perception of employees regarding the evaluation of the benefits and costs of introducing cobots in the workplace, the last 2 questions of the interview were analyzed and coded: 1) "What do you think about the potential benefits of co-working with cobots?", and 2) What do you think about the potential costs of co-working with cobots?" A summary of respondents' responses to the question *"What are the potential benefits of co-working with cobots?"* allows us to identify three blocks of new opportunities for improving: 1) work organisation, 2) socio-psychological climate, and 3) training & development (Table 5):

Table 5. Thematic Block "Perceived Benefits of Co-Working with Cobots" (Source: Authors' Elaboration)

Benefit group	Keywords	Quotes
Work organization betterment	• Roles assigned accurately • Reducing workload • Reducing errors • Increasing efficiency • Perform routine tasks • Work for a long time	*"Working with cobots can give each of us specific tasks, leading to accurately defining my responsibilities."* *"Cobots can work for long times with high efficiency and without errors."* *"They can handle a lot of routine work... also, working with such cobots will make the work environment more fun."*
Socio-psychological organizational climate enhancement	• Reducing usual social problems • Prevention of mood fluctuation • Fun environment • Eliminating bad competition among human colleagues	*"Many of the usual social problems between colleagues can be reduced... There will also be fewer complaints from workers against each other."* *"They do not have mood changes at work... they do not get frustrated."* *"It's safe to assume that cobots will not try to cause me trouble at work, they can't have bad plans, they won't gossip…"*
Training & development	• New skills development • Learning to work with smart assistants • Ability to perform activities with greater cognitive content	*"Cobots could help us ease the burden, freeing us from many tasks so we could devote more time to other, more cognitive and creative tasks."* *"I think one of the best benefits is that I would work with smart assistants so I could learn new things."* *"To keep up with innovation, I have to study and improve my skills, and also to understand how to interface with cobots."*

The analyzed data highlight a clear and structured perception of the interviewees regarding the potential benefits of co-working with cobots. From an organizational point of view, cobots are seen as agents that improve efficiency, accuracy, and task distribution, especially because they can perform routine or repetitive tasks. At a social level, their presence is perceived as a factor in reducing interpersonal tensions in work groups, thanks to their neutrality and lack of emotionality. Thirdly, cobots are seen as facilitators of learning and skills development, encouraging employees to perform more innovative and cognitively challenging tasks.

Based on a thematic analysis of hotel employees' responses to the question "What are the critical issues of co-working with cobots?" All concerns of respondents were classified by the author into five groups of

possible costs: 1) socio-psychological, 2) technical, 3) communication, 4) threat for employment, and 5) security issues (Table 6).

Table 6. Thematic Block "Perceived Costs of Co-Working with Cobots" (Source: Authors' Elaboration)

Cost group	Keywords	Quotes
Socio-psychological	• Lack of emotions • Lack of empathy • Feeling bored • Soullessness • Toxic dependency	*"They do not have a soul or real emotions. If I spent much time with cobots, I would feel bored." "This may seem innovative from a technological aspect, but in my opinion, it creates a toxic dependency on AI and takes us away from our peaceful connection with the natural world."* *"Having the cobot as a work partner, I get bored, I like to talk and create relationships with my colleagues, cobot responds with predefined answers and has no empathy."*
Technical	• Malfunctions, software • Glitches • Lags • Freezing • Not responding	*"Despite the advancement of technology, devices usually malfunction or do not respond to orders." "Often, a system glitch may happen at any time." "Cobots are just programmed devices with many malfunctions and technological problems."*
Communication	• Difficulties in communicating • Difficulties in interaction and engagement • Difficulties in understanding special requests	*"There will be many communications problems.....cobots cannot interact and engage like humans, they cannot understand special orders."* *"Dealing with them will be according to systematic steps or specific processes; otherwise, they will not understand."* *"Communicating with the cobot is not so simple. Initially, it may seem fun, but you have to follow the precise procedure to get the answers you are looking for…"*
Employment	• Loss of jobs • Reducing the number of employees • Robotization of work • activities	*"Many jobs will disappear due to robotization, especially jobs that do not require direct interaction with guests."* *"The number of employees will decrease in the role of employees will be to supervise and solve problems."*
Security risks	• Hackers • Data security risks	*"Some people might try to hack them and then steal the data."* *"It could be a security risk."* *"Devices that can move and have cameras and are led through electronic commands that may represent a danger for both staff and guests…"*

Table 6 represents the results of a thematic analysis exploring hotel employees' concerns about the potential costs of using cobots. Responses reveal a broad spectrum of perceived risks and limitations, which were grouped into five categories of potential costs. Many employees expressed socio-psychological distress, highlighting how the lack of emotional presence and empathy in cobots can lead to feelings of boredom, alienation, and even a sense of "toxic addiction" to AI. Technical reliability also emerged as a major concern. Despite technological advances, respondents reported frequent malfunctions, software issues, and system delays, which disrupt daily operations and create additional stress for staff who are expected to work efficiently in close contact with the machines and resolve not only routine problems but also errors caused by cobot malfunctions. Another potential cost involves the need to revise communication methods. The interviewed employees noted that cobots often fail to understand poorly structured requests, especially when tasks are not based on predefined procedures. This rigidity, interviewees explained, makes interactions with cobots less fluid and more time-consuming than communicating with human colleagues. From a professional perspective, several interviewees expressed concerns about the impact on

employment, fearing that increased automation would reduce staffing levels and reduce the human role to mere oversight or troubleshooting. For many, this raised broader concerns about job losses and the changing nature of work in the hospitality industry. Importantly, some interviewees highlighted security risks. In particular, the vulnerability of networked cobots to cyberattacks and data breaches was highlighted. Additionally, the presence of cobots equipped with cameras was seen as a potential threat not only to employee privacy but also to guest safety.

5 Discussion

This study aims to investigate the organizational, operational, and social aspects of employee interactions with collaborative robots. The success and effectiveness of implementing new technologies within organizations largely depend on employee acceptance and engagement. The adoption of service robots, particularly in the service sector, is still in its early stages and is considered a significant innovation in the literature. Therefore, studies on this topic need to be conducted from multiple perspectives. Our research addresses this gap in the current scientific landscape.

The key difference between our study and previous research lies in the shift in focus - from functional aspects of human-cobot collaboration to the implications for human relations and interpersonal dynamics. Collaboration between human operators and cobots affects various dimensions of work, including skill utilization, task variety, job content, and autonomy. These are among the key elements that emerged from our analysis.

In particular, within the hospitality sector, this relational dimension of cobot introduction has been scarcely explored. For this reason, it represents the core focus of our study.

Preliminary results show that cobots are perceived as a symbol of development and innovation within organizations. Employees generally hold a positive attitude toward cobots, viewing them as engaging and interesting. However, these findings do not fully align with those of other authors (Lu et al., 2020; Vatan & Dogan, 2021), who have reported negative employee responses to cobot integration. It should be noted, however, that their studies are based on more structural and formal approaches, leaving little room for the relational and personal engagement aspects that form the basis of our work. This difference in perspective, and our emphasis on the details of social relationships, contributes to a new framework for analyzing workplace dynamics - one that emphasizes the soft over the hard dimensions of organizational structure.

Since work activities can foster self-esteem, social recognition, and the valorization of individual abilities and achievements, human resource management must pay close attention to the motivational and experiential aspects of job design to achieve not only technological and economic goals, but also social objectives. The most important finding of our research is the redefinition, in accordance with AI design principles, of human positioning within organizations, particularly in the hospitality sector (Appendix A).

In organizational settings, cobots are designed to work side by side with humans, sharing both space and tasks. They are not autonomous or isolated automatons, but true “artificial colleagues” (Ivanov & Webster, 2020). Based on this, the response to the first research question (RQ1) is that most workers perceive the introduction of cobots in the workplace positively, as it enhances human relations and supports personal development (Mühlemeyer, 2020; Picco et al., 2024). This positive perception is further reinforced by the ability of cobots to improve production processes and efficiency, thereby having a beneficial impact not only on organizational performance but also on employees’ professional development (Chi et al., 2020). Our analysis shows that human–cobot interaction is not merely technical, but it influences norms, roles, competencies, and organizational culture, and it is strictly related to the socio-materiality of Orlikowski, (2007).

Positive human cobot relationships foster greater operational efficiency (e.g., through automated routines), freeing up time for creative tasks and customer interaction. However, they may also generate relational conflicts between employees who interact more or less with cobots, and may reduce human social interactions, leading to isolation (Lu, Cai, & Gursoy, 2019).

The main challenge is not to resist change or fear job displacement, but rather to manage the transformation and mitigate potential stressors. This, in turn, weakens the link between AI, job insecurity, and burnout. Self-affirmation helps workers maintain their self-esteem when faced with a "machine colleague" (Smids et al., 2020).

By relieving human workers from heavy, standardized, and repetitive tasks, cobots allow the reallocation of human effort toward more cognitively, creatively, or emotionally engaging activities. Their ability to operate in nearly any environmental condition also supports operational continuity and improves workplace safety, especially during critical periods (e.g., the COVID-19 pandemic). This observation addresses our second research question (RQ2). The analysis revealed that the successful integration of cobots in the hospitality sector requires a multi-level approach that accounts for technological, human, and organizational dimensions. A critical element is managing the relational dynamics between human and non-human actors. As our study shows how workers become facilitators, supervisors, or co-creators of value alongside robots, mirroring the Role Theory (Biddle, 2013).

Another key aspect of effective integration concerns the adaptation of human resource management practices (Table 7). Employee acceptance of cobots is significantly influenced by access to training and upskilling opportunities. Investing in targeted learning programs that equip staff with both technical and interpersonal skills necessary for effective interaction with cobots can foster positive attitudes and reduce resistance.

Table 7. Insights from ARPACE model elements for HRM practices (Source: Authors' elaboration)

Element of ARPACE Model	HRM insight	HRM practices adaptation
Actor (human employee)	Employees are not passive users but active participants who emotionally and cognitively interpret cobot integration	- Job design: Incorporating creativity and decision-making where humans feel valued rather than replaced. - Recruitment and selection: Identifying individuals with openness to technology and adaptability. - Employee engagement: Designing roles that recognize workers' agency and perceptions of co-working with cobots.
Partner (cobot)	Cobots are seen ambivalently: either as helpful colleagues or alienating machines	- Change management: Preparing employees for a paradigm shift in workplace roles and responsibilities. - Internal communications: Framing cobots as partners, not threats, to support psychological acceptance. - Training and development: Educating staff on cobot functionality, limitations, and strengths to foster trust and a collaborative mindset.
Relation (human–cobot Interaction)	From excitement and comfort to anxiety and emotional detachment	- Diversity and inclusion: Ensuring cobots do not exacerbate exclusion or reduce interpersonal team dynamics. - Organizational culture: Promoting a culture that integrates cobots without undermining human social needs. - Well-being programs: Addressing concerns such as emotional disconnect and loneliness.
Activities (tasks and Interaction rules)	Technical (maintenance, updates) and ethical (respectful treatment, representation) norms for working with cobots	- Task allocation and workflow design: Using cobots for routine, dangerous, or repetitive tasks, while humans focus on complex or empathetic functions. - Workplace policies: Establishing guidelines on ethical cobot treatment, akin to organizational rules, norms, and values. - Health and safety: Leveraging cobots to reduce physical strain and increase task safety.
Context (organizational environment)	Cobots influence operational, reputational, and HR-related changes in the organizational environment	- Employer branding: Leveraging innovation to attract tech-savvy talent while managing fears of automation. - Organizational development: Facilitating shifts toward hybrid human-AI service models. - Positive organizational climate: introducing wellbeing and happiness at work initiatives such as emotional support programs, wellness and socialization spaces, recognition of human contributions in tech-driven processes.
Evaluation (cost–benefit analysis)	Benefits: workload reduction, improved job satisfaction, and skill development Costs: job insecurity, emotional detachment, communication difficulties, technical risks	- Workforce planning: Balancing automation with reskilling and redeployment strategies to mitigate job loss fears. - Talent development: Creating learning paths for high-value cognitive and creative tasks. - Retention strategies: Enhancing job satisfaction through meaningful work and reduced stress due to cobot support. - Performance management: Redefining KPIs to include collaborative efficiency with AI and cobots.

Our findings highlight that cobot-driven workplace transformation often entails a redefinition of roles, shifting from routine tasks to functions focused on supervision, coordination, and optimization of robotic systems. Consequently, the role of HR specialists in revising the microstructure of work becomes crucial.

The "relationship" dimension in human–robot interaction centers on how workers assign meaning, trust, and value to their interactions with cobots (activities in the model), in real work settings (environments), resulting in complementary integration. Cobots can operate in synergy with human staff, contributing to task execution in ways that leverage the strengths of both. This collaborative model has the potential to enhance productivity, stimulate innovation, and improve service quality and customer experience.

The integration of theoretical, organizational, and operational implications is summarized in the following table (Table 8):

Table 8. Implications of the Study (Source: Authors' Elaboration)

Research Question	Theoretical Framework	Organizational Implications	Operational Implications (Practitioner Level)
RQ1	Socio-materiality	Positively influences not only organizational performance but also employees' professional development	Service improvement Operational efficiency
RQ2	Role Theory	Cobots enable the reallocation of human effort toward more cognitively, creatively, or emotionally engaging activities	• Innovation • Flexibility • Hybrid work
RQ1 + RQ2	Affordance Theory	AI technologies provide specific affordances that influence both employee and customer behavior	Development of innovative business models

The use of advanced technologies can positively influence employee motivation and engagement, actively involving them in the change process when the benefits of collaboration with cobots are directly perceived by the workforce. From an organizational perspective, the introduction of AI and robotics enables greater reconfigurability of services, facilitating rapid adaptation to changing conditions and optimizing resource management.
However, challenges also arise, including staff training and the ethical implications of customer data usage. Addressing these issues requires a careful balance between technology and human interaction.

From an operational standpoint, the integration of AI and robotics is radically transforming service models, operational management, and the customer experience. Organizations in the hospitality sector, in particular, have begun to adopt either fully automated or hybrid service models, depending on market demands and organizational strategy. Fully automated hotels focus on efficiency and technology, targeting tech-savvy customers, while hybrid hotels combine advanced technologies with human interaction to maintain high service quality. In this way, the adoption of collaborative robots increases customer expectations in terms of both efficiency and personalization. Research shows that customer satisfaction and loyalty are primarily driven by the enjoyment and efficiency of AI-enabled services, rather than aesthetics or reliability.

Furthermore, AI-supported tools enable personalized recommendations for food, activities, and in-room services, enhancing the overall guest experience. The benefits of cobot integration include improved hotel reputation, enhanced service quality, redefinition of roles, and relief from routine tasks, allowing employees to spend more time interacting with guests. These findings align with Ivanov & Webster (2020) and Berezina et al. (2019), who emphasized that cobots can operate continuously, perform tasks with accuracy and punctuality, handle multiple assignments simultaneously, and ensure consistent service quality. Cobots are also immune to fatigue, complaints, illness, and strikes, offering employees a sense of security and significant support in critical situations.

Theoretical frameworks such as socio-materiality (Kamakura et al., 2002) and Role Theory (Biddle, 2013) help explain the impact of AI on productivity, employee satisfaction, and service quality. Automation improves working conditions for various job roles, while personalization enhances customer satisfaction, thereby fostering a virtuous cycle of value creation.

Moreover, affordance theory (Gibson, 2014) offers a valuable interpretive lens: AI technologies provide specific affordances that shape the behavior of both employees and customers. Robots with physical affordances, for example, are preferred due to their higher perceived usefulness. Understanding these affordances is essential for developing innovative business models capable of combining operational efficiency, personalized experiences, and long-term competitiveness.

Nevertheless, the presence of robots in the workplace may evoke feelings of precariousness and insecurity, leading to negative attitudes and behaviors. These effects can be mitigated through self-affirmation, which allows workers to reinforce their self-esteem and adaptive capacity in the face of technological change. Self-affirmation acts as a mechanism to develop a "flexible self-system" that, under prolonged exposure to robots, leads to less threatening cognitive appraisals.

Employees also expressed concerns regarding the social dimensions of interaction with cobots. The main issues relate to the lack of genuine emotional expression by cobots and their potential to control a wide range of tasks, possibly reducing the workforce and increasing unemployment in the sector. This is consistent with findings from Liao et al. (2024), who argued that workers may feel threatened by cobots and worry about their future employability.

The study also revealed that involving employees in the design and implementation of work automation ensures greater acceptance once the technology is deployed in the workplace. Hospitality employees are not passive users of AI; rather, they actively contribute to service innovation by developing new skills through daily interaction. Service robots influence staff willingness to use technology, with a marked preference for physically capable robots due to their higher levels of trust and perceived utility.

Working with cobots enables employees to focus on high–value-added tasks, such as guest interaction, while machines handle repetitive duties. This adaptability occurs through hands-on experience and operational adjustment. To enhance human AI collaboration, targeted training is essential, developing both technical and transversal skills, such as emotional intelligence. AI integration necessitates a redefinition of organizational roles. Employees must evolve from mere task executors to facilitators and innovators, working alongside technology to co-create unique guest experiences. Research highlights that the adoption of AI and cobots can lead to role transformations, where employees take on responsibilities related to supervision, coordination, and service personalization, rather than being directly replaced.

Moreover, the use of AI technologies can positively influence employee motivation and engagement, provided they are actively involved in the change process and perceive clear benefits from collaboration with machines.

By combining these three theoretical perspectives, a more comprehensive understanding of AI integration in hospitality emerges. Socio-materiality offers a framework for interpreting the interaction between technology and social practices; Role Theory and employee empowerment highlight the active role of workers in the integration process; and affordance theory provides insight into how smart technologies are perceived and used in the workplace. Together, these theories suggest that AI should not be viewed merely as an automation tool, but as a catalyst for innovation and value co-creation, with employees playing a central role in shaping emerging practices and business models.

The integration of AI demands a redefinition of roles within organizations. Employees must evolve from task performers to facilitators and innovators, co-creating meaningful guest experiences alongside the technology. Research further shows that collaboration with service cobots has a positive impact on employee well-being. By reducing work-related stress, cobots allow workers to focus on meaningful tasks while robots take on dangerous or physically demanding duties, thus improving employee health. These findings support Smids et al. (2020), who asserted that engaging in meaningful work enhances job satisfaction and well-being. However, cobots may also limit peer-to-peer social interactions, potentially having adverse effects on workers' social wellness.

Finally, it is crucial to consider shifts in organizational culture. In culturally adaptive environments that embrace innovation, cobots are met with curiosity and enthusiasm. Conversely, in settings marked by skepticism or ethical concerns, particularly about automation's impact on employment or interpersonal relationships, resistance tends to be stronger and more difficult to manage. Thus, cultural alignment plays a pivotal role, requiring transparent communication and participatory change management strategies.

Figure 2 illustrates the key findings related to the various components of the ARPACE model. In the analysis conducted through collected data, the role of the "actor" was attributed to the interviewed employee, positioning them as the central subject of observation and interpretation. The cobot was conceptualized as

a “partner,” rather than a mere technological tool or subordinate entity. The “relationship” dimension captures how human–cobot interactions are perceived, interpreted, and emotionally experienced by the participants. Through this lens, the analysis explores the evolving dynamics of human–robot interaction, focusing on how employees assign meaning, trust, and value to their interactions with cobots (activities in the model) in real work contexts (environment).

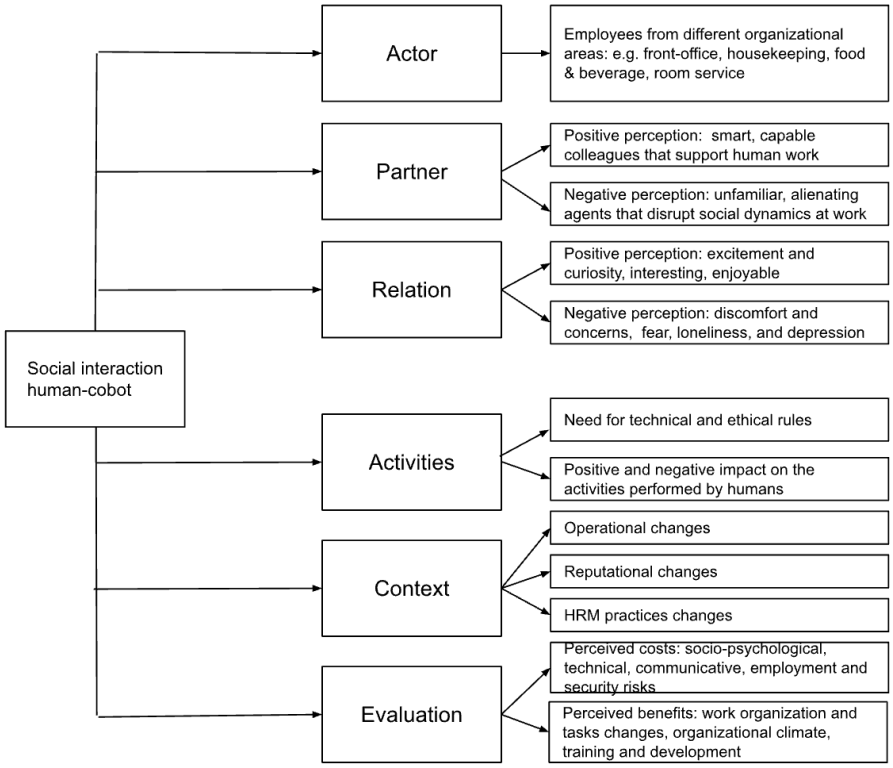

Figure 2. Main Findings of Social Interaction “Human-Cobot” in the Hospitality Sector (Source: Authors’ Elaboration)

The analysis concludes with the evaluation of the interaction between participants and cobots, analyzing the perceived costs and benefits. The implementation of cobots in the hospitality sector can generate significant gains in efficiency, service quality, and innovation. However, it requires tailored HRM practices, including careful workforce planning, targeted training, and effective change management to counterbalance the high costs and potential resistance.

The most effective approach is one that integrates technology, organizational culture, and customer experience focus. An application of this research will move in this direction.

6 Conclusion

The focus of this study is the analysis of the opportunities and limitations deriving from the integration of cobots into the business processes of hotel enterprises, while also developing the concept of Work 5.0 and the human-robot co-working model as a sub-system of HRM within organisations. Summarizing the evidence collected and discussed in the previous sections, our research confirms that process automation through AI increases operational efficiency, reducing costs and improving service quality. Technologies such as service robots and intelligent assistants can handle repetitive tasks, freeing up staff to focus on more value-added activities. This not only optimises resources but also promotes a more sustainable management of operations, contributing to more resilient economic models. Therefore, the possibilities offered by AI foster the emergence of innovative business models in the hospitality industry. The integration of advanced technologies enables organisations to offer more flexible and adaptable services, responding

quickly to changes in the market and guests' needs. This dynamic approach will be the future of research in this area and will help organisations remain competitive and explore new growth and diversification opportunities. More in general, the article contributes to show that by integrating theories such as socio-materiality (Giddens,1984; Orlikowski, 2007), employee empowerment (Boudreaux, 2021), and affordance theory (Gibson,2014; Norman,1999), it is possible to reinterpret AI-driven automation not merely as a tool for labor substitution, but as a mechanism for business model innovation. This shift enables more dynamic service personalization and opens up new revenue model opportunities, especially in a context where guest preferences and operational conditions are constantly evolving. Analyzing how AI affordances influence the sector's economic evolution helps us better understand the dynamics of innovation, personalization, and sustainability that define contemporary hospitality. However, a more in-depth analysis of how AI affordances can generate emerging economic models in hospitality would be valuable.

In this frame, the article offers an evaluation of employee perceptions, analysing the socio-psychological aspects of introducing cobots into the working environment of hotel enterprises. The findings of the study reveal the benefits and challenges of human-cobot coworking as a new form of labour organisation in the hospitality sector. Furthermore, the study argues that the increasing trends of work digitalisation and workforce instability necessitate the creation of a new management approach that takes into consideration both the positive and negative consequences of implementing innovative technology into business processes. As discussed, the results of the study can provide a foundation for HR decision-making aimed at minimising the risks associated with workplace digitalisation, ensuring the smooth and successful integration of service robots into workplaces, and increasing employee acceptance of cobots.

Despite the theoretical and practical implications of the analysis conducted in this study, one of its major limitations is the focus on the micro aspects of the phenomenon, specifically from the employees' perspective, without considering the meso and macro-level implications. In addition, concentrating on some specific socio-psychological aspects could ignore other important variables influencing employees' perceptions. Furthermore, although offering quantifiable insights, the chosen method may not fully reflect the complexity of user experiences since other approaches/techniques allow subjective impressions to provide a deeper background. Furthermore, limiting the external validity of these findings could be the sample size and makeup, since employees' perceptions may also differ depending on task-specific programs. By using a mixed-methods approach, adding further variables, and expanding the workers' role involved to create a more complete model of elements impacting human-cobot interaction, future studies could address these restrictions.

To identify further research directions, an analysis of the most frequently recurring keywords across the thematic blocks was conducted. As shown in Figure 3, six distinct dimensions were identified: i) Innovation, development, progress, and updates; ii) Performing routine tasks and providing standard services; iii) Enhancing the work environment and reducing social problems; iv) Training, upskilling, and reskilling; v) Loss of jobs and staff reductions; vi) Lack of emotions.

Each dimension is connected to at least two thematic blocks, making it valuable to delve deeper into these connections and their implications. Given the link between perceived costs in a specific organizational environment and job loss or staff reduction, future research should examine the conditions in which the introduction of cobots leads to displacement versus transformation of job roles. Moreover, it is important to understand the role of training and reskilling programs in this transformation. The theme of "lack of emotions" suggests the need for further inquiry into the socio-psychological consequences of working with emotionless artificial colleagues to understand their impact on employee morale, engagement, and interpersonal relationships in the workplace. Since cobots are perceived as effective in performing routine tasks and providing standardized services, future research might focus on measuring productivity and quality outcomes, particularly in service-driven industries. Understanding how contextual factors (e.g., organizational environment and personal life of employees) moderate the success or failure of cobot integration could inform more effective implementation strategies and HRM policies aligned with Industry 5.0 principles.

Furthermore, future studies could benefit from using data from countries with differing social, economic, and cultural frameworks to enhance the generalisability of the results. For example, comparisons could be made between developed and developing countries or between European and non-EU countries.

This research focused on the hotel industry, so future studies could replicate the study in other sectors (e.g., restaurants and airports) or investigate differences in perceptions among workers from different hotel departments who interact with varying types of cobots. Additionally, further research could explore

mechanisms such as collaboration with robots to help employees improve their skill development and satisfaction levels, thereby reducing burnout.

Although this analysis of the social impacts of robots in the workplace has some limitations and is not exhaustive, it aims to shed light on the human-robot relationship. The study also acknowledges the potential long-term negative effects on certain psychological aspects of employees required to interact with cobots.

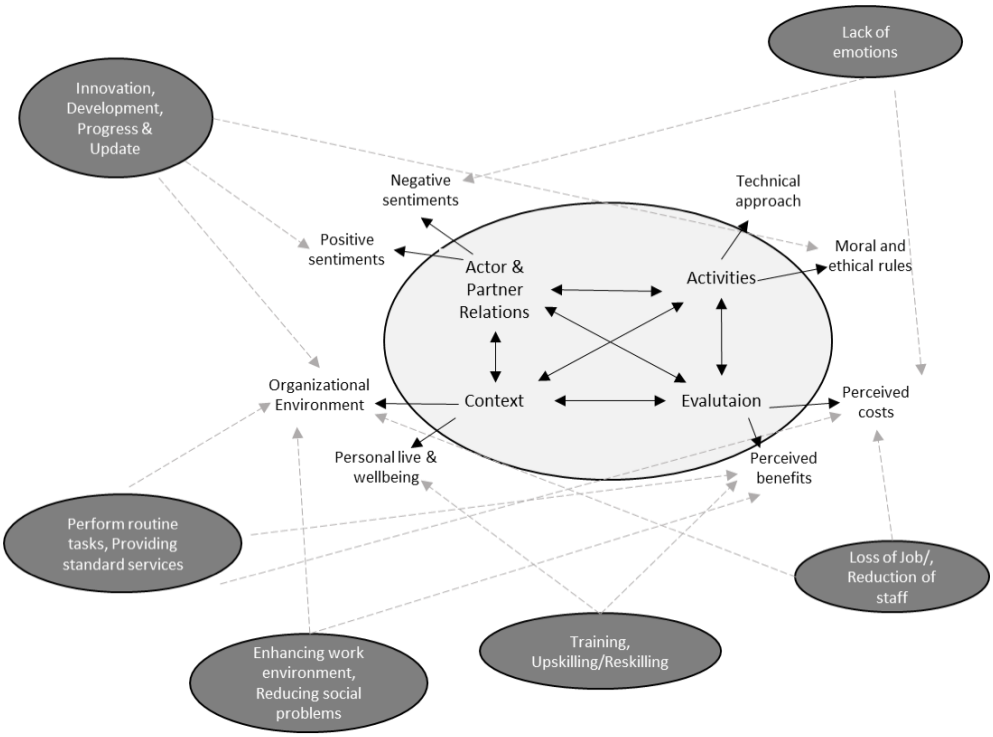

Figure 3. The Keywords Map (Source: Authors' Elaboration)

There is no doubt that robots within an organisation can significantly enhance company productivity and improve the efficiency of employees' work performance. However, this research highlights that increased efficiency may be offset by heightened job insecurity and elevated stress among employees.

The future impact of robots on society remains uncertain. While technology has radically transformed the nature of work, human concerns appear fundamentally unchanged: we continue to fear that a workplace with robots may ultimately be a workplace without us.

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8 Declaration of AI

During the revision of this work, the author(s) used ChatGPT Pro and Grammarly in order to review and improve the clarity, grammar, and fluency of the English language.

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Appendix A: Transformation of Job Descriptions Before and After Cobots Introduction

Job position	Before cobot introduction (extraction of some activities from the job descriptions)	After cobot introduction (activities to be modified based on the interviews' responses)
Bellboy (front-office)	• Load and unload luggage from guest vehicles. • Ensure the safe storage of guest luggage in coordination with the Doorman and Front Desk. • Respond to guest requests and fulfill their needs promptly and courteously. • Assist with the cleaning of restrooms, public areas, and guest floors as required. • Ensure the hotel entrance area is kept clean and presentable at all times. • Help with the collection and disposal of waste within the Rooms Division. • Move and transport equipment or furniture upon request. • Ensure that all services provided meet the company's quality standards.	• Load and unload luggage from guest vehicles in coordination with the cobot to ensure efficient and safe handling of guest belongings. • Ensure the safe storage of guest luggage in coordination with the Doorman, Front Desk, and the cobot, optimizing handling time and security. • Respond to guest requests and fulfill their needs promptly and courteously, leveraging the cobot's support for deliveries or repetitive tasks. • Assist with the cleaning of restrooms, public areas, and guest floors as required, supervising or collaborating with cobots for routine or repetitive tasks. • Ensure the hotel entrance area is kept clean and presentable at all times, with cobot support for continuous upkeep and floor-level maintenance. • Help with the collection and disposal of waste within the Rooms Division, working with cobots to ensure hygienic and efficient removal. • Move and transport equipment or furniture upon request, using cobots to reduce physical strain and improve handling speed. • Ensure that all services provided—whether human-led or cobot-assisted—meet the company's quality standards.
Receptionist (front-office)	• Organize, confirm, and process guest check-in and check-out procedures, adapting to any changes as needed. • Secure payments by verifying and adjusting billing information as necessary. • Assign rooms and provide guests with information about the hotel, directions, amenities, and local points of interest. • Report emergencies, lost items, or theft cases to the appropriate authorities or security personnel.	• Organize, confirm, and process guest check-in and check-out procedures in coordination with the cobot, adapting to guest preferences and system updates as needed. • Secure payments by verifying and adjusting billing information, with cobot support for document scanning, data entry. • Assign rooms and provide guests with hotel information, directions, amenities, and local points of interest, while using cobots to assist with real-time navigation or personalized digital support. • Report emergencies, lost items, or theft cases to the appropriate authorities or security personnel, also monitoring alerts or sensor data flagged by the cobot system.

Hotel Food and Beverage Server	• Ensure diners are comfortable and have a pleasant dining experience. • Record food and drink orders accurately from customers. • Memorize the menu and provide recommendations for appetizers, meals, and drinks. • Address customer issues promptly and professionally. • Assist with tidying tables, clearing leftovers, and maintaining a neat dining area. • Set tables and rearrange the dining area for larger groups or special events.	• Ensure diners are comfortable and have a pleasant dining experience, coordinating with cobots to enhance service efficiency and maintain attention to guest needs. • Record food and drink orders accurately from customers, while using cobot interfaces to transmit orders directly to kitchen or bar systems. • Memorize the menu and provide recommendations for appetizers, meals, and drinks, complementing digital suggestions displayed by service cobots. • Address customer issues promptly and professionally, ensuring that cobot-assisted tasks support rather than hinder the guest experience. • Assist with tidying tables, clearing leftovers, and maintaining a neat dining area, with cobots managing the transport of used items to reduce staff physical workload. • Set tables and rearrange the dining area for larger groups or special events, collaborating with cobots to move furniture and stage setups efficiently.
Housekeeping Room Attendant (Housekeeping)	• Respond promptly to guest requests for items such as irons, safety instructions, amenities, or information, ensuring a high level of guest satisfaction. • Clean guest rooms and assigned areas daily, including making beds with fresh linen, dusting furniture, cleaning bathrooms, and wiping down surfaces. Ensure cleanliness and freshness by following company-approved cleaning procedures. • Stock housekeeping carts with necessary supplies, such as toiletries, coffee amenities, and water bottles. • Collect soiled linens, trash, and in-room dining trays. • Follow all hotel policies, procedures, and service standards, ensuring the proper use and maintenance of housekeeping equipment and supplies.	• Respond promptly to guest requests for items such as irons, safety instructions, amenities, or information, coordinating with cobots for quick and contactless delivery while ensuring a high level of guest satisfaction. • Clean guest rooms and assigned areas daily, including making beds with fresh linen, dusting furniture, cleaning bathrooms, and wiping down surfaces, while working alongside cobots for routine or repetitive cleaning tasks to maintain high efficiency and service consistency. • Stock housekeeping carts with necessary supplies, such as toiletries, coffee amenities, and water bottles, and use cobots to assist in the transport and distribution of supplies across guest floors. • Collect soiled linens, trash, and in-room dining trays in coordination with cobots to reduce manual load and optimize workflow. • Follow all hotel policies, procedures, and service standards, ensuring the proper use and maintenance of both traditional housekeeping tools and cobot-assisted equipment, with attention to safety, hygiene, and guest comfort.

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