

Robots and service delivery in hotels: preliminary insights from co-workers and supervisors

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In this research note, we analyze semi-structured interviews with hotel managers and co-workers of robots in Chinese hotel operations. We find that both managers and employees seem to be supportive of delivery robots in their operations, although managers and employees note that delivery robots have substantial limitations. The findings illustrate that management has a laissez-faire attitude toward the incorporation of robots, offering no formal robot training for the employees and establishing no rules about the use of the robots in operations. The findings suggest that hotels are in a ‘Wild West’ stage of the incorporation of robots into operations, where there is enthusiasm about the technologies but little strategic thinking about how such technologies will be implemented to reach organizational goals.

Keywords: *cobotics, robotics, service automation, delivery robots, service robots, robot co-worker, hospitality, hotel service delivery, robot integration challenges*

1 INTRODUCTION

Although there is a large and growing literature documenting the expansion of automation technologies in the hospitality industry (see, for example, Ivanov et al., 2019; Ye et al., 2022; Zhonga et al., 2021), there is a general lack of insight from the people who manage and work with robots on a daily basis in hospitality workplaces. In the growing literature on service automation, research methods and perspectives on the issue have remained somewhat limited, although they have moved away from a focus on engineering/technical aspects related to automation technologies. Recent research has primarily employed quantitative approaches to investigate customer attitudes toward these technologies (see, for example, Ivanov and Webster, 2023; Ivanov, Webster and Seyitoğlu, 2023; Letheren et al., 2020; Seeber et al., 2020; Soliman et al., 2024; Wirtz et al., 2018). In this research, we seek to learn about actual daily experiences of working with robots and practical management of a workforce with service robots with interviews that allow respondents to explain their impressions of working with robots, specifically delivery robots, the robots most frequently used in hotel operations.

The rapid adoption of robots and artificial intelligence (AI) in hospitality, travel, tourism, and food and beverage (F&B) industries has led to increased human–robot interaction (Khoa et al., 2022) with both customers and human labor in establishments. This shift from backstage to front stage impacts various stakeholders at different levels such as individual customer experience, market dynamics, and societal implications (Wirtz et al., 2018). Collaboration between frontline employees and service robots is increasingly crucial for productivity and service quality (Krafft, Sajtos and Haenlein, 2020; Seeber et al., 2020) and has been noted in the literature. For example, Latikka et al. (2021) explored the intricate relationship between human labor and automation driven by AI, focusing on the role and autonomy of robots in the workplace. Their study revealed that varying levels of autonomy in robots can significantly impact workplace dynamics and human perceptions. By investigating how human attitudes, norms, and past experiences shape the acceptance of advanced social robots, the researchers shed light on the dynamics of cooperation between humans and machines. Their randomized experimental study demonstrated a preference for robots that incorporate human input, underscoring the importance of considering autonomy levels in robotics design. Furthermore, the study emphasized how individuals' confidence in technology and previous encounters with robots influence their perceptions of them, whether viewed as equipment or co-workers.

A recent research review on service robots in the tourism and hospitality sector highlights the widespread use of delivery robots in Chinese cities (Chen et al., 2023). With the growth of e-commerce, there is an increasing demand for efficient delivery services. Tech giants such as Alibaba and Meituan deploy delivery robots equipped with mapping technology to navigate sidewalks and meet delivery deadlines. This has reduced reliance on human couriers for routine deliveries, resulting in faster service. However, challenges remain, such as navigating busy areas and evolving regulatory frameworks. Overall, delivery robots play a vital role in optimizing China's delivery networks and managing high e-commerce order volumes.

Despite extensive quantitative research, there is a notable gap in qualitative approaches regarding customer perceptions, management attitudes, and employee experiences with these technologies in hospitality settings. This study pursues to address this gap by conducting in-depth qualitative interviews to understand the acceptance of automation technologies from the perspectives of managers and co-workers in the hospitality and tourism sectors. We will also relate the findings to the growing field of cobotics since the findings relate to how humans and automation technologies coexist in the workplace.

2 METHODOLOGY: INTERVIEWS WITH ROBOT EMPLOYERS AND CO-WORKERS

Interdependence theory posits that the outcomes of an individual's actions in a relationship are contingent not only on their own actions but also on the actions of their partner, with mutual dependency being a key factor for success. This study aims to explore the dynamics of human–robot interactions, particularly in the hospitality industry, examining the implications at various levels – from managerial and employee perspectives on robot integration to inform customer experiences and manufacturer considerations for future development. Given the specific focus of this study, a qualitative approach is deemed most suitable. This research design collects detailed perspectives on robots as workers, co-workers, and service providers in the hospitality industry (Creswell and

Creswell, 2018). It employs purposeful sampling of two participant groups – managers and employees – who have interacted with robots in this sector. The study utilizes a phenomenological design, conducting one-on-one interviews with semi-structured questions to gather data (Creswell and Creswell, 2018). Data transcription and coding were performed using NVivo software, with thematic analysis and inductive coding by (Saldaña, 2021) to minimize researcher bias.

In order to learn about the perceptions of robots by managers and co-workers, some preliminary interviews were held using a convenience sample. For the research, two managers and two frontline employees in hotels were interviewed in Chinese hotels. Permission was granted to do the research through the institutional review board (IRB) of an academic institution in China. Semi-structured interviews took place in the manager's or employee's place of work in Chinese, using native-speaking interviewers. The interviews were translated into English, so that a team of researchers could analyze the responses. The responses to the questions were analyzed by each member of the team, and a final analysis of the data was agreed upon by the members of the team.

In order to analyze the data, each of the three members of the team separately read through the transcripts of the interviews and identified themes in each of the interviews. The members of the team then convened to discuss findings and come to a consensus of the identified themes and interpretation of the data. There was general consistency in the understanding of the themes emerging from the interviews, and the consensus of the interpretation of the findings was placed into tables to summarize the responses from the respondents.

2.1 Managers of robots

The findings of the interviews (see Table 1) demonstrate that managers typically understand that the robots used in their premises are usually used to deliver small things to hotel rooms where the guests are staying, and these robots can be used for little else. One manager noted that the robot is used largely to 'deliver things like toothbrushes and towels' to guests in their rooms. In addition, there seems to be little or no training given to employees on how to use the robots, and there seem to be few or no rules with regard to the use of the robots. When asked about whether there are any rules or policies with regard to how employees are supposed to work with robots in the workplace, one respondent said bluntly, 'not at all', suggesting that while the organization has robots, formal procedures and expectations for usage have not been developed. Typically, we see that management is generally happy that robots can deliver small items to hotel guests, but they also report that the robots are generally inflexible and can only really accomplish one particular task (delivery) but that this is appreciated, as it gives the human employees the ability to concentrate on the other tasks that robots cannot do during busy times. One manager noted that the robot 'saves a lot of labour, you really don't have to run it by a person and it's faster than a person'. This highlights the general satisfaction of management with the limited assistance that delivery robots can make, as it saves them labor. The managers note that there are weaknesses in the current capabilities of the robots, suggesting that robots should be able to deliver more than the small quantities that they currently transport or also do other tasks, apart from delivering small things.

2.2 Robots' Co-workers

The findings of the interviews (see Table 2) indicated that the co-workers of robots typically use the robots for the delivery of small goods to the guests in their guest rooms.

Table 1 Responses from managers

Questions	General findings
Q1: What are the uses of the robots in your work?	Robots deliver small items like towels, tooth-brushes, and select food orders to guest rooms.
Q2: Are there any policies on law and ethics mentioned in your company statements such as mission or vision statements or operating and training materials in regard to service robots?	There appears to be no rules or regulations in place within the organization pertaining to the robots.
Q3: Are there any human relation policies specific to human–robots interactions (cobotics) in your organization?	There are no rules, and the management of the robots appears to be very informal.
Q4: Have there been any challenges managing both humans and robots as employees?	Humans are versatile and can handle various tasks, unlike robots, which typically focus on a single task due to their limited flexibility and multitasking capabilities.
Q5: What type of training and orientation is provided to the human–robots teams?	There is an almost complete lack of formal training. Any training seems to be verbal, informal, and unstructured.
Q6: Do you find value in human–robot teams?	Robots excel at delivering items, easing the burden on human employees when they're occupied, thus freeing them from that specific task.
Q7: From your experience, do you feel that service robots serve their purposes in the industry?	Robots are helpful and relieve human employees when they are overwhelmed with tasks, but robots can only do one task, unlike humans.
Q8: Do you feel there should be some types of improvements (for the manufacturers and management)?	Robots are beneficial but restricted to single tasks and limited functionality. Developing multifunctional machines would be ideal, enabling them to expand beyond current constraints and perform a wider range of tasks beyond delivery.

An interesting thing that came out of the interviews is that the robots are also used to guide guests to specific places in the facility. The co-workers of robots have had little or no experience working with robots before, showing that the incorporation of robots into the hotel industry is a novelty and a new tool that has not really been experienced before. As with the managers, co-workers of robots report that robots are most commonly used simply to deliver small things (food and other small goods) to guests in their rooms. When asked about when robots are used, one respondent said when there 'aren't enough staff'. The response indicates that the delivery robot is only used when there is a staff shortage, showing that the robots are used to pick up the slack at times when humans are busy with other issues. The other respondent described the typical scenario in which the robot is used when the switchboard is called up and the robot is used to send up small items such as 'disposable chopsticks or bowls and so on' to a room. Interestingly, the example given also notes that this may take place when the guest 'is not feeling well', suggesting that the use of the technology is also a means to maintain some social distance in the wake of the pandemic, as others have found (Parvez, Eluwole and Lasisi, 2024).

Table 2 Responses from co-workers

Questions to co-workers	General findings
Q1: What are the uses of the robots in your work?	Employees primarily operate the switchboard and program robots for guest deliveries, occasionally using them to assist guests on-site.
Q2: How long have you been working with robots as co-workers?	Working with the robots is a new experience for employees.
Q3: In what work situations and how often do you usually use robots?	Robots typically deliver small items to hotel guests when human staff are occupied.
Q4: What are your most favorite and least favorite tasks to do when working with your robot co-workers?	The robots excel at single-item deliveries but have limited utility otherwise. Issues arise when guests don't hear the robot at their door, highlighting a weakness in their functionality. Delivery robots are mainly suited for small item deliveries.
Q5: Did you receive any trainings or orientations prior to working with a robot?	There is little or no formal training. Most employees train themselves or have fellow employees show them how to use the robots.
Q6: Do you enjoy working with your robot co-workers?	Working with robots is usually enjoyable and not overly challenging. Despite limitations in their delivery capacity and completion rate, they prove beneficial when human staff are occupied with other tasks.
Q7: Do you feel there should be some types of improvements (for the manufacturers and management)?	The robots have limited flexibility, primarily delivering very small items and restricted to delivery tasks only. Improvements in bypassing the main switchboard and enhancing communication with customers could reduce delivery failures.

One issue that they report is that there are failures at times to deliver the goods to the guests, as they do not always have an effective method for notifying the hotel guest that their delivery is outside of their door. A common delivery failure is that the robot tries to communicate that a delivery is outside the door, but the guest is not effectively informed of this. One respondent explained about failures when the robot rings the doorbell, 'if the guest doesn't hear it or isn't in the room, the robot returns, and guests complain that they didn't receive their items'.

Additionally, the interviews illustrate that employees do not seem to receive any formal training about how to use the robots. Instead, employees report that all the training is informal and done when they are not particularly busy. Employees report experimenting on using the robot or informal training from other employees who have pattered with the robot. One employee stated, 'there's no training on robotics and if you start using it, you have to consult the head foreman inside the restaurant to sort it out if you don't know how to use it at first'. This suggests that it is an informal system in which employees ask for permission from a supervisor to get some permission and quick pointers on how to use robots. The employees, however, report enjoying that the robots alleviate them of some extra delivery tasks when times are busy at the workplace. However, employees also note that current robots have many limitations of what they can do, since they cannot deliver much material and can only really perform one task, delivery. Similarly, employees mention that the current robots generally require

tasks to be allocated through the switchboard, and there is not an adequate communication system directly with the hotel guests. One suggested that the robots could ‘use phone notifications as well’, preferably calling the room’s telephone when a delivery has been made so that delivery is more likely to be completed by the receiver.

3 DISCUSSION

Overall, the research illustrates that the current robots being used in hotels in China are very limited in their abilities and are mostly being used solely for the delivery of goods to hotel guests. It is interesting that this is appreciated, and it is seen as a very positive way both by the managers and the robots’ co-workers, since it takes over one task from workers, allowing employees to concentrate on other tasks. It is noteworthy that all those interviewed saw that the robots used are limited in the tasks that they can do and the amount of work that they can do, while still noting that the delivery robots are appreciated since they can alleviate some pressure among busy employees. What is most interesting is that one of the managers stated that the delivery robots seem better at delivery than humans. The robots are appreciated by all those interviewed, in that they seem to indicate that robots take the pressure off busy employees, even if they can only do one specific task and cannot do much apart from that specific task. At any rate, the robot alleviates some of the workload from busy employees.

While robots seem to be appreciated by managers and co-workers, there seems to be little or no organized managerial thinking to support the integration of robots into their operations. Managers report no rules or organizational regulations pertaining to the robots. In fact, it seems a bit surprising that managers are responsible for expensive machinery and yet do not see the value in investing in training for the proper use of the machines and appear to be unconcerned about the consequences of the misuse of robots. Additionally, none of those interviewed, neither managers nor robot co-workers, indicated that there is any formal training of employees on how to use the robots in effective and safe ways. So, while these businesses are willing to invest in these technologies, they seem not to be concerned about either creating guidelines to use such technology in an effective way or training employees so that the robots are used in ways envisioned by the management.

Finally, managers and employees seem to recognize that the current robots used are very limited in their capabilities, although they recognize that they can do a very narrow and limited task better than humans can. An interesting field invention seems to be the use of the robot as a guide within a facility, as one employee stated, ‘a function that can guide customers to a certain place’. While it may be outside of what the original envisioned function of the robot is, many of the technical needs for the robot to guide a person are already embedded into the hardware and software, so it seems like extra functionality was understood by those in the field to perform another important task, delegated from a human agent. There seems to be a demand not just for robots that are good for one function but also for delivery robots that can deliver greater loads apart from the small deliveries they now can deliver.

4 CONCLUSION: GENERAL ACCEPTANCE AND THE WILD WEST

The interviews give a great deal of insight into the use of robots in hotel operations and the experience of managers of robots, showing a generally optimistic view of the

use of robots and a disorganized and non-strategic implementation of robots into hotel operations. While it is unfortunate that there are so few respondents, it seems that this approach has identified some issues that are not particularly present in the current research on the topic and can be used to inform future research to learn more about robots in hospitality operations. The most interesting finding from the interviews, perhaps, is the quite optimistic feeling that both the employees and managers express in working with robots, showing that there seems to be little robophobia from either the employees who manage or work with robots, something that has been envisioned in the literature (Webster and Ivanov, 2021). Additionally, both employees and managers seem to be in agreement that robots are effective in terms of alleviating human employees from simple tasks so that the human employees can use energies for things that are not yet relegated to service automation technologies. But this could also be because, as previous research has shown, employees seem to have a preference to work with delivery robots over some other forms of robots (Leung et al., 2023). So, it may be that delivery robots are welcome as co-workers but that other forms of robots are not.

Perhaps one of the most interesting findings from the interviews is that hotels have not fully thought through the issue of how to create rules and regulations pertaining to the technology, so that the current period is a fairly chaotic period in the use of delivery robots, a ‘Wild West’ of sorts. This supports the findings of researchers in human–robot teaming (Dehkordi et al., 2021; De Keyser and Kunz, 2022; Khoa et al., 2022; Krafft, Sajtos and Haenlein, 2020; Le, Sajtos and Fernandez, 2022; Letheren et al., 2020; Mason, 2012; Seeber et al., 2020; Wirtz et al., 2018; Zhao, Henrichs and Mutlu, 2020), as it seems that organizations are lacking in integrating robots into strategic thinking in realistic and pragmatic ways.

Part of the reason for this is that this service technology may be that the technology is still rather innovative, something of a novelty for the managers and employees. No respondents seem to indicate that their organization has thought about rules nor training for managers and frontline employees. However, there will be a time when stricter guidelines will have to be created to help employees learn to use the technologies in ethical, safe, and effective ways, since regulations will have massive political and economic repercussions for industry (Webster and Cain, 2024). A person could infer that there is a managerial attitude in that the expenditure on the technology is considered substantial enough and that modern robots are intuitive enough for new employees to learn how to use without any formal training. However, this finding indicates a major practical opportunity for industry, since cost-effective training for the use of robots and their software will likely allow hotels to use robots in more effective ways and avoid unnecessary repairs caused by employees mishandling robots. In a pragmatic sense, it may be that the lack of effective use of robots in operations may have a negative impact upon perceptions of quality of services, since there is indication that robots can be linked with customer satisfaction and loyalty (Alma Çallı et al., 2023).

This research highlights cobotics, a blend of ‘collaborative robotics’, which merges robotics with the human–machine interaction to enhance mutual capabilities and address limitations, something that recent research of the literature (Chen et al., 2023) has identified as an important topic to research in the future. In hospitality and tourism, cobotics significantly boosts operational efficiency and guest satisfaction by supporting staff in roles such as concierge services and room cleaning, under human supervision. However, more research needs to be done in order to learn about how employees and robots can collaborate and be integrated into the daily operations of hotels and other tourism-related industries.

This research offers fresh insights into how the hospitality industry views automation technologies, impacting on micro, meso, and macro levels. First understanding managers' perceptions of managing robots reveals the advantages and drawbacks of employing robotics as service staff. Second, exploring employees' views on robots as co-workers helps enhance support, working conditions, and policies. Third, uncovering customers' experiences with service robots informs preferences and service dos and don'ts. Fourth, findings contribute valuable insights for robotics manufacturers, informing future manufacturing strategies. Lastly, researchers can utilize the final study's findings and limitations for future research. Future research should likely look into the differences in perceptions of different types of robots. It appears that delivery robots may seem to be generally accepted as a useful tool for the delivery of services, although it is unclear if different types of automation technologies would be perceived in the same positive light.

Finally, this research illustrates the value that qualitative approaches may add to research, by giving insights that quantitative research approaches may not give, as has been shown by others (for example, see Frost and Frost, 2021). Future research should investigate the best practices of the integration of such technologies in this 'Wild West' period in which automation technologies are integrated into operations but management has not fully thought out the parameters of their use, training, and rules under which employees are to use the machines. We expect that learning more about whether management conceptualizes robots as amusing novelties in the workplace or more as critical work tools that can increase the effectiveness of operations would be fruitful for researchers. Additionally, there should be research done on the delivery of effective and inexpensive training in the use of these robots, since there is a need, and it is likely that the robots are not intuitive enough yet for a novice to quickly use in an effective and safe manner.

With the increased technical capabilities of robots and a clear willingness to accept robots as employees and co-workers, we will need rules and education in order for consumers and service providers to engage in the technologies in effective and efficient ways. We can expect that this current rather nonchalant vision of the incorporation of delivery robots in an *ad hoc* way to operations will fizzle out, when hospitality organization begin treating such technologies not as fun novelties but more as tools that have to be integrated into their daily operations in ways that are safe, effective, and conducive to a healthy bottom line. Once the novelty of these new technologies fizzles out, a sobering effect should come into play, and further research should look into how these technologies can be integrated strategically, rather than simply adopted as a fashion statement.

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