Artificial Intelligence and Robots in the Service Encounter

By Stefanie Paluch and Jochen Wirtz

1. Artificial Intelligence and Robots are Changing Service Encounters

We believe that our economies are facing a turning point in history similar to the industrial revolution in manufacturing that started in the 18th century. Rapidly improving technologies become smarter, more powerful, smaller, lighter and cheaper. These include sensors, cameras, speech processing, image processing, biometrics, analytics, mobile and cloud technologies, geo-tagging and more, and they are increasingly powered by artificial intelligence (AI). Together, we firmly believe that these technologies will transform virtually all service sectors. Especially the advent of service robotics (virtual and physical service robots) in combination with these technologies will lead to rapid innovation that has the potential to dramatically improve the customer experience, service quality, and productivity all at the same time (Wirtz and Zeithaml 2018). Automated service interactions enable individually tailored, more efficient as well as effective services. Furthermore, they free up employees' time for more inter-personal, creative, and complex service activities (Huang and Rust 2018). And these technologies allow scalable service offerings at virtually zero incremental costs (Wirtz et al 2019).

This special issue on AI and robots in service interactions of the *Journal of Service Management Research* aims to contribute to and elaborated our understanding of the new challenges organizations, employees and customers face due to the infusion of service robot- and AI-facilitated and automated interactions in the service encounter. For service organizations, it is essential to recognize and evaluate service robots' potential not only for their own organizational success, but also for the well-being of their employees and acceptance, and the quality perception and satisfaction of their customers.

We will start with a short introduction into service robots and AI before we introduce the four papers of this special issue. We use the topics of these papers as a starting point and discuss implications for future research in this emerging field.

1.1. Artificial Intelligence and the Rise of Service Robots

AI defined as the *"use of computerized machinery to emulate capabilities once unique to humans"* (Rust 2020, p. 4) is one of the driving forces behind the service robot evolution. Numerous technologies such as machine learning, deep learning, natural language and image processing belong to the key technologies behind AI (Davenport and Ronanki 2018) and will change the way service providers and customers interact (c.f. Larivière et al 2017). Service robots and AI can be applied in various forms and service contexts (for a recent review, see Lu et al. 2020). For example, AI can be used to automate business processes in which algorithms independently complete their programmed tasks without human intervention. AI is also able to generate insights from data by analysing different kinds of information to predict, for example, customer churn behavior, and to make individually tailored recommendation based on past behaviors and other customer data. Lastly, AI can engage and interact with customer in different stages of the service process and support human service employees (Davenport et al. 2020; Davenport and Ronanki 2018).

The implementation of AI in organization is regarded as a major source of innovation (Huang and Rust 2018) and is expected to increase revenues and reduce costs (Davenport et al. 2020). The infusion of AI will alter service jobs and is likely to stepwise replace service employees in the future (Huang and Rust 2018). According to the four intelligences, AI can already execute mechanical and analytical tasks, but has not reached its full potential in intuitive and empathetic tasks.

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Over the past years, service robots a have received considerable scholarly and practitioner attention (Čaić et al 2018, 2019; Ivanov et al. 2019; Jörling et al. 2019; Mende et al. 2019; van Doorn et al. 2017). Service robots are defined as *"system-based autonomous and adaptable interfaces that interact, communicate and deliver service to an organization's customers"* (Wirtz et al. 2018, p. 909) and they can deliver customized services and *"physical as well as nonphysical tasks with a high degree of autonomy"* (Jörling et al. 2019, p. 406). Customer can be served by virtual robots in form of algorithms (e.g. roboadvisors for investment services), text-based chatbots (e.g. Woebot, a therapy chatbot), and voice-based digital assistants (e.g. Siri and Alexa). Physical service robots often appear as humanoid robots that are employed at airports, hotels and retails stores to welcome customers, help customers find their way, and provide information. Customer can typically interact with physical robots by asking questions and/or working on a touchscreen. The deployment of service robots will dramatically change the nature of services, their cost structure, and customer perceptions of service quality.

In 2015, the Henn-na Hotel in Japan tried to overcome an employee shortage by starting to 'hire' service robots. The hotel introduced robots as their new frontline staff in different forms and shapes, and customers were greeted and checked-in by humanoid robots and dinosaurs, the luggage was brought to the room by robot luggage carriers, and questions about nearby attractions would be answered by the robot concierge. In the room, a robot-doll called Churi entertained the guests. So far so good, but the reality looked a bit different. Even service robots have no job guarantee. Recently, the hotel management decided to fire at least half of the service robots and bring back more human frontline staff as some of the robots were creating more problems than they solved. Guests complained about the lack of knowledge of the frontline robots, and Churi the in-room doll was disturbing the guests in the middle of the night with loud noises. Suddenly, human employees were facing an increasing burden as they had to look after the robots and calm down complaining guests (Gale and Mochizuki 2019).

The Henn-na hotel example demonstrates the intense interest of organization to integrate new technologies and to use service robots for wide range of tasks. At the same time, it also undoubtedly reveals that as of now service robots are not yet able to fulfil a wide range of tasks autonomously and without human support. It will probably take a few more years of development until service robots reach their full potential. Currently service robots can be used for the simpler and more repetitive tasks, whereas humans are better at services that require social skills. The Service Robot Deployment Model (sRDM; Paluch et al. 2020; Wirtz et al. 2018) provides an overview of how tasks

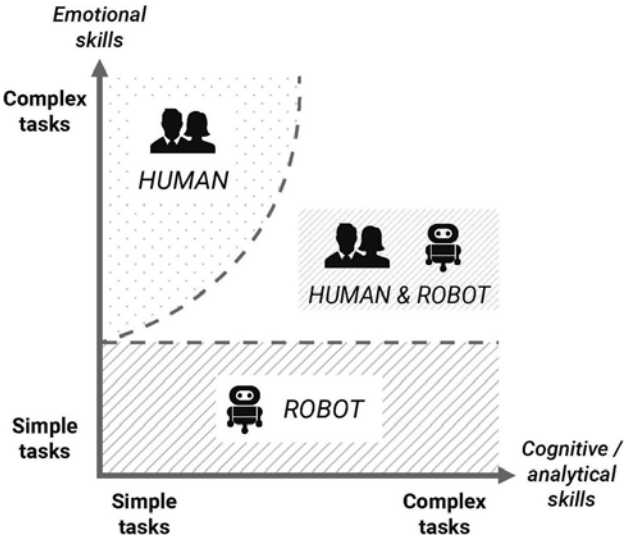

Fig. 1: The Service Robot Deployment Model (adapted from Paluch et al. 2020; Wirtz et al. 2018)

can be distributed between human employees and service robots. *Fig. 1* shows the sRDM.

Recent deployments of serviced robots have focused on simpler and highly repetitive jobs, such as providing information via chat bots on websites, providing service in customer contact centres, and physical robots in airports, hospitals and shopping centres that provide directions and information. For these standardized tasks, robots follow programmed scripts and often offer initial support for customers. Usually these assignments do not require emotional or higher-level analytical skills and are more about providing assistance such as answering simple questions in live-chats and delivering packages. In the future, service robots will be assigned to more of these jobs to relieve service employees so that they can concentrate on more complex tasks. Since robots follow strict protocols, service organizations benefit from the consistent service quality they can deliver at low cost.

In addition to routine tasks, we expect an increase in robot deployment for tasks that require high cognitive skills, such as in accounting, stock trading and data analytics. Algorithms can be designed to analyse huge amounts of data and recognize patterns within the data to identify the best options for a particular customer problem. Robots are integrated in knowledge networks that provide access to internal and external information. Within minutes robots can relate these data to customer profiles and propose best-fitting options and recommendations. Higher level of emotional and social skills are typically not necessary for these tasks and therefore service robots can exploit their full potential.

It is getting more difficult for robots when it comes to customer relationship building. Robots are used to entertain customers, for example, in waiting queues or at cruise ships that require at least some form of social skills, but

emotions are not genuine, and robots often cannot effectively respond to customer comments or humour. Complex and emotionally demanding tasks are still better handled by human service employees since robots are not able to show emotional responses outside their programmed scripts. This seems to be an advantage humans have, at least in the short- to medium-term future, as they can bring true emotions such as empathy and compassion to the service encounter (also called 'deep acting'; Wirtz and Jerger 2017) which are important for relationship building. Especially in complaint and service failure situations humans can respond better to the individual context and show understanding.

For tasks that require high cognitive and emotional skills, we expect an increase in human-robot teams. In these hybrid teams tasks are distributed between humans and robots, which means service robots are responsible for the analytical work (e.g. analyse symptoms and compare them with databases to identify possible diagnoses) and humans take over the social tasks (e.g. advising and persuading patients) and make the final recommendations and decisions (c.f. Wirtz 2019). We expect that hybrid teams will prevail in the future for service tasks where the combination of both skills (cognitive and emotional) from humans and robots optimally utilises the potential of both actors and results in higher quality, lower costs, and enhanced customer satisfaction. The Henn-na hotel example once more supports this prediction. Particularly in the service context where customers seek for a unique and memorable experience, they do not expect fully automated, predictable and emotionless interactions. Service organizations still need to experiment to better understand for which tasks robots are best qualified in their respective organizations to optimize efficiency and effectiveness.

2. Overview of the Special Issue

The articles of this special issue address a broad range of topics since AI and service robots are still a fairly new phenomenon for service organizations, employees and customers alike. These articles also present initial investigations in their respective topics. For this reason, we as editors suggest further research questions that could be addressed in the future to expand the understanding of AI and service robots in the contexts of these papers.

The first paper in our special issue, "*Robots on Blockchain: Emergence of Robotic Service Organizations*", deals with the current changes that service organizations face when introducing robotic service assistance (RSA). Specifically, Fukawa (2020) discusses in how far the infusion of AI changes service organizations and their governance structure, and how blockchain technology can help to organize RSA. Fukawa assumes that very few service organizations are able to transform RSA into unique resources. Yet, still one of the biggest challenges with RSA is the improvement of the customer service experience. Additionally, organizations that rely on service robots and more automated interactions require different governance styles. Building on transaction cost theory and the resource-based view, Fukawa proposes the *robotic service organization* that uses blockchain technology to vertically integrate different actors (suppliers, distributers and RSA) within one organization. These organizations are referred to as decentralized collaborative organizations (DCO; Davidson et al. 2018). Blockchain technology allows a connection between the members of the organization. This means that processes and activities amongst the participants are more transparent and can be better aligned, which in turn results in lower transaction costs. Fukawa proposes that service providers need to integrate human-, organizational- and physical capital resources with their technologies (e.g. AI and blockchain) so that RSA becomes a valuable, rare and imperfectly imitable resource (i.e. it becomes a competitive advantage) that increases a service provider's performance and ultimately enhances its customer service experiences. Fukawa highlights that service organizations are facing new challenges regarding their internal governance structures. Due to the emergence of AI and RSA new virtual collaborative networks are created and rigid centralized organizations become obsolete.

In our editors' view, topics on the interplay between AI and organizational structure or strategies have not yet been sufficiently investigated, but we think that technological changes lead to numerous questions that need scholarly attention in the future:

- Will service robots and AI be supplied to organizations by specialized third parties, where all players in an industry can buy from? Does that mean that the technology itself is unlikely to become a sustainable source of competitive advantage?
- Which organizational strategies and sources of competitive advantage will most effective in a world largely served by service robots and AI? Will human-provided services become bespoke and expensive, and only affordable to the elite?
- Given that AI and robots will replace many jobs, allow slim organizational design but require new support and skills for designing, implementing and maintaining automated robotic processes, how do service organizations need to reconsider their organizational structure in order to stay competitive?
- In how far can blockchain technology help in orchestrating different members of the value chain and provide governance?

The second paper, "*Frontline Employees' Acceptance of and Resistance to Service Robots in Stationary Retail – An Exploratory Interview Study*", focuses on service frontline employees (FLEs) and their acceptance of service robots in retail settings (Meyer, Jonas, and Roth 2020). The paper highlights the crucial role of human FLEs and their feelings towards service robots. Much of the extant academic service robot literature takes a customer perspective in general (Jörling et al. 2019; Mende et al. 2019) or focuses on the customer's acceptance of service robots (Wirtz et al. 2018). Here, the current study by Meyer et al. (2020) makes a strong contribution by shedding light on the drivers and barriers of employee-robot collaboration in retail settings. Specifically, the authors found that for a successful implementation of service robots it is essential to understand how service employees react and what drives their acceptance and resistance.

Based on 24 qualitative interviews with FLE from six different retailers the authors identify five aspects of acceptance and resistance to service robots. They are: (1) loss of status when FLEs fear of losing their jobs; (2) tensions when FLEs perceive uncertainty and experience stress when working together with robots; (3) required commitment to work through the changes in responsibilities of FLEs; (4) role incongruency experienced as FLEs adapt to their changing roles when collaborating with service robots; and (5) advocation for FLEs' involvement and training needed to master the handling of service robots. Furthermore, each driver has several subconstructs that explain these dimensions in more detail. The authors establish the "three Es" framework (Enablement, Engagement and Empowerment) for promoting employees' acceptance and reducing their resistance to service robots. They conclude that companies need to 'enable' their employees and provide them with the opportunity to understand and experience service robots. Next, providers need to 'engage' employees to become familiar with service robots and their new role. Lastly, employees need 'empowerment' which means active involvement in activities with service robots to recognize the robots' potential as support and not substitution.

Research from the service employee perspective is still limited and we as the editors call for more research on service employee's collaboration with AI and service robots. Therefore, we believe that future research should focus on the following topics:

- How will service jobs and job requirements for human employees change in the future?
- What are the skills and competences necessary for human service employees to successfully collaborate with service robots?
- How can pride and job satisfaction be instilled in jobs where humans and robots work side-by-side?
- How can service companies build employee loyalty even when more and more service robots and AI deployed?
- For which kind of jobs will human employees still be necessary and/or preferred by customers? Can academics work with service organization to obtain behavioural data on the long(er) term consumer acceptance and responses to service robots and AI-provided service (c.f. Benoit et al. 2019; Lu et al. 2020)?

The third paper of this special issue by Meyer-Waarden, Pavone, Poocharoentou, Prayatsup, Ratinaud, Tison, and Torné (2020) examines "*How Service Quality Influences Customer Acceptance and Usage of Chatbots?*". Chatbots combine AI and text-based communication (Wünderlich and Paluch 2017) and are often used to offer support for customers. Chatbots represent a particular form of service robots, since they belong to the category of virtual robots that interact with text-based communication with the customers (Wirtz et al. 2018). The authors empirically test in how far the SERVQUAL service quality dimension (Parasuraman et al. 1985) influence customer acceptance of chatbots by integrating the SERQUAL dimensions and the Technology Acceptance Model (TAM; Davis 1989) in their conceptual model.

Using an online survey, 146 participants were asked to simulate a booking request with Flybot, a travel chatbot in France. The authors found that reliability and perceived usefulness of the chatbot were the most important dimension to influence customers' intention to reuse the chatbot, whereas empathy and trust showed no significant effects in this context (Meyer-Waarden et al. 2020). The findings demonstrate that virtual service robots in form of chatbots are favoured by customers for their utilitarian value rather than for social or emotional skills.

From the editorial perspective, we encourage more research on virtual service robots, including chatbots, to enhance our understanding of consumer responses to different types of service robots in different contexts. Specifically, we suggest more research on:

- For which phase of the service encounter (pre-service, service or post-service) and for which types of service (e.g., people-, possession, and information-processing type services; hedonic vs utilitarian service) are chatbots most suitable (Lu et al. 2020)?
- Should, and if 'yes', how can chatbots integrate emotions more effectively in text-based communications?
- What constitutes an authentic and credible text-based communication in the customers' view (Wünderlich and Paluch 2017)?
- What is the role of tangibles in AI and text-based communication?

The fourth paper by Ewers, Baier, and Höhn (2020) is entitled "*Siri, do I like You? Digital Voice Assistants and Their Acceptance by Consumers*". Digital voice assistance (DVA) is an emerging AI-based technology (Tuzovic and Paluch 2018; Paluch and Wittkop 2020) whereby consumers can use their voice to communicate with DVAs (Siri) or smart speakers (Alexa). DVAs can answer a wide range of questions such as on weather forecasts to almost any information available on the internet. Many companies recognize the increasing usage of DVAs and offer their own apps, which are called skills for Amazon Alexa and actions for Google home. A popular skills for Alexa is Spotify, users can select songs via voice, start and stop the music or switch between playlists. In the USA, for example, customers can place orders via Amazon Alexa at Domino's Pizza (Paluch and Wittkop 2020).

Ewers et al. (2020) empirically examine consumer's DVA acceptance and asked 283 consumers with the help of an online questionnaire about Siri, Apple's digital assistant. The authors integrated the Uses and Gratification Approach (Katz 1974) and TAM (Davis 1989) for their conceptual model. Their findings suggest that enjoyment, social status and social influence are main drivers of consumer acceptance. Privacy concerns are perceived as acceptance barriers, since many participants believe that DVAs spy on them and collect personal information. Interestingly, DVAs (Siri) are valued for their hedonic utility (Ewers et al. 2020), whereas chatbots are preferred for their functional value (Meyer-Waarden et al. 2020). Digital voice assistants are becoming more popular, and companies recognize their potential as an addition marketing channel.

We as editors believe that more research is necessary that broadens the understanding of DVAs and their roles in a company's marketing and sales strategy. We propose the following research questions:

- How will digital voice assistance change traditional marketing strategies when DVAs make customized purchase recommendations?
- For which purposes (e.g., search, assistance, entertainment, and shopping; Paluch and Wittkop 2020) are DVAs most suitable?
- What are the characteristics of customers who use DVAs and how can these characteristics be used to market products and services exclusively via DVAs?
- Given the lack of visual content, what challenges do companies face when they want to market their products based on voice and sounds (Tuzovic and Paluch 2017)?
- How can DVAs be used for customer relationship building?
- How can DVAs be designed to reduce user privacy concerns (Lobschat et al. 2020)?

In closing, we hope that this special issue will further our understanding of service robots and AI in the service sector and that it will encourage further research in this important and rapidly developing field.

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