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Service Robots and the Changing Roles of Employees in Restaurants: A Cross Cultural Study

The advent of increasingly pervasive automation of front-of-house restaurant service processes calls for a cross-cultural examination of employee roles in robotised service encounters. Through an ethnographic approach this study explores robotised service encounters in two culturally distinct contexts: the US and Japan. Five roles service employees may assume are observed to varying degrees of importance depending on cultural context: enabler, coordinator, differentiator, educator, and innovator. The roles of enabler and coordinator seem the most dominant in Japan, while in the US the future of work in restaurants seems more skewed towards the roles of educator and innovator. Implications for hospitality management are discussed, and an agenda for future research is presented.

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Introduction

It is no secret that the hospitality industry often tends to play catch-up with technological trends (Bilgihan and Nejad, 2013). In particular, uptake of technology has been slow in restaurants (Ashcroft at al., 2019). Davis et al. (2018) describe the sector as traditional, labour intensive, and slow to react to innovation, and, as a result, the ways different stakeholders interact in services have remained largely unchanged for decades. That is, until now. The emergence of increasingly intelligent technology has afforded hospitality businesses to start automating most routine, manual, data- and people-processing tasks in both front- and back-of-house operations (Tuomi, Tussyadiah and Stienmetz, 2019). This has sparked a dire need for reconceptualising service encounters and the employees' roles within the service encounter triad (Bowen, 2016). In the case of restaurants, previous studies have investigated how different types of self-service technology (SST) or kitchen display systems (KDSs) change service encounters (Kokkinou and Cranage, 2013; Rosenbaum and Wong, 2015; Restaurant Business, 2018). However, not much is currently known about the changes brought by more pervasive use of technology (e.g., through the use of intelligent service robots) in restaurants. This cross-cultural study addresses that gap by examining how state-of-the-art service robotics are transforming restaurant service encounters in Japan and the US and, consequently, changing the roles of service employees.

Literature Review

Bowen (2016) identifies four roles service employees may assume in technology-mediated service encounters, namely: enabler, differentiator, coordinator, and innovator. As enablers, employees may help customers and technology perform their respective roles in the service encounter, resolving any problems or technical glitches that may arise (Bowen, 2016). As differentiators, employees bring their personalities to the service, making each encounter unique and thus able to stand out from competition (Hudson and Hudson, 2013). As

coordinators, employees manage the interplay of multiple actors as they co-create value (Ostrom et al., 2015; Bowen, 2016), and as innovators, employees actively identify areas of improvement due to their unique positioning in service delivery (Larivière et al., 2017). With the integration of intelligent service robots in restaurants, it is important to explore how employees assume one of these four roles.

Research has also found that national culture affects service culture and that the adoption of technology varies between countries, thus impacting the way technology-mediated service may manifest (e.g., Steers, Meyer and Sanchez-Runde, 2008). Hofstede's theory of cultural dimensions is perhaps the most widely applied framework for distinguishing between cultures (Gannon and Newman, 2002). In his original work, Hofstede (2001) identified four distinct dimensions through which national cultural differences may be analysed: power distance, uncertainty avoidance, individualism-collectivism, and masculinity-femininity. According to Hofstede (2001), power distance indicates how readily societies accept inequality in power distribution; uncertainty avoidance measures societies' tolerance for ambiguity; individualism-collectivism refers to how much value a given society places in individuals or the collective, and; masculinity-femininity indicates the importance of either masculine or feminine values in societies. Building on Hofstede's cultural dimensions, Griffith, Hu and Ryans (2000) suggest two general culture types: Type 1 (individualistic, weak uncertainty avoidance, low long-term orientation) and Type 2 (collectivistic, strong uncertainty avoidance, high long-term orientation). Lee, Trimi and Kim (2013) used this categorisation to study mobile phone adoption in the US (Type 1) and South Korea (Type 2), and found that Americans were generally more open and curious towards novel technology and its potential usefulness, while South Koreans tended to take a more reserved stance, putting more value on the collective opinion. In a similar study, Erumban and de Jong (2006) found power distance and uncertainty avoidance to be the most crucial factors in understanding ICT adoption in different cultures.

With the consideration of early conceptualisation on the changing roles of employees due to technological applications and the influence of culture in adoption and use of technology, this study explores the use of intelligent service robots in service encounters and the subsequent change in the roles of service employees comparing between two distinct cultural contexts: the US (Type 1) and Japan (Type 2).

Methodology

The use of service robots in service encounters is still an emerging phenomenon and, as such, an exploratory qualitative approach – namely, applied ethnography – was utilised. Following purposive sampling, service encounters were observed in 22 restaurants across the US (12) and Japan (10). The two countries were chosen as the study's contextual framework as they were identified as forerunners in robotics technology development in the West and the East, respectively. This was manifested in practice by having ample examples of service robots deployed in actual restaurant service settings. Observations lasted four hours on average, following an observation guide developed based on Lillicrap and Cousins' (2010) Service Sequence Model. A sample (18%) of locations were visited multiple times, on different days, and at different times of day. In addition, semi-structured interviews were conducted with eight restaurant managers and roboticists who work on automating various front- and back-of-house tasks in restaurants, such as serving food and cooking. The interview questions explored the impacts of robotics technology on service encounters, that is, the production and delivery of service offerings in the context of restaurants. Emerging data was analysed thematically building on a priori categories of employee roles in technology-mediated service encounters as put forward by Bowen (2016).

Findings

In line with previous research by Bowen (2016), four employee roles were observed in robotised service encounters: coordinator, enabler, differentiator, and innovator. In addition, a new, fifth role, specific to employees working alongside automation technology in restaurants was found: educator. The most prevalent roles service employees were observed to assume in the US and Japan's robotised restaurants were enabler and coordinator. As enablers, front-of-house employees were assisting customers in using technology or helping if something went wrong. For example, some restaurants required customers to join the queue by registering with a robot butler upon entry. Sometimes customers struggled to check themselves in using the robot, and in these instances, human employees were quick to step in, provide assistance and go through the check-in process with the customer. For the most part, employees assumed the role of a coordinator, whereby they simply observed that operations were running as intended. Further, in some of the businesses observed (six of 22), this role was carried out covertly via surveillance cameras. Employees monitored the service delivery from a dedicated command centre and only left their post to resolve problems.

The role of differentiator was also observed in both Japan and the US. When robotics technology was used to support staff in service encounters rather than to substitute them completely, front-line employees could spend more time on the floor and at their sections, proactively interacting with guests. This seemed to lead to positive outcomes both at the individual and organisational level, as participants noted:

> "*Instead of doing the same mindless tasks over and over, I can now focus on making customers enjoy themselves more by giving them recommendations and sharing my knowledge. It feels good to be the expert.*" (Manager, US).

> "*I think that [by implementing tech] we've actually increased our hospitality. The customer response has been overwhelmingly positive.*" (Manager, Japan).

However, this only worked so long as there were customers to interact with. In the case of a US-based coffee shop, the operations were manned by a human – robot team, whereby a human employee took care of customer service and a robot made all the actual beverages. As soon as it got quiet, the lone employee appeared visibly bored with no one to interact with.

Besides leveraging employees' expertise and personal flair, some restaurants had realised that the use of robots afforded them to take the notion of guest interaction even further. Indeed, particularly in US-based restaurants, employees had started to move towards not only giving recommendations, but also educating customers on the ingredients, technology, or process used. As put by participants:

"*We wanted to make healthy food affordable...to increase awareness on the consequences of our everyday choices.*" (Developer, US).

"*We believe this to be the right way of bringing automation to food. And by being transparent, and communicating what we're doing, we think we can enact wider societal change, too.*" (Founder, US).

While employees were often observed feeling empowered externally (i.e., greater freedom to focus on tasks they find fulfilling such as displaying their domain expertise to customers), and to some extent internally (being a part of and contributing towards a common cause i.e., the company's overarching vision and strategy of implementing automation), this was not always the case. Employees were observed to act as innovators only rarely. This was confirmed in both informal discussions and formal interviews. Especially in Japan, strict managerial hierarchy seemed to effectively prohibit front-line employees from bringing forth any ideas or suggestions for improvement. In the US, some restaurateurs seemingly advocated co-creation and acting on their employees feedback, but when prompted, failed to provide any concrete examples of changes that had taken place as per employees' suggestions.

Discussion

The advent of service robots is transforming the roles of frontline service employees in restaurants in the US and Japan. For example, the role of service employees acting as enablers and coordinators in robotised hospitality seems to be moving away from traditional customer service and more towards supervision and surveillance, at least in the contexts observed here (and comparatively more so in Japan). In general, robots perform well on their own when delivering customers' transactional need, such as placing a routine order. The notion of human-robot collaboration, also known as cobotics (Pozniak, 2018), comes into play when customer expectations are more centred around an experience, such as when a customer wishes to ask questions or recommendations, or has a complaint to make. In these situations, human discreetness and the role of humans in differentiating service offerings seem to be preferred. Adding extra value to the existing offering, for example by educating customers on food supply chain, may offer businesses a further means of standing out from the competition. For the moment doing so seems more pronounced in the US, but the trend itself seems equally applicable for other cultural contexts. Further, in all cases observed here the potential of frontline employees as innovators remains largely untapped. Employees who are in regular contact with customers are uniquely positioned to observe what works in practice and what does not (Larivière et al., 2017). Managers should therefore do more to leverage this tacit knowledge in order to best integrate robotics as part of restaurant service encounters.

Alongside operational changes, the automation of service encounters through robotics poses difficult ethical questions around employment, with experts increasingly expressing concern for displacement and need for large scale retraining (World Economic Forum, 2018). The ingrained need for businesses to cut costs and find ways to increase efficiency notwithstanding, the hospitality industry needs to consider how the notion of robotised service should be realised in order promote the provision of decent work as per the United Nations'

(2018) Sustainable Development Goals. Unfortunately, not much is yet understood about what this might mean in practical terms. For example, one could argue that even though having people move from operations to supervision (i.e., from delivering service to remotely supervising robots that deliver service) might be seen as a step-up in terms of position and salary, in practice the newly-created supervisory role may prove more monotonous and provide less intellectual stimuli than dealing with routine enquiries in person. Other sectors have experienced a similar shift as they have transitioned to robotic process automation (RPA). For instance, the buzz surrounding machine learning has prompted the creation of countless tedious jobs centred purely around manually cleaning and labelling data for the use of intelligent algorithms (Schmelzer, 2019). To ensure a future that makes best use of both human and robot capability, it is imperative that decision-makers set sector-specific parameters for human-robot interaction and integration that take into account the local, national, global, as well as the cultural connotations. At present, there are only a few formal guidelines for robot development, less so for robot deployment (Boden et al., 2018).

Conclusion and Further Research

It is the turn of the decade and the hospitality industry finds itself at a tipping point: service robots are increasingly being integrated into hospitality service encounters, posing to change traditional conventions of value creation. This calls for the reconceptualisation of hospitality management, particularly with regards to people management strategies. In order to stay relevant in robotised service encounters, employees delivering hospitality may assume one of five roles: enabler, coordinator, differentiator, educator, or innovator. The underlying cultural context impacts the way in which these roles manifest and get implemented in practice. For example, the role of educator and innovator is more pronounced in the US (Type 1 culture), while in Japan (Type 2 culture) the direction of change is skewed towards the roles of enabler

and coordinator. This is in line with previous research, which has asserted that employees from an individualistic background (Type 1) tend to be more accustomed to speaking their mind while their collectivistic counterparts (Type 2) may find going against the status quo counterintuitive or even disrespectful (Friedman, 2007). It is therefore imperative for especially multinational corporations to carefully consider the cultural nuances of different geographical markets when scaling up their automation efforts.

Naturally, the changes in frontline hospitality operations bring about a rich agenda for future research. For example, implications of robotisation on recruitment, training, career progression, and the education of future hospitality professionals require further research. As we start to move away from the traditionally people-dependent, labour-intensive hospitality (Davis et al., 2018) towards a more supervisory, knowledge-based industry, the way we organise, manage, and market jobs of the future will need to change. The current study began to address this gap in knowledge by providing empirical insights from the field. However, it should be noted that using robots to carry out service is still an emerging phenomenon and as such the availability of especially longitudinal data is limited. Further, this study only considered robotised restaurants in the US and Japan. Other parts of the world where foodservice automation is spreading rapidly include Eastern China, South Korea, and to a lesser extent, India. Future research focusing on these regions will assist in further conceptualisation of highly-automated service encounters and, thus, more comprehensive managerial implications for the tourism and hospitality industry.

References

Ashcroft, E., Tuomi, A., Wang, M., Solnet, D. (2019) Resistance to the Adoption of ICTs in Independent Restaurants: Insights from China and the UK. e-Review of Tourism Research (eRTR) 16(2/3), pp. 105-114.

Bilgihan, A. and Nejad, M. (2015) Innovation in hospitality and tourism industries. Journal of Hospitality and Tourism Technology 6(3).

Boden, M., Bryson, J., Caldwell, D., Dautenhahn, K., Edwards, L., Kember, S., Newman, P., Parry, V., Pegman, G., Rodden, T., Sorrell, T., Wallis, M., Whitby, B., and Winfield, A. (2017) Principles of robotics: regulating robots in the real world. Connection Science 29(2), pp. 124-129.

Bowen, D. (2016) The changing role of employees in service theory and practice: An interdisciplinary view. Human Resource Management Review 26, pp. 4-13.

Davis, B., Lockwood, A., Alcott, P. and Pantelidis, I. (2018) Food and beverage management. 6th ed. New York: Routledge.

Erumban, A. and de Jong, S. (2006) Cross-country differences in ICT adoption: A consequence of Culture? Journal of World Business 41, pp. 302-314.

Friedman, B. (2007) Globalization Implications for Human Resource Management Roles. Employee Responsibilities and Rights Journal 19(3), pp. 157-171.

Gannon, M. and Newman, K. (2002) The Blackwell Handbook of Cross-Cultural Management. Oxford: Blackwell Business.

Griffith, D., Hu, M. and Ryans, J. (2000) Process Standardization across Intra- and Inter-cultural Relationships. Journal of International Business Studies 31(2), 303-324.

Hofstede, G. (2001) Culture's consequences: comparing values, behaviors, institutions, and organizations across nations. 2nd ed. London: Sage.

Hudson, S. and Hudson, L. (2013) Customer Service in Tourism and Hospitality. Oxford: Goodfellow Publishers.

Kokkinou, A. and Cranage, D. (2013) Using self-service technology to reduce customer waiting times. International Journal of Hospitality Management 33, pp. 435-445.

Larivière, B., Bowen, D., Andreassen, T., Kunz, W., Sirianni, N., Voss, C., Wünderlich, N. and De Keyser, A. (2017) "Service Encounter 2.0": An investigation into the roles of technology, employees and customers. Journal of Business Research 79, pp. 238-246.

Lee, S-G., Trimi, S. and Kim, C. (2013) The impact of cultural differences on technology adoption. Journal of World Business 48, pp. 20-29.

Lillicrap, D. and Cousins, J. (2010) Food and Beverage Service. 8th ed. London: Hadder Education.

Ostrom, A., Parasuraman, A., Bowen, D., Patricio, L. and Voss, C. (2015) Service Research Priorities in a Rapidly Changing Context. Journal of Service Research, vol. 18, pp. 127-159.

Pozniak, H. (2018) What is 'cobotics' and how could this transform manufacturing? Available at: https://www.telegraph.co.uk/education/stem-awards/defence-technology/cobotics-transform-manufacturing/ (Accessed 11th August 2019).

Restaurant Business. (2018) Screen Savers: Operators say the right kitchen display system can streamline order fulfilment and costs. Restaurant Business 116(8), pp. 28.

Rosenbaum, M. and Wong, I. (2015) If you install it, will they use it? Understanding why hospitality customers take "technological pauses" from self-service technology. Journal of Business Research 68, pp. 1862-1868.

Schmelzer, R. (2019) The Achilles' Heel of AI. Available at: https://www.forbes.com/sites/cognitiveworld/2019/03/07/the-achilles-heel-of-ai/#707aaeb27be7 (Accessed 11th August 2019).

Steers, R., Meyer, A. and Sanchez-Runde, C. (2008) National culture and the adoption of new technologies. Journal of World Business 43, pp. 255-260.

Tuomi, A., Tussyadiah, I. and Stienmetz, J. (2019) Leveraging LEGO® Serious Play® to embrace AI and robots in tourism. Annals of Tourism Research (Forthcoming).

United Nations. (2018) The Sustainable Development Goals Report 2018. Available at: https://unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf (Accessed 11th August 2019).

World Economic Forum. (2018) The Future of Jobs Report. Available at:
http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf (Accessed 11th August 2019).