Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
ROBOTS COME to RESCUE: How to reduce perceived risk of infectious disease in Covid19-stricken consumers?

Lisa C. Wan, Elisa K. Chan, Xiaoyan Luo

School of Hotel and Tourism Management, The Chinese University of Hong Kong, Cheng Yu Tung Building, Shatin, Hong Kong
New York Institute of Technology – Vancouver, 701 W Georgia St Suite #1700, Vancouver, Canada

Introduction

The immediate economic impairment of the Covid-19 pandemic-triggered lockdown is substantial. While no industry is spared, high contact services typical in the tourism industry are amongst those experiencing the most pain. As economies start to reopen, many are hoping for a rapid rebound after lockdown eases. Yet some statistics are suggesting otherwise. A recent Harris Poll shows that 66% of Americans surveyed would not dine out for at least three months after the ‘curve flattens’ and 60% would not stay in a hotel for at least six months after (Kelleher, 2020). This suggests that high contact services in the tourism industry need to find ways to encourage customers to visit. This research builds on the intersection of affect heuristics in risk perception (Slovic & Peters, 2006) and service robots (e.g., Tussyadiah, Zach, & Wang, 2020) literature to propose that the use of service robots is one solution to reduce risk perception of viral transmission for the concerned customers and in turn, increase intention to visit.

Service robots refer to computer-guided technology that “can perform physical tasks [and] operate autonomously without…instructions” (Tussyadiah, 2020, p. 3). Increasingly, service robots are seen as an element to be integrated into the customer’s frontline experience (Ivanov, Webster, & Garenko, 2018; Tussyadiah & Park, 2018). Service robots can work collaboratively with service employee (Van Doorn et al., 2017) to interact and cocreate value with customers (Čaić, Mahr, & Oderkerken-Schröder, 2019) and serve different purposes. Service employees offer interpersonal comforts which facilitate rapport building, whereas robots instill functional trust for being reliable in delivering the core service (Park, 2020).
Affect heuristics literature suggests that people perceive a risk by how they feel about the context of the activity (Slovic & Peters, 2006). Unfavorable feelings towards the activity make people perceive higher risk. This research argues that after a prolonged period of practicing physical distancing, the presence of others may trigger thoughts of disease transmission (a negative feeling) for two reasons: 1) distancing advisements are constructed around the knowledge that interpersonal contact increases viral infection and 2) exposure to media mentioning and physical distancing routines further strengthen the association between people and infection.

In tourism services, people may perceive a higher risk of virus transmission due to the interpersonal interactions associated with human employees. This implies that reducing interpersonal interactions should also lower perceived risk of contracting diseases. As such, service robots, which is associated with functionality (Park, 2020; Tussyadiah et al., 2020), should reduce perceived interpersonal interactions and in turn lower perceived risk of viral infection. Therefore, the use of service robots in high contact services should increase customer intention to visit (Fig. 1).

H1. Perception of reduced interpersonal interaction due to robots is positively related to intention to visit.

H2. The positive relationship between the perception of reduced interpersonal interaction due to robots and intention to visit will be mediated by perceived risk reduction in viral infection.

Methodology and results

Study 1

We conducted a survey on Amazon Mechanical Turk between April 7 and 13, 2020 and received responses from a total of 496 respondents (M_age = 38) (Study 1, Table 1). They rated on three questions regarding service robots in restaurants: (1) whether they perceive the use of robots in restaurants would reduce interpersonal interactions (1 = very unlikely; 7 = very likely); (2) whether they agree that reducing interpersonal interactions in restaurants would effectively reduce the risk of infectious disease (1 = very unlikely; 7 = very likely); and (3) how likely will they visit a restaurant if robots are used in most of the service operations when it reopens (1 = very unlikely/incline not to/ definitely will not; 7 = very likely/incline to/ definitely will). Regression analysis showed that the perception of reduced interpersonal interaction due to robots positively impacted customer intention to visit (β = 0.25, t(494) = 4.58, p < .001), supporting H1. Bootstrapping analyses (model 4) (Hayes, 2017) further showed that this direct effect became non-significant after controlling for perceived risk reduction in viral infection (Study 1, Table 2), supporting H2 (overall model: F(2, 493) = 137.64, p < .001).

Study 2

To enhance generalizability, study 2 added a hotel context. We also recruited American and Chinese respondents via two online platforms: Amazon Mechanical Turk and Tencent Questionnaire. One thousand and sixty-two respondents participated in this survey between April 18 and 24, 2020 with 524 American (M_age = 38) and 538 Chinese respondents (M_age = 30) (Study 2, Table 1). They answered three questions identical to Study 1 for both a restaurant and hotel context. Regression results revealed that for both contexts, the perception of reduced interpersonal interaction due to robots significantly increased intention to visit (hotel: β = 0.24, t(1060) = 7.17, p < .001; restaurant: β = 0.33, t(1060) = 10.63, p < .001), supporting H1. Bootstrapping analyses confirmed this positive relationship is mediated by participants’ perceived risk reduction in viral infection (Study 2, Table 2), supporting H2 (overall model: F_{hotel} (1, 1060) = 51.44, p < .001; F_{restaurant} (1, 1060) = 112.95, p < .001).

![Fig. 1. The conceptual model.](image-url)
Interestingly, additional analyses showed that Chinese respondents indicated higher intention to visit hotels/restaurants when service robots are used than their American counterparts (hotels: 5.37 vs. 4.83, \(t(1060) = 5.86, p < .001, d = 0.36\); restaurants: 5.36 vs. 4.89, \(t(1060) = 5.14, p < .001, d = 0.31\)). Chinese (vs. American) respondents also believed to a greater extent that the reduced interpersonal interaction due to robots would effectively reduce the risk of viral infection (hotels: 5.76 vs. 5.32, \(t(1060) = 5.02, p < .001, d = 0.31\); restaurants: 5.65 vs. 5.30, \(t(1060) = 4.03, p < .001, d = 0.25\)).

**Conclusions**

The objective of this research is to explore whether service robots can help high contact tourism services encourage customer visits. Results show that at times when a pandemic dominates people’s awareness, service robots could signal low interpersonal contacts, reduce perceived risk of virus transmission, which in turn increase visit intention.

**Theoretical implication**

Building on affect heuristics (e.g., Slovic & Peters, 2006) and service robots (e.g., Tussyadiah et al., 2020) literature, this study shows that the use of service robots can reduce risk perception of viral transmission and in turn, increase intention to visit. In general, this study illuminates an untapped mechanism of how service robots may influence customer – ironically, in the face of a pandemic, the lack of interpersonal touches characterized by service robots lower perceived risk of contracting viruses and in turn, increase intention to visit. The current research suggests how affect in risk perception may influence the acceptance of service robots in some situations.

**Limitations and future research**

Visit intention is clearly not the optimal dependent variable. The current study reverted to this sub-optimal dependent measure due to the urgency of Covid-19 research and the difficulty in observing actual behaviours when travel is halted. Future research can use experiments along with behavioral dependent measures to test causalities and external validity of the proposed impacts of service robots on actual visits.

**Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Declaration of competing interest**

None.
References

Čaić, M., Mahr, D., & Oderkerken-Schröder, G. (2019). Value of social robots in services: Social cognition perspective. Journal of Services Marketing, 29(2), 178–205.

Hayes, A. F. (2017). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford publication.

Ivanov, S., Webster, C., & Garenko, A. (2018). Young Russian adults’ attitudes towards the potential use of robots in hotels. Technology in Society, 55, 24–32.

Kelleher, S. R. (2020, March 25). Poll: Americans are wary about traveling after COVID-19 curve flattens. Forbes Retrieved May 26, 2020, from https://www.forbes.com/sites/suzannerowankelleher/2020/03/25/poll-americans-are-wary-about-traveling-after-covid-19-curve-flattens/#25e0214014b9.

Park, S. (2020). Multifaceted trust in tourism service robots. Annals of Tourism Research, 81, Article 102888.

Slovic, P., & Peters, E. (2006). Risk perception and affect. Current Directions in Psychological Science, 15(6), 322–325.

Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the annals of tourism research curated collection on artificial intelligence and robotics in tourism. Annals of Tourism Research, 81, Article 102883.

Tussyadiah, I. P., & Park, S. (2018). Consumer evaluation of hotel service robots. Information and communication technologies in tourism 2018 (pp. 308–320). Cham: Springer.

Tussyadiah, I. P., Zach, F. J., & Wang, J. (2020). Do travelers trust intelligent service robots? Annals of Tourism Research, 81(C).

Van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., & Petersen, J. A. (2017). Domo arigato Mr. Roboto: Emergence of automated social presence in organizational frontlines and customers’ service experiences. Journal of Service Research, 20(1), 43–58.