International Journal of Hospitality Management 135 (2026) 104604

Contents lists available at ScienceDirect

International Journal of Hospitality Management

journal homepage: www.elsevier.com/locate/ijhm

Full Length Article

Tech at the table: Managerial insights into workforce evolution in restaurants

Nirmeen M.A.A. Elmohandes [a,b,d,*], Károly Pető [a], Katalin Csobán [a], Mostafa N.M. Marghany [c,d,**]

[a] Department of Tourism and Hospitality Management, Faculty of Economics and Business, University of Debrecen, Hungary
[b] Business & Tourism Management, GBS, Canterbury Christ Church University, UK
[c] Edge Hotel School, Faculty of Arts and Humanities, University of Essex, Colchester, UK
[d] Hotel Management Department, Faculty of Tourism and Hotel Management, Helwan University, Cairo, Egypt

ARTICLE INFO

Keywords:
TAM-TOE
Managers and workforce
Technological unemployment
Service technologies
Restaurants

ABSTRACT

By integrating the technology acceptance model (TAM) and technology-organisation-environment (TOE), this study explores the factors affecting UK restaurant managers' intentions to adopt advanced technologies and how these intentions shape the future of the restaurant workforce. Drawing on a qualitative approach, the data collection involves semi-structured interviews and field observations to provide comprehensive insights. Thematic analysis was employed to extract key themes, uncovering factors across three dimensions: technological (usefulness, ease-of-use, cost), organisational (trust, employee engagement, readiness), and environmental (brand perception, competitive pressure, labour dynamics). The analysis led to three in-depth scenarios of the workforce future: (1) human-technology interaction (HTI), (2) tech-related joblessness (TJ), and (3) unemployment and job creation paradox (UJCP). Each scenario was explored thoroughly and individually, informing strategies for workforce management. This research enhances the TAM-TOE model by providing a comprehensive insight into managerial decision-making towards technology adoption. It also offers practical workforce solutions for policymakers, enabling them to address automation challenges while supporting sustainable employment practices.

1. Introduction

The hospitality industry consistently showcases a forward-thinking attitude towards embracing innovative technological advancements (Elmohandes and Marghany, 2024; Soliman et al., 2024) for various tasks, like service robots for cleaning, cooking and customer service (Choi et al., 2020), artificial intelligence (AI) for recognising speech and information provision (Majid et al., 2024), helping in staff recruitment (Elmohandes and Marghany, 2024), and mobile technologies for travel purposes (Li et al., 2024). These technologies improve service quality, promote customer experience, cut costs, and reduce errors (UK Government, 2021; Chen et al., 2022). Adoption has accelerated worldwide, particularly in countries such as China, Japan, and Malaysia (Koo et al., 2021) and was further intensified by the post-COVID-19 recovery (Liu et al., 2022; Seyitoğlu et al., 2023; Yeoman and McMahon-Beattie, 2024), leading to significant changes (Koo et al., 2021), in operations (Belanche et al., 2021), customer experience (Kim and Cha, 2024), and workforce (Seyitoğlu et al., 2025).

In the UK, the hospitality sector stands as the sixth largest employer, contributing significantly to the national economy. In 2023, the sector supported 2.8 million jobs, accounting for 7.6 % of the total workforce (UKHospitality, 2023), and the food and accommodation services segment alone generated £ 73.8 billion in economic value. At the same time, the UK hospitality emphasised that the hospitality sector has persistently faced a shortage of staff with 132,000 vacancies, which is 48 % higher than pre-pandemic, along with a greater number of job openings in comparison to other economic sectors (Hutton et al., 2024). This situation could accelerate the excessive adoption of new technologies as a solution (Morosan and Bowen, 2022). While new technology transforms the industry (Seyitoğlu et al., 2023), it may also challenge the workforce by shifting employees from manual to cognitive labour, specifying human labour for decision-making, critical thinking, and

* Corresponding author at: Department of Tourism and Hospitality Management, Faculty of Economics and Business, University of Debrecen, Hungary.
** Corresponding author at: Edge Hotel School, Faculty of Arts and Humanities, University of Essex, Colchester, UK.
E-mail addresses: nirmeen.elmohandes@canterbury.ac.uk (N.M.A.A. Elmohandes), mostafa.marghany@essex.ac.uk (M.N.M. Marghany).

https://doi.org/10.1016/j.ijhm.2026.104604
Received 6 May 2025; Received in revised form 21 January 2026; Accepted 9 February 2026
Available online 13 February 2026

creativity that lead to personalised value-added products/services (Pillai et al., 2021), or redefining future job roles (Ivanov and Webster, 2017), creating further uncertainty about the future of work in hospitality (Pericleous et al., 2025; Pan et al., 2025).

Although there is considerable literature on advanced technologies in the hospitality industry (Pillai et al., 2021; Wang and Uysal, 2024), previous studies focus on guests' acceptance (Gursoy et al., 2019; Hou et al., 2021; Marghany et al., 2025), employees readiness, acceptance (Jerez-Jerez, 2025; Lu et al., 2025) and feelings (Pericleous et al., 2025), industry 4.0 challenges (Mingotto et al., 2021; Nam et al., 2021), advanced technologies and service enhancement and productivity (Belanche et al., 2021), and competitiveness (Yang et al., 2021). However, significant knowledge gaps remain regarding managers' acceptance (Tussyadiah et al., 2022; Santiago et al., 2024) who are considered one of the key players in the technology adoption decision. In particular, there is limited attention to labour-related concerns, which are directly shaped by adoption decisions (Seyitoğlu et al., 2023; Pericleous et al., 2025; Seyitoğlu et al., 2025), and to the development of new labour-management strategies (Choi et al., 2020; Pan et al., 2025; Shin et al., 2025). Managers' intentions towards technological advances should be considered in the context of workforce shortages, rising labour costs (Santiago et al., 2024), and the potential job displacement due to increased investment in new technologies (Seyitoğlu et al., 2023; Pericleous et al., 2025). Moreover, previous research in new technologies impact on future workforce applied in the US restaurants (Seyitoğlu et al., 2023; Seyitoğlu et al., 2025) and Turkey (Seyitoğlu et al., 2021). In this line, managers' intentions to adopt new technologies and their potential impact on future workforce employment, particularly within the UK restaurant context, remain uncertain in the current literature. Hence, this study considers restaurant managers to reveal more profound insights into the topic at hand.

Further, there is another gap in the extensive usage of TAM on the customers' and guests' acceptability of technology (Yang et al., 2021), as opposed to its original purpose of predicting manager/employee technology acceptance in the organisational context (Davis et al., 1989; Slade et al., 2015). TAM is popular in technology acceptance research and has specific applicability and sustained impact in hospitality (Guo et al., 2023). However, according to Mogaji et al. (2024), TAM's limitations come from its individualistic perspective, limited scope, static nature, and reliance on self-reported measures. Similarly, Santiago et al. (2024) and Shin et al. (2025) noted that TAM's factors are not always enough to explain technology adoption, arguing for the inclusion of additional factors. Therefore, this study integrates the Technology-Organisation-Environment (TOE) model with TAM to establish a comprehensive framework for understanding the technological, organisational, and environmental factors, which are not traditionally used with TAM in exploring restaurant managers' decisions to adopt new technologies. The TAM-TOE model was successfully tested in the adoption of cloud-computing (Gangwar et al., 2015) and AI (Chatterjee et al., 2021).

Given the aforementioned gaps, our research explores the factors influencing UK restaurant managers' intentions to adopt advanced technologies through an integrated TAM-TOE framework. It further explores how such intentions affect the workforce's future and new strategies for managing them. The study uses in-depth interviews and field observations following studies (Cai et al., 2022; Mogaji et al., 2024; Pericleous et al., 2025) that call to use a qualitative approach to understand the nuances and complexities of the adoption process, surpass the TAM's criticism and explore factors extend the model from a managerial perspective. This research seeks to answer the following questions:

- *What factors influence restaurant managers' intentions to adopt new technologies?*
- *How will the intentions to adopt advanced technology impact the future of the restaurant workforce?*

Theoretically, this is one of the first studies to look at UK restaurant managers' intentions to adopt new technologies using the TAM-TOE framework. Furthermore, it investigates the factors that influence restaurant managers' decision-making that are different from those that influence customers/guests, and the implications for the restaurant workforce's future. Practically, it provides comprehensive guidance to restaurant stakeholders about the projected future workforce scenarios. It provides empirical evidence to assist business managers and policymakers in making well-informed decisions about technology investments to promote business growth, employee well-being, and sustainable employment practices, such as digital literacy, upskilling, and psychological and practical support for affected workers.

2. Literature review

2.1. Technological advances (TAs) in restaurant industry

TAs in restaurants include mobile ordering systems (Dirsehan and Cankat, 2021), digital kiosks (Yoon, 2023), robotics (Choe et al., 2022), payment platforms, digital menus (Öksüz et al., 2025), and AI (Kim et al., 2025). These innovations accelerate service, streamline ordering, boost operational efficiency and customer satisfaction. Domino's Pizza cuts labour costs through drones and autonomous delivery vehicles, while Jingdong X Future in China uses robot chefs and waiters (Zhu, 2022). Despite these benefits, implementation costs, data security risks, and dehumanisation can compromise the dining experience (Choi et al., 2020). Although new technologies attracted research attention (Tian, 2024; Soliman et al., 2024), the hospitality sector received limited focus on how decision-makers perceive and implement these innovations, and even less on the broader implications for the workforce (Pizam et al., 2022; Seyitoğlu et al., 2023). Existing theoretical frameworks like Innovation Diffusion Theory (IDT) (Rogers, 2003), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and Technology Readiness Index 2.0 (TRI 2.0) (Parasuraman and Colby, 2015) offer lenses for understanding adoption drivers. However, they struggle to capture the socio-environmental and organisational contexts that shape managerial decisions (Chatterjee et al., 2021; Pizam et al., 2022).

Building on calls for models that address industry-specific challenges (Gangwar et al., 2015; Wang et al., 2016; Santiago et al., 2024), researchers turned to TAM (Davis, 1989) and TOE framework (Tornatzky and Fleischer, 1990) as an integrated model for examining technology adoption in manufacturing (Chatterjee et al., 2021), hotels (Pizam et al., 2022), and other hospitality contexts (Chen et al., 2023). Yet, integrating these frameworks is complex, as TAM's external variables and TOE's contextual dimensions must be adapted to the nuances of each industry (Gangwar et al., 2015). This underscores further exploration into how an integrated TAM-TOE approach can be customised to reflect the specific factors that influence technology uptake in specific organisations like restaurants.

2.2. TAM-TOE framework

Davis (1989) developed TAM model to predict the frequency of individual system utilisation and to forecast system usage. TAM summarises various theoretical frameworks, resulting in a model that is notably less complex than more intricate ones (Venkatesh et al., 2007). TAM comprises two main variables. The first is Perceived Usefulness (PU), which denotes the extent to which an individual believes that employing a particular system will improve work performance (Davis et al., 1989). The second is Perceived Ease of Use (PEOU), which indicates the degree to which an individual believes that using the system will require minimal effort. Davis et al. (1989) excluded attitude towards adopting technology from their final model due to the weak correlation between PU and attitude, alongside the strong correlation between PU and intention. This occurred when individuals aimed to utilise technology

yet maintained a negative disposition towards its use solely due to its advantageous nature. Excluding attitude from the model allows for a concentrated examination of the significant effects of PEOU and PU on intention (Venkatesh, 2000).

On the other hand, the TOE framework is widely employed in organisational technology adoption research, spanning robotics (Nam et al., 2021; Pizam et al., 2022), AI (Chen et al., 2023), and mobile reservation systems (Wang et al., 2016). Developed by Tornatzky and Fleischer (1990), TOE analyses how organisations adopt new technologies by examining three core dimensions: technological, organisational, and environmental. According to Wang et al. (2010), the TOE framework has two main limitations; first, it does not clearly specify the key factors relevant to each context, and second the specific determinants within its three dimensions may differ across the findings of the studies. While this approach may render factors of the model somewhat broad and less defined (Wang et al., 2010), it also provides the flexibility to adapt factors based on context and emerging technologies and allows TOE to be integrated with other models (Gangwar et al., 2015). The TOE framework remains a valuable foundation for analysing and identifying appropriate factors that influence innovation adoption decisions due to its strong and consistent empirical support (Wang et al., 2010; Chatterjee et al., 2021).

The first dimension of TOE is the technological that addresses the organisation's internal technology usage and the technologies leveraged by competitors (Tornatzky and Fleischer, 1990). These factors vary according to context. Wang et al. (2016) integrated Rogers's (2003) IDT constructs, relative advantage, compatibility, and complexity, while Pizam et al. (2022) added cost to these technological factors for hotel settings. Similarly, Nam et al. (2021) explored the factors of relative advantage, complexity, and IT expertise in Dubai hotel context. Meanwhile, studies incorporated TAM variables, PU and PEOU, into TOE's technological dimension (e.g., Chatterjee et al., 2021) to enhance the flexibility of this model. Second, the organisational dimension relates to organisation evaluative factors like operational scale, size, management, and resources (Tornatzky and Fleischer, 1990). Previous studies emphasised the factors of leadership/management support/readiness as key factors to successful technology adoption. Organisations with formal communication and clearly defined roles are better suited for the implementation phase of new technologies (Wang et al., 2016; Chen et al., 2023; Pizam et al., 2022). Lastly, the environmental dimension is "the arena in which a firm conducts its business, its industry, competitors, access to resources supplied by others, and dealings with government" (Tornatzky and Fleischer, 1990, p. 153). The environmental dimension includes market structure, regulatory environment, dealing with business partners and competition levels (Tornatzky and Fleischer, 1990). The goal is that an organisation may adopt innovation to avoid a competitive disadvantage and maintain its image (Abrahamson and Rosenkopf, 1993). In line with this, studies highlighted the competitive advantage/pressure as a key influence within this dimension (Pizam et al., 2022; Chen et al., 2023).

TAM variables (perceived usefulness and perceived ease of use) can explain at least 40 % of the reasons why people choose to adopt a system (Venkatesh and Davis, 2000). The TOE framework adds another layer by looking beyond the individual to include organisational and environmental factors (Wang et al., 2010). When combined, TAM and TOE provide a more comprehensive lens, capturing the internal drivers of adoption with the wider organisational and environmental context. Therefore, this TAM-TOE hybrid is perceived as a suitable framework for use in interpreting the socio-environmental and technological aspects underlying the technology adoption in organisations and overcoming the criticisms (e.g., static nature and dynamic interactions).

2.3. New technologies adoption and workforce future

There is a contrasting view on how new technologies adoption in the hospitality industry will impact the future of the labour force. On one side, the debate in literature suggests that the industry may integrate technology as a substitute for human labour to tackle various issues (Tussyadiah et al., 2022), such as young workers' scarcity, a lack of experience (Ivanov, 2020), and human labour costs (Tussyadiah et al., 2022). For example, digital kiosks, automated cooking systems and AI-powered automated systems are increasingly adopted in restaurants, as they allow providing services with less labour and decrease labour costs (Park et al., 2023; Seyitoğlu et al., 2025). Ivanov et al. (2018) emphasised that hospitality organisations seek automation, and tech advances reached a stage where services can be delivered with a reduced workforce or without human intervention. Tussyadiah and Park (2018) highlighted that there are no obstacles to substitute humans with advanced technology in hotels, as robots could perform front desk and room service tasks. This study also asserted that discussing this matter may continue until advanced technology replaces humans. Wang (2024) and Pan et al. (2025) expressed concerns about robotics' negative impact on youth employment and societal repercussions, including livelihood threats and arousal of concern, anger, anxiety, resentment, and hostility.

Conversely, other studies asserted that the interaction between humans and advanced technology is more effective than entirely replacing humans, indicating that businesses require the presence of human staff (Decker et al., 2017; Lin and Mattila, 2021; Sadangharn, 2021; Kim and Cha, 2024; Qiao et al., 2026). This is because new technologies assist human resources in hiring temporary staff, managing work schedules, and enhancing reputations. However, technologies are neither capable of capturing human emotions and thoughts nor can they handle unprogrammed scenarios. Hence, employees do not fear unemployment and perceive robots as colleagues (Lin and Mattila, 2021; Kim and Cha, 2024). Mingotto et al. (2021) found that humanoid robots can serve as an enhancement for the roles of frontline employees. A qualitative study by Kömürcü et al. (2021) revealed that dehumanisation cannot occur at all levels of tourism services and that technological advancements create a collaborative work environment between human workers and robots. Moreover, Yoon (2023) found that the use of self-service technologies in restaurants did not impact staff numbers using the classical skill-biased technological change (SBTC) theory.

The debate deepened when Ivanov (2020) and Ghosh et al. (2024) discussed that changes would involve new and eliminated roles in the front and back-of-house working areas in the service sector. Webster and Ivanov (2020) studied the impact of robotics and AI on the tourism workforce, highlighting that they lead to the displacement of workers in repetitive tasks, especially within the hospitality sector. Lower-skilled occupations (Rukumnuaykit et al., 2025), like waitstaff, cleaners, and cashiers, may continue but be less in demand (Ivanov and Webster, 2017; Tian, 2024; Yuan and Liu, 2025). Consequently, the service's nature and the job requirements will change (Tian, 2024; Pan et al., 2025). However, this shift also creates careers among high-skilled labourers like technology managers (Sigala, 2018), data analysts and maintenance personnel (Rukumnuaykit et al., 2025), which can appeal to younger individuals and encourage creative thinking (Tian, 2024).

The debates outlined above suggest that technology adoption may collaborate with, replace, or create new roles for human labour, which may place the industry on the cusp of significant workforce transformation (see Appendix A). Therefore, it is essential to understand how managers' intentions to adopt advanced technologies will shape the future of the workforce and what workforce management strategies may be required to prepare for these scenarios. To address this, our study employs the TAM-TOE framework to explore managers' adoption intentions and their potential long-term impacts on the restaurant workforce.

3. Methods

We employed a qualitative research design grounded in subjective interpretivism paradigm, which is well-suited for investigating emerging

phenomena (Bell et al., 2022). We combine two data collection techniques: semi-structured interviews and field observations (Creswell and Creswell, 2017). The study focused on UK restaurants, as the UK is a developed nation that adopts advanced technologies in early stage (UK Government, 2021), which makes the UK a relevant context for understanding these dynamics. Initially, the authors compiled background information on restaurants potentially relevant to the study, creating a broad profile. This list was refined, and recruitment materials and information were disseminated through the authors' professional networks.

Following the lines of earlier qualitative studies (Nam et al., 2021; Seyitoğlu et al., 2023; Shin et al., 2025), purposive sampling was adopted to maximise the probability of getting rich and meaningful data (Etikan et al., 2016; Bell et al., 2022). We established inclusion criteria explicitly aligned with the study's aim, which focuses on individuals in managerial roles at restaurants where advanced technologies are widely implemented (e.g., robots, chatbots, self-service kiosks, digital menus, and mobile applications), and these individuals had relevant industry experience and were currently employed in the restaurant sector. To reduce selection bias, the research team jointly reviewed the selection of participants to minimise individual bias. We also ensured variety across restaurant location, size and managerial experience to facilitate the investigation of different views, mitigate bias, and get a full understanding of the subject. The questions were developed based on the literature review (see Supplement A) and reviewed by two experts to ensure its appropriateness. In line with Bell *et al.*'s (2022) confirmation that pilot studies add credibility and dependability, a pilot study was conducted with two participants. Following minor refinements to the questions, the main interviews commenced. Prior to each interview, participants signed a consent form. To minimise bias and encourage truthful answers, participants were ensured complete anonymity, confidentiality, and privacy of the information gathered and shared at the beginning of each interview.

Between January and April 2023, we conducted 27 interviews (see Table 1), each lasting approximately 40 min. Participants received compensation for their time and were free to choose from online, phone, or in-person formats. All interviews began with presenting the concept of technological advances to ensure clarity for participants. Thereafter, participants were asked to answer the questions based on their experience and background. We proceeded with an open question about 'work experience' before moving to questions about managerial intentions and actual technology adoption experiences. Subsequent topics concerned future workforce implications and strategies for managing staff in a technology-driven environment. Participants were assigned coded identifiers (e.g., P1) to maintain confidentiality and accuracy. In qualitative research, saturation is a key indicator of when to conclude sampling (Creswell and Creswell, 2017; Bell et al., 2022). While we achieved saturation by the 20th interview, scheduled interviews proceeded to enhance the overall trustworthiness of the sample size and refine the codebook.

Table 1
Participant profiles.

Participant	Position/Experience (YoE)/Gender	Location (England)
P1	Supervisor, four, male	Milton Keynes
P2	Manager, five, male	London
P3	Manager, six, male	Yorkshire
P4	Supervisor, three, female	London
P5	Assistant manager, four, male	London
P6	Manager, eight, male	Manchester
P7	Assistant manager, four, female	Manchester
P8	Assistant manager, five, male	Liverpool
P9	Supervisor, two, female	Manchester
P10	Assistant manager, five, female	Milton Keynes
P11	Manager, eight, male	Cumbria
P12	Manager, six, male	Derbyshire
P13	Manager, seven, male	London
P14	Assistant manager, four, female	London
P15	Supervisor, three, female	London
P16	Manager, eight, male	Liverpool
P17	Supervisor, two, female	Liverpool
P18	Assistant manager, three, female	Liverpool
P19	Supervisor, three, female	Yorkshire
P20	Supervisor, three, female	Derbyshire
P21	Assistant manager, six, male	Essex
P22	Supervisor, two, female	Essex
P23	Manager, seven, male	Liverpool
P24	Supervisor, two, female	Surrey
P25	Manager, six, male	Surrey
P26	Manager, five, male	Milton Keynes
P27	Manager, four, male	Essex

Note: YoE is years of experience.

Following the interviews, the first author stayed in the UK for a month (July 2023) to engage in six participant observations in restaurants (each one is in a restaurant). In line with prior studies (Çalışkan and Sevim, 2023; Majid et al., 2024), we selected the restaurants based on their active use of advanced technologies reflected in interviews. Field notes and reflective memos were used for recording events. The observations captured dimensions: restaurant ambience (seating capacity, music, interior and exterior design, layout, lighting, and the movement of robots within the space), the workforce roles and structure (technological tools to human staff ratio, multitasking and supervising technological tools), the technologies in use (robots, AI applications, self-service kiosks, and other digital tools), engaging with these technologies as a 'test customer' to experience automated tasks (ordering, serving, carrying trays or plates, and clearing tables), service quality (speed, accuracy, consistency), staff-customers-technology interactions (greeting, smiling, voicing, and chatting), and tours and conversations with staff to capture reactions and adaptability.

Interviews and observations worked together to complement each other. While interviews uncovered issues that might remain hidden without direct questioning, observations allowed us to see behaviours and practices unfold in real time (Denzin and Lincoln, 2018). Analysing observation notes helped refine code definitions and, where appropriate, split or merge theme categories. This process facilitated the triangulation of data and supported the reliability of the findings (Denzin and Lincoln, 2018). For example, 'multitasking' arose in interviews and was repeatedly confirmed during observations, where staff were seen helping in serving, cleaning, supervising technologies, and cooking.

We employed thematic analysis to identify key themes and subthemes, following Braun and Clarke's (2006) six-step approach, which offers a systematic yet flexible method for interpreting qualitative data. The first stage involved transcribing interviews and field observations in MS Word documents, followed by multiple reviews of the texts by the first author to ensure a comprehensive content understanding and research data readiness. Next, open codes were identified by organising similar code groups using colour-coding. The data was filtered to select only statements that aligned with the research objectives. In the third and fourth stages, the data interacted with subthemes and led to the emergence of main themes through iterative review cycles. Stage five involved the refinement and organisation of the themes, while the final stage involved the selection and presentation of extract examples and quotes to illustrate each theme in the findings. To enhance rigour at all stages of the analysis, the second and third authors systematically cross-checked and discussed the meanings of the codes and themes developed by the first author. A second round of reviews by the fourth author further validated the themes accuracy and representative quotes.

4. Findings and discussion

4.1. Key factors affecting technology adoption

4.1.1. Technological factors

TAM factors. The PU and PEOU emerged as factors behind

technology adoption. The reasons focused on the factors' role in enhancing order accuracy, speeding up the service times, customising of items, optimising operational workflows, streamlining payment processing, tracking sales, providing valuable information, and necessitating less training. The consensus confirmed that the more usable, useful and user-friendly a technology is, the more likely of its adoption. P1, *"…we seek technologies that are user-friendly for staff, minimising resistance and training requirements, enhancing operational efficiency and competitive advantage."* The literature indicates that complexity and limited advantages of technologies negatively affect the willingness to adopt AI and robotics. This suggests that managers are less willing to adopt robotics when they view them as challenging to operate and face difficulties in integrating them into their work routines (Chatterjee et al., 2021; Sadangharn, 2021; Pizam et al., 2022).

Perceived cost. Although the investment in technology appears high, managers acknowledge that, over time, technology can lower operational costs and improve profitability. This technology optimises resource allocation, mitigates inefficiencies, and reduces inaccuracies, resulting in cost savings. These objectives can be accomplished through implementing labour-saving automation, optimising inventory management, and improving order processing efficiency. P4, *"We take into account the cost-effectiveness of adopting cutting-edge technologies…includes the upfront and ongoing costs of the technologies, as well as the savings and revenue gains."* Existing research supports this view, suggesting that new tech can operate for extended periods with punctuality and greater accuracy than human workers (Mingotto et al., 2021). In similar vein, other studies indicate that improving operational effectiveness and efficiency through these technologies can lead to a reduction in labour costs, either by replacing or supplementing personnel in repetitive and monotonous tasks. This enables employees to dedicate time to complex and innovative tasks, thereby enhancing the value of the organisation (Tussyadiah et al., 2022; Seyitoğlu et al., 2023). However, this contradicts Pizam et al. (2022) who indicated that cost was not a predictor of adoption, noting that the study sample lacked specific knowledge or opinions about costs in hotels.

4.1.2. Organisational factors

Trust. There was an emphasis on technology's trustworthiness, its security, reliability, and capacity to meet operational goals and customer experience. "Trust" herein refers to how trustworthy the technology is perceived to be. Managers require trust technologies that can securely protect data and seamlessly integrate with existing systems. As P3 stated, *"…trust that the advanced technologies used in the restaurant would perform their intended functions reliably, accurately, and contribute to customer satisfaction."* This emphasis on trust is consistent with prior studies highlight the significance of trust in technology acceptance. Wu et al. (2011) conducted a meta-analysis demonstrating that trust has a significant effect on behavioural intention (BI) regarding technology adoption. In restaurants, trust is a vital component in decision-making and significantly affects the probability of individuals accepting recommendations from online restaurant communities (Shaker et al., 2023).

Employee engagement. The majority emphasised the link between management support and employee engagement; they also stated that with engagement, employee resistance rates tend to decrease and increase employees' ability with technological tools that can complement their work, resulting in time and resource savings for the restaurant. P16, *"It's important to think about how willing and able staff members are to adapt to and use the new technology well."* P14 viewed employee engagement as *"a way to pique the interest and enthusiasm of staff."* Prior studies found significant relationships between the management support and intentions to accept new technologies like cloud computing (Gangwar et al., 2015), artificial intelligence (Chatterjee et al., 2021), and robotic technology (Pizam et al., 2022). The studies found that employees seek management support when deciding to adopt new technologies, as management plays an important role in strategic planning and decision-making. Employees are more to engage and adopt new technologies if they believe management is committed to investing in them and is willing to accept the associated pitfalls.

Innovation and readiness. Organisations must have enough financial and technological resources to adopt new technologies. While technological resources show an organisation's ability to adapt and use these innovations to keep a competitive edge in the market, financial resources guarantee that organisations can afford the costs involved in purchasing, implementing, and maintaining new technologies. P21, *"…our technological and financial resources directly shape our ability to not only adopt but also maximise the benefits of new technologies."* Although previous research had differing views on this topic, Chatterjee et al. (2021) noted that there would be no barriers to implementing an innovative technology if the right financial and technical resources as well as trained staff were available. However, research like Wang et al. (2016) and Pizam et al. (2022) clarified that innovation, readiness, and intentions to adopt do not align. According to such studies, managers were either unaware of the resources required to implement the new technologies in their organisations or were unable to assess whether their hospitality businesses were prepared for the deployment of new technologies.

4.1.3. Environmental factors

Brand perception. Integrating new technologies can enhance the brand perception of restaurants as modern, forward-thinking, and dedicated to customer satisfaction. Incorporating technology that aligns with a positive brand image allows them to attract technologically inclined customers, differentiate themselves from competitors, and inspire trust in the restaurant's ability to meet evolving customer needs. P2, *"We evaluated the potential benefits of doing cutting-edge technologies to improve the restaurant's image and reputation, positioning it as a front-runner."* This finding is consistent with Cruz-Jesus et al. (2019) in the information technology context, as well as Kim et al. (2021) and Soliman et al. (2024) in the hospitality context, which indicated that brand reputation is a factor that necessitates the use of robots and AI (Cai et al., 2022). This also aligns with Wu (2025), who emphasised the connection between service robots and restaurant brand love, noting that customers who see a service robot as friendly, helpful and satisfactory are likely to suggest the restaurant to others. In contrast, Wünderlich et al. (2024) argued that interactive robots raise concerns among consumers in the service industry about the potential dehumanisation of service delivery and its impact on corporate brand perception. However, our research highlights the significance of cutting-edge technologies in building restaurants' reputation and positive reviews as leaders in innovation.

Competitive pressure. By incorporating new technologies, restaurants can set themselves apart from their rivals. P3, *"We look at how the technology can make our restaurants stand out from competitors, bring in more customers, and improve the way people think of their brand."* In literature, this perspective is established, and previous research has identified competition as a factor in technology adoption. Utilising new technologies can offer a competitive edge to organisations in contrast to those that do not implement them (Chatterjee et al., 2021; Pizam et al., 2022; Chen et al., 2023).

Labour market dynamics. Managers highlighted the difficulties confronting the hospitality industry, including labour costs, labour shortages, and labour policies. Managers view advanced technology as a solution to address labour dynamics in the market. P22, *"Technology can address one of the challenges we face, which is a shortage of qualified workers, changes in the minimum wage, and the need for a better work-life balance. It serves as a method for reducing costs while ensuring smooth operations."* This finding aligns with Tussyadiah et al. (2022), Tian (2024), and Ivanov (2024), who indicated the adoption of automation is driven by a significant shortage of labour. The shortage is attributed to a variety of interconnected factors, including demographic changes, quality of life, labour mobility, and political and regulatory concerns. Due to rising labour expenses in Malaysian hotels, Ahmad and Scott (2019) found that

five-star hotels use HR information systems to decrease the number of employees in HR departments. In contrast, Morosan and Bowen (2022) found that, although IT contributes to achieving strategic outcomes, it was not clearly identified as a factor that could address a labour crisis. All factors have been summarised in Supplement B.

4.2. Potential workforce scenarios

4.2.1. Human-technology interaction (HTI)

Given the significance of the human in service, numerous participants emphasised the higher probability of this scenario compared to others. There will be no redundancies of personnel, and technological innovations can solely enhance and support human employees in their respective roles. P12, *"There are some tasks in which we cannot totally rely on the machines; thus, a human-technology interaction can be a better combination for increasing the accuracy of the tasks."* This aligns with field observations in a restaurant that had implemented robotic systems to improve its reputation, assist with marketing purposes, and support employees through serving tables alongside. This aligns with the studies (Lu et al., 2019; Kim and Cha, 2024), noting that the cooperation between humans and robots is better than completely substituting humans, as human interaction is still necessary in the industry.

Advanced technologies can cooperate with humans on any given task such as repetitive tasks, P25, *"tasks that need to be done in a routine"*, involve physical exertion, P4, *"Tasks that may involve standing for long periods of time, lifting heavy objects*, etc.*"*, need to be completed promptly, P6, *"…tasks that need to be done in a certain amount of time"*, and require cognitive abilities, P7, *"Tasks that require mental effort."* This aligns with Gibbs (2022), who asserted that technologies facilitate the mechanisation of monotonous tasks. However, our research goes beyond this understanding by applying it to the restaurant industry, suggesting that technologies can enhance human efforts in physical, cognitive, and time-sensitive tasks. Moreover, they are unable to enhance human performance in tasks that are not routine and require multitasking.

4.2.1.1. Strategies for HTI scenario. Prioritising human value. This may entail roles in which human staff excel in warmth, empathy, and a customised experience that technology may lack. For example, welcoming and assisting customers and addressing specific inquiries, P5, *"Managers should stress how important human employees are to providing good service and making customers happy."* This aligns with Huang and Rust (2018) in the service industry and de Kervenoael et al. (2020) in the tourism industry who emphasised that these technologies are designed to handle repetitive and dangerous tasks, freeing up humans to concentrate on tasks that contribute value. Our study furthered this understanding by showcasing the importance application of this knowledge in the hospitality sector, with specific illustrations from a managerial perspective.

Allocating resources towards training programmes and establishing rewards. Training staff to operate and use technology provides the skills for its application, enabling smooth incorporation into everyday tasks. Promoting soft skills training like empathy, communication, and adaptability, holds significant value. P25, *"…enough training to make sure they can use the technology well and work with it. This will make it less likely that technology will replace people."* Employees who demonstrate proficiency in integrating technological tools with interpersonal communication may receive incentives, award ceremonies, or bonuses. These programmes must equip staff with the capability to utilise technology to augment human interaction. P15, *"Employers can offer incentives or bonuses to employees who demonstrate strong skills in human-technology interaction."* This aligns with Seyitoğlu et al.'s (2023) research regarding the importance of technological skills and training in restaurants. Our research emphasised important factors to consider in training initiatives from a managerial perspective.

Encouraging a culture of collaboration and openness. Achieving this involves fostering open communication and encouraging collaborative learning. Employees should engage in technology implementation decision-making processes to foster a sense of responsibility and comprehension. P17, *"Encouraging employee support and collaboration with technology can foster an environment where employees feel comfortable seeking assistance or troubleshooting technology-related issues."* Encourage collaboration and motivate employees to exchange their knowledge and experiences related to the effective application of technology. Previous studies emphasised this aspect that can promote transparent communication, collaboration, and the sharing of knowledge among teams in the tourism and hospitality sectors (Ratna et al., 2023). Our research expanded on current understanding by proposing strategies to improve collaboration, openness, and employee voice in the interaction between humans and technology.

Human-technology interaction ratio assessment. Monitoring the equilibrium between humans and technology necessitates regular assessments and feedback systems. Establishing key performance indicators (KPIs) for operational efficiency and customer satisfaction allows for a measurable evaluation of technology's impact on human interaction. Gathering feedback from customers and staff regarding their experiences with technology helps acquire an understanding of its influence on service delivery. Restaurants must be prepared to modify strategies in response to feedback. P6, *"Routinely assess the contribution of technology and human workers to the service delivery process."* Despite the prior research addressing the interaction between humans and technologies, like Choi et al. (2020), Sadangharn (2021), and Kim and Cha (2024), limited studies have emphasised this strategy as a means of managing the workforce in this era.

4.2.2. Tech-related joblessness (TJ)

Technologies can fully replace humans, especially in physical tasks that entry-level positions perform like waiting staff. P14, *"Replacement could happen in tasks that have a set of protocols, tasks that need efforts and need to be done quickly."* This is because these roles require minimal or no previous experience. However, supervisory-level has the potential to become entirely displaced, unlike managerial-level roles. P27, *"Operational staff and supervisors may go, OK, but the deputy and the restaurant manager stay."* It has been noticed that there has been a replacement of staff within certain dining areas of restaurants; for example, a single shift requires the assignment of three staff members who engage in multitasking roles, responsible for cooking, monitoring robots during order service, and performing cleaning duties. The staff also acted as waiters for customers who were unfamiliar with the robots, assisting them with their orders.

Few participants noted that technologies could potentially take over multitasking and cognitive tasks from humans. P16, *"Working in a restaurant requires multitasking."* P11, *"Activities that require the use of one's intellect."* This aligns with Nissim and Simon (2021) in technology, sociology, and labour studies, which indicated that technologies pose a risk to various roles by automating both routine and non-routine tasks. To date, workers have been substituted with automated systems to carry out routine tasks, regardless of whether they are physical or cognitive in nature (Ivanov, 2020; Ghosh et al., 2024; Qiao et al., 2026). Despite concerns about the difficulties of automating non-routine tasks, workers engaged in such tasks were substituted for lowest human intervention. Our study built upon this understanding by demonstrating that technologies can take over repetitive, physical, and time-sensitive tasks in restaurants, yet they are less likely to replace humans in multitasking and cognitive functions.

4.2.2.1. Strategies for avoiding tech-related joblessness. This scenario, like the HTI scenario, highlights similar recommendations by underscoring the importance of human value, advocating for robust training programmes, and fostering a collaborative culture. Participants proposed strategies to address the challenges associated with human substitution.

Encourage innovation and creativity. Encourage employees to share ideas and hold regular brainstorming sessions for creative solutions to operational challenges and technology deployment. Provide training to strengthen digital skills and problem-solving, reward innovative thinking, and support their collaboration with technology. P6, *"It's still important for employees to think creatively and find new ways to make the restaurant experience better. Managers can encourage innovation by giving employees chances to share ideas and try out new ways of doing things."* Uniting back and front-of-house teams to develop and execute creative service and menu ideas. Staying updated on the latest advancements in restaurant technology and routinely evaluating the technology infrastructure ensures alignment with the restaurant's objectives and customer needs. While earlier studies suggest that emerging technologies promote innovation in hospitality (Elkhwesky et al., 2024), there is a lack of focus on this approach as a means of workforce management.

Reskilling and upskilling. Encourage employee involvement in technical and interpersonal training by offering voluntary participation and incentives that highlight the benefits of gaining new skills. encourage personal growth by online courses, workshops, and mentorship opportunities. Make certain that the workforce retains its flexibility, adaptability, and responsiveness by regularly assessing and updating the training programmes to align with new technological advancements. P7, *"Businesses must ensure that their employees have access to upskilling and reskilling opportunities. Managers can facilitate skill development by arranging for employees to participate in training programmes or to rotate through different positions or departments."* This aligns with Chi et al. (2020) and George et al. (2023), who emphasised the importance of improving workers' skills and knowledge, assisting during job transitions, and implementing regulations to overcome the challenges of adopting AI. Our study enhances the existing knowledge by presenting methods for employees' reskilling and upskilling.

Soliciting feedback from employees. Feedback provides insights into areas that require retraining and reskilling, helping employees adapt to changing technological demands, enhance job security, and reduce the chances of layoffs, thereby enhancing their sense of value and being heard. P24, *"Through employee feedback, managers can gain a deeper understanding of the needs, concerns, and suggestions for improvement of their workforce."* While earlier studies highlight the significance of employee feedback (Abdelmotaleb, 2024; Arun Kumar et al., 2024), there remains a lack of focus on this approach as a means of workforce management.

Setting clear goals and plans. Establishing objectives and KPIs that illustrate how technology can increase productivity, simplify processes, and improve organisational outcomes. Developing a plan that incorporates specific dates and milestones for technology integration to avoid unemployment. P14, *"Managers should create a detailed technology plan with measurable objectives to prevent job replacement."* This aligns with Baum's (2015) study advising managers to strategically prioritise employee retention, while Cobos et al., (2016) claim that effective technological advancements result from a thoughtfully crafted and implemented technology adoption process.

4.2.3. The unemployment and job creation paradox (UJCP)

This is the least likely scenario. It can occur simultaneously as skilled workers are necessary to oversee, sustain, and enhance automated order processing systems, digital marketing platforms, and data analytics tools. Information technology specialists, data analysts, and technical support teams are crucial for the integration and functioning of these advanced solutions. The adoption of digital payment, user experience design, and app development by restaurants is increasing the demand for professionals in these fields. Furthermore, the integration of robotics and automation may generate new roles tasked with supervising and maintaining these technological innovations. Moreover, there is an increasing demand for skilled workers in menu engineering, digital marketing strategy, and social media management. P22, *"Increase in need for technicians to run the advanced technology and workers who can deal well with service automation."*

Advanced technologies may lead to the obsolescence of certain job positions. Mobile applications, online ordering systems, and self-service kiosks can replace order takers and cashiers. The integration of robotics and intelligent kitchen appliances enhances food preparation processes and influences the roles of kitchen staff. P10, *"New technology will not create jobs in our restaurants; rather, it will result in job cuts as the old manpower will be replaced by the new equipment."* Based on observations, there were not any new positions in the dining area, attributed to the expertise of the two kitchen employees in operating the robots and the existing technologies. This aligns with Ivanov (2020) and Nissim and Simon (2021), who suggested that advanced technologies may generate job opportunities while displacing human workers, thus intensifying technological unemployment.

When it comes to restaurant level, self-service kiosks and automated cooking systems in fast-food restaurants may diminish the necessity for kitchen and counter staff tasked with routine responsibilities. These advancements generate employment opportunities in software development, system maintenance, and digital marketing, indicating a transition towards technology-oriented roles. Fine-dining restaurants prioritise personalisation and specialised expertise, wherein technology can augment human roles rather than replace them. Positions focused on customer service and experience remain essential. P25, *"While new technologies have the potential to automate some tasks and reduce the need for certain levels of jobs, they can also create new jobs."* This aligns with prior studies, noted that digitalisation would significantly transform the service sector, including front and back-of-house operations (Ivanov, 2020; Ghosh et al., 2024). The proposed modifications involve the creation of new positions and the elimination of existing ones, based on job-level and restaurant classification.

4.2.3.1. Strategies for handling this scenario.

Training and fostering collaboration are common strategies among scenarios. Participants proposed strategies to address this specific scenario.

Supporting affected workers. Managers must clarify the rationale behind technological advancements, emphasising the organisation's dedication to support employees throughout the transition. Managers can establish mentorship programmes that pair employees possessing advanced technological skills with those requiring assistance. Demonstrating a commitment to employee well-being by promoting open communication, resolving issues, and providing emotional support. Managers exhibit commitment to the future success and professional advancement of impacted employees by offering internal job opportunities and facilitating external job placements. P4, *"Managers should help employees who lose their jobs due to new technology by offering severance packages, job placement assistance, and retraining programmes."* This aligns with Chatterjee et al. (2021), who recognised leadership support as a significant moderating factor in the adoption of new technologies. Similarly, George et al. (2023) emphasised the significance of support in job transitions and the necessity for policies to tackle challenges related to AI integration. Our research further extends this understanding by offering actionable recommendations for providing effective assistance in these contexts.

Exploring opportunities and new roles. This may include roles in technology management, data analysis, and digital marketing strategy execution. Restaurants should thoroughly evaluate their operational protocols to pinpoint areas where technologies' integration improves efficiency and generates employment opportunities. To maintain a leading position in technological innovation, restaurants should engage with technology vendors and industry experts. This strategy enables staying abreast of the most recent developments and trends. Pilot programmes to assess the feasibility and operational impacts of newly established positions are advisable. Encourage employees to generate ideas concerning potential avenues for employment expansion. P20, *"Don't be hesitant to adopt new technologies thinking that it will close the career prospects for the employees rather come up with innovative ways to*

create more opportunities." This aligns with Chi et al. (2020), who underscored the necessity of creating tasks to replace those fully automated to avert potential psychological and social problems that may emerge from increasing unemployment rates.

Incremental advanced technology integration. This reduces the impact on existing roles and allows staff to enhance their skill sets. This strategy facilitates transition, enabling employees to acclimate without excessive stress or the threat of job displacement. This allows managers to evaluate the effects of technology on operations and workforce dynamics, facilitating the identification of potential areas for new positions. P21, *"Managers should implement advanced technologies gradually; they do not need to just push a button."* Although previous research discussed technology integration in the hospitality industry (Tlili et al., 2021), there is insufficient emphasis on incremental implementation for workforce management. All workforce scenarios have been summarised in Supplement B.

5. Conclusion and implications

5.1. Theoretical contributions

This study offers some theoretical contributions. First, it advances understanding of how UK restaurant managers adopt technological innovations through the TAM-TOE framework. To our knowledge, this is among the first studies to apply TAM-TOE to explore managers' intentions towards technology adoption in the restaurant sector. In doing so, it differs from previous hospitality research that examined technology adoption from the perspective of customers (Santiago et al., 2024), guests (Soliman et al., 2024; Marghany et al., 2025), or employees (Lu et al., 2025). This contribution is particularly significant because managers are one of the key decision-makers who ultimately determine whether technologies are implemented, yet their perspectives have received limited attention. By applying TAM-TOE qualitatively, the study captures the mechanisms underlying adoption behaviour, offers fresh empirical support for the framework, and responds to repeated calls for its application across different contexts (e.g., Chatterjee et al., 2021).

Second, our findings are consistent with earlier studies that point to well-established TAM factors (perceived usefulness and perceived ease of use) and TOE dimensions (cost, innovation and readiness, and competition) (Wang et al., 2016; Chatterjee et al., 2021; Pizam et al., 2022). At the same time, our study introduces four additional factors that enrich theoretical explanations of managerial adoption (see Fig. 1). We found that trust as a multidimensional determinant extending beyond functionality to include security and reliability. Employee engagement highlights that adoption is not only a managerial directive but a collective process, where staff involvement and enthusiasm complement the success of implementation. Brand perception positions technology as a strategic tool for reputation-building, showing that adoption is shaped by symbolic and competitive considerations as much as operational efficiency. Finally, labour-market dynamics underscore the influence of external structural pressures, such as staff shortage, in motivating technology use. These additional factors enrich the organisational and environmental dimensions of existing model and point to the complex realities managers face when deciding whether to adopt new technologies.

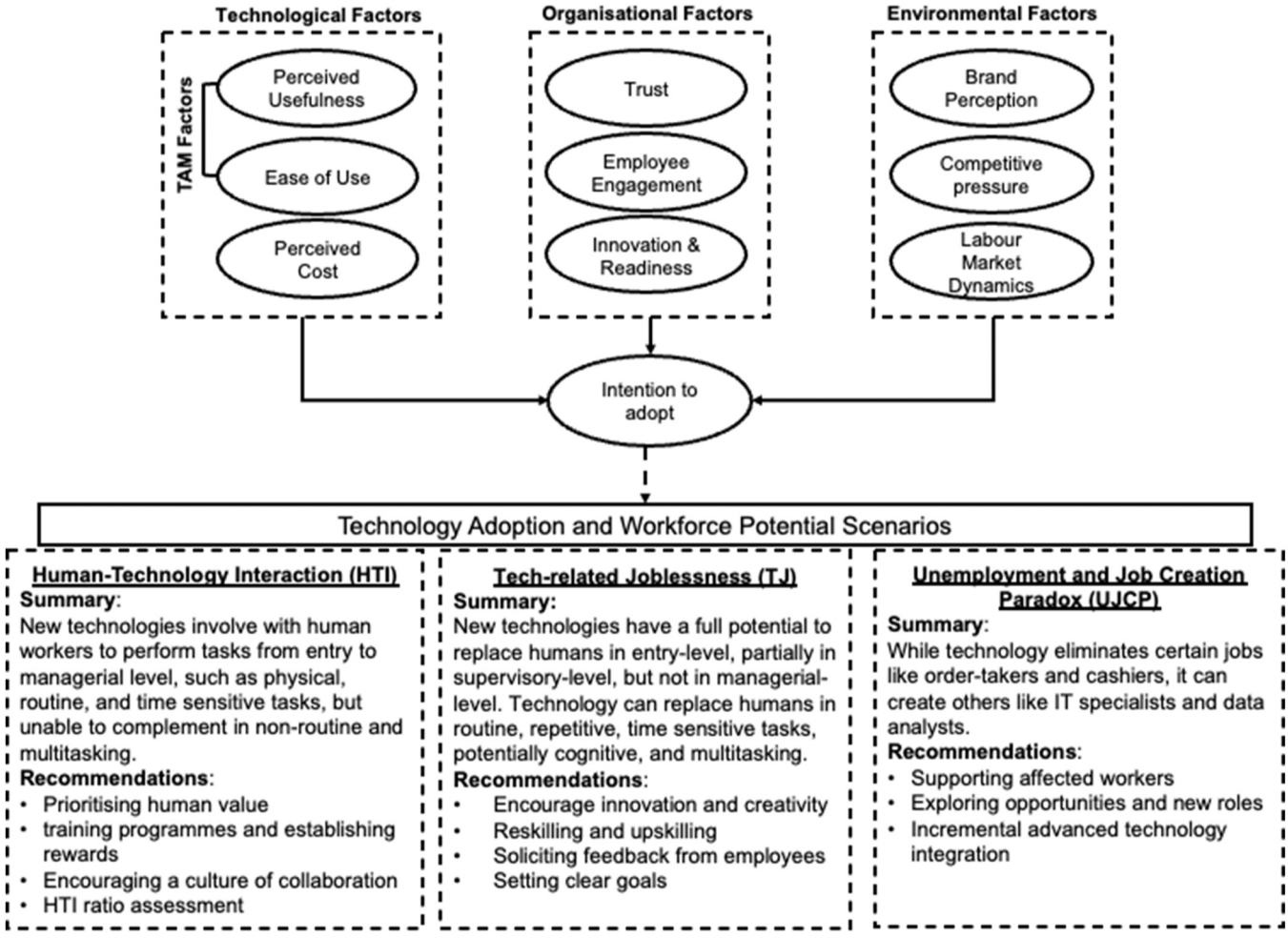


Fig. 1. A framework for understanding technology adoption and workforce future (TAWF).

Third, this study also presents empirical data on the influence of managers' technology adoption behaviours on the future workforce in restaurants. We conceptualise three scenarios that extend current debates. The scenarios include: (1) human-technology interaction (HTI), where technologies reshape but also complement human roles; (2) tech-related joblessness (TJ), where automation displaces routine tasks yet leaves higher-level functions intact; and (3) unemployment and job creation paradox (UJCP), where technologies simultaneously eliminate and generate jobs. Previous research has examined the future of the workforce through various lenses. For example, Tian (2024) emphasised the significance of process and product innovation in employment within hotels. Seyitoğlu et al. (2023) investigated the effects of the COVID-19 pandemic on labour in US restaurants. However, there is a lack of clarity concerning the ultimate effects of advanced technologies on the workforce in the hospitality sector, necessitating new labour force management strategies (Shin et al., 2019, 2025). Thus, this study expands the literature on the relationship between new technologies and employment and constructs a detailed analysis framework by employing in-depth interviews and field observations as a step in responding to previous studies (Cai et al., 2022; Mogaji et al., 2024). This approach allowed us to understand the nuances and complexities of the adoption process, surpass the TAM's criticism, and incorporate factors and the workforce's scenarios to provide deeper insights from a managerial perspective.

5.2. Practical contributions

The study offers fact-based information to help stakeholders in restaurants make smart choices about technology investments. First, the findings provide an exhaustive guide for restaurant managers regarding the factors to consider when contemplating new service technology adoption. Although the study aligns with the current knowledge about the importance of usability, utility, and cost to ensure managers acceptance (Chatterjee et al., 2021; Pizam et al., 2022), it reveals the existing organisational factors to focus on for a successful investment in technological adoption, emphasising trust and employee engagement. To ensure trust in the functionality, security, and reliability of technology, managers should collaborate with technology vendors to conduct pilot testing before actual implementations. This approach helps avoid service errors, significant financial losses, and potential legal issues. After adoption, managers should follow the employees' and customers' reviews on these technologies. By taking these steps, managers can successfully adopt technology while also helping designers, developers, and vendors understand the challenges restaurants face and demonstrate how their products provide optimal solutions and undergo regular development. Regarding employee engagement, this study provides a guide for managers that without the employees' engagement, the investment in technology is at risk. This should be achieved through fostering open communication, encouraging collaborative learning, engaging employees in technology implementation decision-making, urging employees to give feedback, and attending the designated training to support innovation. This in turn, foster a sense of responsibility and comprehension and reduce employee's turnover.

The study provides managers with environmental factors that affect the restaurant business, including competition, brand perception, and workforce dynamics, which may be addressed through new technologies from a managerial standpoint. In terms of competition and brand perception, managers will need to ensure that the adoption of technology is linked to delivering high-quality service for customers, as this can influence the restaurant's branding, competitive stance in the market, and customer loyalty. They should also avoid unfavourable reviews from dehumanisation and balance technology implementation in customer facing jobs. Concerning labour dynamics (shortages, costs, and policies), managers should not consider the adoption of these technologies as the ultimate solution for labour force challenges. They ought to expect changes in skills and push employees towards digital literacy and provide improved working conditions and payments.

Second, the research identifies three potential scenarios for the workforce with technology adoption. Individual job levels and characteristics were considered when analysing each scenario. This alerts managers to distinguish when technology acts as a support for human tasks and when it serves as a substitute. Analysing the scenarios' strategies provides valuable insights for industry practitioners and policymakers to help build a resilient and sustainable workforce. Our study recommend sustainable employment practices that are briefly manifested by: (1) striking a balance between the personal touch diners value and the new technology's efficiency; (2) implementing incentives to reward employees who excel at blending technological tools with interpersonal communication; (3) supporting affected workers psychologically and practically; (4) designing training programmes that go beyond instructions on task execution; and (5) reskilling and upskilling personnel to enhance adaptability and digital literacy. While these practices are detailed in each labour force's future scenario strategies in the findings, their emphasis on the practical implications is crucial, as it guides managers that the technology adoption decision is based on the environmental, organisational and technological factors, alongside they need to embed these practices in the technology adoption plan to ensure employees' well-being and long-term stability.

Lastly, managers can illuminate future workforce management through prioritising human value in areas where they make a significant impact. Managers should prioritise reskilling and upskilling, solicit feedback from employees, and establish clear plans to mitigate potential unemployment issues. Managers should identify areas where technology integration can enhance efficiency and create employment opportunities. We recommend a gradual implementation of new technologies to identify potential areas for new positions. Tangible impacts on the workforce enable the development of decisions that promote business advancement while ensuring employee welfare. This research alerts policymakers to implement regulations that uphold employees' rights and foster equitable labour practices, such as updating employment laws to ensure fair wages and job security when automation is implemented. The law should require managers to be open with staff about how tech adoption will change their roles and how their data will be processed. Moreover, regulate the ratio of tech to human in the workplace to ensure balance. Additionally, collaborate with restaurant owners and educational institutions to establish programmes that align with workforce development in this evolving era.

5.3. Limitations and future studies

This study has some limitations. Firstly, it focused on dominant technologies in sampled restaurants, such as robots, AI chatbots, and self-ordering kiosks reflected by participants, potentially overlooking newer innovations like Tesla's Optimus robots or agentic AI. Future research should broaden its scope to include emerging technologies in the hospitality sector. The adoption of technology is a dynamic process, and longitudinal studies will be crucial for tracking how managerial perceptions and organisational outcomes evolve with the ongoing integration of these technologies. Experimental and longitudinal studies that involve real-world applications can provide deeper insights into the long-term implications of technological adoption. Secondly, the study did not focus on the social and psychological effects of these technologies on workers and customers, including factors such as job satisfaction, work-life balance, data security, employee surveillance, workplace anxiety, and customer privacy. Future research could generate more profound insights into these impacts. Thirdly, the research was limited to the UK restaurant sector, which may restrict the generalisability of the findings to other cultural, economic, or technological contexts. Future investigations could extend to other service industries, such as hotels or restaurants in various countries, to capture cross-cultural and cross-market variations. Additionally, this study employed qualitative research methods to achieve a profound understanding of specific

phenomenon. The theoretical model proposed in this study requires validation through quantitative research to support generalisability. Future studies should use quantitative methods, such as surveys or scenario-based experiments, to test the model and enhance its generalisability. Empirical findings will provide further insights and additional evidence regarding the robustness of the proposed framework.

CRediT authorship contribution statement

Nirmeen Elmohandes: Writing – review & editing, Writing – original draft, Visualization, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Pető Károly:** Writing – review & editing, Validation, Supervision. **Katalin Csobán:** Writing – review & editing, Validation, Supervision. **Mostafa Marghany:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. A summary of new technologies adoption and workforce research in the hospitality and restaurant sector

Research aim	Theory/Model	Methodology	Study context/sample	Major findings	Source
Examine conditions under which robots substitute for, complement, or cooperate with human workers, and to develop criteria for ex-ante technology assessment.	No specific theory but drawing on economic perspectives of capital-skill complementarity and CES production functions	Conceptual and analytical study	Service sector	Service robots do not uniformly replace human labour; their impact depends on task characteristics, skill requirements, cost structures, and organisational design. Robots are more likely to substitute routine and physically demanding tasks, while complementing human labour in complex, cognitive, and interactive activities.	Decker et al. (2017)
Explore hotel managers' perceptions of whether information and communication technologies (ICT) can reduce labour costs in the hotel industry.	Unidentified	Qualitative exploratory study.	Full-service hotels in Langkawi, Malaysia; interviews with 20 hotel owners and managers.	Managers widely acknowledged the importance of ICT for improving efficiency, but its use to reduce labour costs was limited and largely confined to back-of-house, employee-operated systems such as Property Management Systems (PMS) and HR Information Systems (HRIS). Customer-facing technologies (e.g., self-check-in/out kiosks) were generally rejected due to service expectations, guest characteristics, and concerns over losing personalised service.	Ahmad and Scott (2019)
Examine the ways in which automation eliminates, changes, and generates jobs in the tourism and hospitality industries, as well as to determine future job roles, skill requirements, and educational consequences.	Unidentified	A conceptual viewpoint	The global tourism and hospitality industry from operation management perspective.	Depending on task structure, service capacity, and financial incentives, automation both improves and replaces human labour. Roles requiring emotional intelligence and social interaction are more resilient to automation than jobs with routine, standardised, and information-processing tasks.	Ivanov (2020)
Examine how hotel employees' perceptions of artificial intelligence influence job insecurity, job engagement, and turnover intention.	Self-determination theory.	Explanatory sequential mixed methods. Quantitative survey followed by qualitative case study interviews.	United States hotel industry. 425 hotel employees (quantitative) and 11 hotel professionals (qualitative)	Perceived job insecurity significantly affects employee outcomes. Severity of threat increases job engagement, while powerlessness reduces it. Job engagement negatively influences turnover intention and mediates the relationship between job insecurity and turnover intention. Qualitative findings confirm mixed employee perceptions, with AI viewed simultaneously as a work support tool and a source of job insecurity.	Koo et al. (2021)

(*continued on next page*)

(*continued*)

Research aim	Theory/Model	Methodology	Study context/sample	Major findings	Source
The study evaluates how Turkish restaurant managers and patrons view service robots.	Drawing on institutional theory and Uncanny Valley theory.	Qualitative case study.	Semi-structured interviews: 26 restaurant owners and managers and 32 restaurant patrons in Turkey.	Robots are well-suited for tasks that are dirty, dull, dangerous, and repetitive. Customers generally hold favourable views of robots, whereas managers tend to have more unfavourable opinions. A service delivery system that integrates human-robot collaboration is viewed as the most suitable approach. Customers are prepared to invest additional funds for the robotic service experience.	Seyitoğlu et al. (2021)
Examine hospitality staff's perceptions about service robots.	Drawing on notions of technology-induced unemployment and human-robot collaboration.	Quantitative and cross-sectional survey design.	Hospitality service employees in the USA. 405 employees with previous experience using service robots.	Employees' awareness of the adoption and utilisation of service robots greatly influences their perceptions on unemployment caused by robots. Moreover, the perception of robots' social competencies substantially affects service personnel' views on robot-induced unemployment.	Parvez et al. (2022)
Explore how managers and staff at restaurants view the future of work in the restaurant sector in the USA by identifying the main obstacles, the effects of COVID-19, and the labour needs of the future.	Drawing on viewpoints of uncertainty, complexity, and risk in hospitality work.	Qualitative research methodology.	Interviews with 25 restaurant employees and managers in U.S. restaurants.	The restaurant industry confronts difficulties such as extended working hours, inadequate work–life balance, elevated stress levels, and financial instability. The COVID-19 pandemic heightened labour shortages, transformed business operations, increased dependence on technology, and diminished employee confidence in job security.	Seyitoğlu et al. (2023)
Examine the impact of restaurants' implementation of self-service kiosks on labour outcomes and evaluate if these effects vary by worker skill level and ownership type.	Skill-biased technological change theory; Efficiency wage theory; Technology adoption and labour demand framework.	Quantitative and cross-sectional survey.	The food service business in South Korea. Data from a national survey of 12,224 restaurants from 2018 to 2021.	The implementation of self-service kiosks does not significantly impact the quantity of full-time or part-time employees. The implementation of kiosks decreases the pay of part-time employees and lessens dependence on unpaid familial labour. The effects are mostly influenced by franchise restaurants, which reduce labour costs, whereas independently held businesses elevate pay for full-time staff.	Yoon (2023)
Discuss how AI exposure affects labour market outcomes, with emphasis on employment, jobs, income, productivity, and organisational structure.	Drawing on task-based theory of technological change, and human-AI complementarity perspectives	Systematic literature review following PRISMA guidelines.	37 peer-reviewed studies published between 2010 and 2022.	AI exposure has uneven and context-dependent effects on labour markets. While AI tends to displace routine and low-skill tasks, it simultaneously complements high-skill roles and enhances productivity.	Ghosh et al. (2024)
Examine the influence of technological innovation on the quantity and quality of employment within the hospitality sector.	Creative destruction theory and skill-biased technological change perspective.	Quantitative empirical research.	The hospitality accommodation sector in China. Panel data including 30 provinces in China.	Process innovation significantly enhances employment quantity, whereas product innovation significantly diminishes employment quantity. The creative effect of process innovation and the substitution effect of product innovation balance each other out, so in the long run, technological innovation does not have a big effect on the number of jobs. But technological innovation has made the hospitality	Tian (2024)

(*continued on next page*)

(*continued*)

Research aim	Theory/Model	Methodology	Study context/sample	Major findings	Source
				industry a lot better place to work.	
Investigate the potential for technology to replace labour supply in tourism by analysing future work arrangements in the context of labour shortages.	Scenario planning theory.	Qualitative research on scenario planning.	The tourism and hospitality business in New Zealand. The government, industrial leaders, educational institutions, trade unions and consultants were all stakeholders.	Technology can replace labour supply in various ways instead of following just one straightforward route. Four modes of substitution are identified: replacement (complete automation of tasks and roles), experiences (technology generates new value and experiences instead of displacing labour), augmentation (technology enhances worker productivity), and redesign (service systems are reconfigured to diminish reliance on labour).	Yeoman and McMahon-Beattie (2024)
Examine how AI involvement in back-of-house restaurant tasks (recipe creation vs. food production) affects consumers' willingness to order food.	Cognitive Continuum Theory; Algorithm Aversion; Uniqueness Neglect.	Quantitative, experimental design. Three between-subjects experiments testing AI involvement across different kitchen tasks.	US Casual dining restaurant context. Study 1: 279 Study 2: 288 Study 3: 286	AI involvement in food production does not reduce consumers' willingness to order, as this task is perceived as objective and well suited to automation. In contrast, AI involvement in recipe creation leads to lower willingness to order due to perceptions of uniqueness neglect and reduced intuitive judgment.	Kim et al. (2025)
Explore the negative aspects of service robot usage for hotel employees by identifying the factors that contribute to robot risk awareness and its effects on employee withdrawal behaviour and career intentions, while also testing the moderating influence of learning goal orientation.	Uncertainty Management Theory. Cognitive appraisal theory. Concepts of robot risk awareness and learning goal orientation.	Mixed-methods approach. Study 1: Cross-sectional survey. Study 2: experimental-causal-chain design comprising two experiments.	Study 1: A total of 612 frontline hotel staff from hotels in southern China that have adopted robots. Study 2: 205 students in hospitality and tourism who have completed internships in Macau.	Employee awareness of robot risk is raised by organisational investment in robot development and customer satisfaction with robot use. Increased awareness of robot risk results in more withdrawal behaviours at work and a decreased desire to work in the hospitality sector. Learning goal orientation mitigates the adverse impacts of robot risk awareness. Employees who possess a strong learning goal orientation are more adept at managing uncertainty related to robots. The adoption of robots generates psychological uncertainty instead of solely causing technological disruption.	Pan et al. (2025)
Examine hotel employees' perceptions of artificial intelligence towards job performance, creativity, job insecurity, and perceived risk of job loss.	Drawing on job insecurity perspectives	Quantitative study using a self-administered questionnaire	Hotel employees from 4- and 5-star hotels in Cyprus; 270 valid responses.	AI adoption enhances perceived job performance and creativity but simultaneously increases job insecurity and turnover intentions. Employees perceive AI as both a productivity-enhancing tool and a potential threat to job security, highlighting a coexistence paradox between technological efficiency and human employment.	Pericleous et al. (2025)
Examine how technology will change restaurant work.	Drawing on theories of labour and technology adoption (e.g., cognitive appraisal, job demands-resources, technology acceptance).	Qualitative approach.	20 interviews with employees at US restaurants	Employees' perceptions on the benefits, consequences, and drawbacks of technology advances in the restaurant business vary. The limitations of each technological trend highlight the need for human labour, as some features cannot meet the needs of certain tasks.	Seyitoğlu et al. (2025)
Examine the factors affecting the adoption of AI, the managerial outcomes, and the changing skill sets	Diffusion of Innovation theory and Technology Acceptance Model.	Qualitative approach.	22 directors and managers of lodging in hotels and resorts in South Korea.	Labour shortages, cost reduction, conflict minimisation, and COVID-19 impacts are driving the adoption of AI; however,	Shin et al. (2025)

(*continued on next page*)

(*continued*)

Research aim	Theory/Model	Methodology	Study context/sample	Major findings	Source
required of frontline staff in the automation and AI era.				luxury service expectations, employee resistance, system incompatibility, high costs, and a lack of qualified IT staff are limiting it. Adoption boosts efficiency and service standardisation creates value co-creation and value co-destruction in workforce deployment, but also increases anxiety, identity confusion, job insecurity and dependence on outsourcing. Emotional empathy, human-centred service, creative service design, automation technology application, communication, and resilience are the five essential frontline skills that show up. Sustainable hospitality operations require hybrid human-AI service models.	
Examine how intelligent automation-related job substitution risk influences hospitality employees' job tenure and career change decisions.	Job demands-resources model	Quantitative longitudinal analysis	Hotel and restaurant industry	Automation-related job substitution risk has non-linear effects on careers. Higher risk initially reduces job tenure and increases career change likelihood, reflecting job insecurity. At higher levels of automation exposure, these effects weaken, indicating adaptation and human-technology complementarity.	Yuan and Liu (2025)
Examine how intelligent technology disruption influences hospitality employees' taking-charge behaviour, and how this effect depends on employees' implicit beliefs.	Conservation of Resources (COR) theory and Implicit Theory (entity vs. incremental beliefs).	Mixed-method, multi-study design	1262 employees in China.	Intelligent technology disruption affects employee proactivity in opposing ways: it reduces taking-charge behaviour among entity believers through job replacement insecurity, while it encourages proactive behaviour among incremental believers by triggering job transformation insecurity.	Qiao et al. (2026)

Data availability

Data will be made available on request.

References

Abdelmotaleb, M., 2024. Exploring the effect of perceived fun at work on hospitality employees' behaviors in and out of work. Int. J. Contemp. Hosp. Manag. 36 (7), 2214–2231. https://doi.org/10.1108/IJCHM-02-2023-0139.

Abrahamson, E., Rosenkopf, L., 1993. Institutional and competitive bandwagons: using mathematical modeling as a tool to explore innovation diffusion. Acad. Manag. Rev. 18 (3), 487–517. https://doi.org/10.5465/amr.1993.9309035148.

Ahmad, R., Scott, N., 2019. Technology innovations towards reducing hospitality human resource costs in Langkawi, Malaysia. Tour. Rev. 74 (3), 547–562. https://doi.org/10.1108/TR-03-2018-0038.

Arun Kumar, P., Nivethitha, S., Vilvanathan, L., 2024. Empowering employees, empowering the environment: green HRM's journey to happiness, resilience and feedback seeking. J. Hosp. Tour. Insights 7 (2), 1130–1147. https://doi.org/10.1108/JHTI-11-2023-0800.

Baum, T., 2015. Human resources in tourism: still waiting for change?–a 2015 reprise. Tour. Manag. 50, 204–212. https://doi.org/10.1016/j.tourman.2015.02.001.

Belanche, D., Casaló, L.V., Flavián, C., 2021. Frontline robots in tourism and hospitality: service enhancement or cost reduction? Electron. Mark. 31 (3), 477–492. https://doi.org/10.1007/s12525-020-00432-5.

Bell, E., Bryman, A., Harley, B., 2022. Business Research Methods. Oxford University Press.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3 (2), 77–101. https://doi.org/10.1191/1478088706qp063oa.

Cai, R., Cain, L., Jeon, H., 2022. Customers' perceptions of hotel AI-enabled voice assistants: does brand matter? Int. J. Contemp. Hosp. Manag. 34 (8), 2807–2831. https://doi.org/10.1108/ijchm-10-2021-1313.

Çalışkan, G., Sevim, B., 2023. Use of service robots in hospitality: an observational study in terms of technology acceptance model. Tour. Hosp. Res., 14673584231198438 https://doi.org/10.1177/14673584231198438.

Chatterjee, S., Rana, N., Dwivedi, Y., Baabdullah, A., 2021. Understanding AI adoption in manufacturing and production firms using an integrated TAM-TOE model. Technol. Forecast. Soc. Change 170, 120880. https://doi.org/10.1016/j.techfore.2021.120880.

Chen, Y., Hu, Y., Zhou, S., Yang, S., 2023. Investigating the determinants of performance of artificial intelligence adoption in hospitality industry during COVID-19. Int. J. Contemp. Hosp. Manag. 35 (8), 2868–2889. https://doi.org/10.1108/IJCHM-04-2022-0433.

Chen, M., Jiang, Z., Xu, Z., Shi, A., Gu, M., Li, Y., 2022. Overviews of internet of things applications in China's hospitality industry. Processes 10 (7), 1256. https://doi.org/10.3390/pr10071256.

Chi, O., Denton, G., Gursoy, D., 2020. Artificially intelligent device use in service delivery: a systematic review, synthesis, and research agenda. J. Hosp. Mark. Manag. 29 (7), 757–786. https://doi.org/10.1080/19368623.2020.1721394.

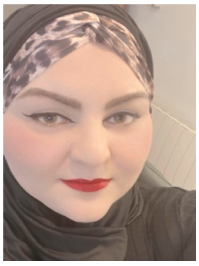
Choe, J., Kim, J., Hwang, J., 2022. Innovative robotic restaurants in Korea: merging a technology acceptance model and theory of planned behaviour. Asian J. Technol. Innov. 30 (2), 466–489. https://doi.org/10.1080/19761597.2021.2005466.

Choi, Y., Choi, M., Oh, M., Kim, S., 2020. Service robots in hotels: understanding the service quality perceptions of human-robot interaction. J. Hosp. Mark. Manag. 29 (6), 613–635. https://doi.org/10.1080/19368623.2020.1703871.

Cobos, L., Mejia, C., Ozturk, A., Wang, Y., 2016. A technology adoption and implementation process in an independent hotel chain. Int. J. Hosp. Manag. 57, 93–105. https://doi.org/10.1016/j.ijhm.2016.06.005.

Creswell, J., Creswell, J., 2017. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Sage Publications, Thousand Oaks, CA.
Cruz-Jesus, F., Pinheiro, A., Oliveira, T., 2019. Understanding CRM adoption stages: empirical analysis building on the TOE framework. Comput. Ind. 109, 1–13. https://doi.org/10.1016/j.compind.2019.03.007.
Davis, F., Bagozzi, R., Warshaw, P., 1989. User acceptance of computer technology: a comparison of two theoretical models. Manag. Sci. 35 (8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982.
de Kervenoael, R., Hasan, R., Schwob, A., Goh, E., 2020. Leveraging human-robot interaction in hospitality services: incorporating the role of perceived value, empathy, and information sharing into visitors' intentions to use social robots. Tour. Manag 78, 104042. https://doi.org/10.1016/j.tourman.2019.104042.
Decker, M., Fischer, M., Ott, I., 2017. Service robotics and human labour: A first technology assessment of substitution and cooperation. Robot. Auton. Syst. 87, 348–354. https://doi.org/10.1016/j.robot.2016.09.017.
Denzin, N., Lincoln, Y., 2018. The Sage Handbook of Qualitative Research. Sage Publications, Thousand Oaks, CA.
Dirsehan, T., Cankat, E., 2021. Role of mobile food-ordering applications in developing restaurants' brand satisfaction and loyalty in the pandemic period. J. Retail. Consum. Serv. 62, 102608. https://doi.org/10.1016/j.jretconser.2021.102608.
Elkhwesky, Z., El Manzani, Y., Elbayoumi Salem, I., 2024. Driving hospitality and tourism to foster sustainable innovation: a systematic review of COVID-19-related studies and practical implications in the digital era. Tour. Hosp. Res. 24 (1), 115–133. https://doi.org/10.1177/14673584221126792.
Elmohandes, N., Marghany, M., 2024. Effective or ineffective? Using ChatGPT for staffing in the hospitality industry. Eur. J. Tour. Res. 36, 3617. https://doi.org/10.54055/ejtr.v36i.3286 (-3617).
Etikan, I., Musa, S., Alkassim, R., 2016. Comparison of convenience sampling and purposive sampling. Am. J. Theor. Appl. Stat. 5 (1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11.
Gangwar, H., Date, H., Ramaswamy, R., 2015. Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. J. Enterp. Inf. Manag. 28 (1), 107–130. https://doi.org/10.1108/JEIM-08-2013-0065.
George, A., George, A., Martin, A., 2023. ChatGPT and the future of work: a comprehensive analysis of AI's impact on jobs and employment. Partn. Univ. Int. Innov. J. 1 (3), 154–186. https://doi.org/10.5281/zenodo.8076921.
Ghosh, D., Ghosh, R., Roy Chowdhury, S., Ganguly, B., 2024. AI-exposure and labour market: a systematic literature review on estimations, validations, and perceptions. Manag. Rev. Q. 1–28. https://doi.org/10.1007/s11301-023-00393-x.
Gibbs, M., 2022. How is new technology changing job design? IZA World Labor.
Guo, Q., Zhu, D., Lin, M.-T., Li, F.(S.), Kim, P., Du, D., Shu, Y., 2023. Hospitality employees' technology adoption at the workplace: Evidence from a meta-analysis. Int. J. Contemp. Hosp. Manag. 35 (7), 2437–2464. https://doi.org/10.1108/IJCHM-06-2022-0701.
Gursoy, D., Chi, O.H., Lu, L., Nunkoo, R., 2019. Consumers' acceptance of artificially intelligent (AI) device use in service delivery. Int. J. Inf. Manag. 49, 157–169. https://doi.org/10.1016/j.ijinfomgt.2019.03.008.
Hou, Y., Zhang, K., Li, G., 2021. Service robots or human staff: how social crowding shapes tourist preferences. Tour. Manag. 83, 104242. https://doi.org/10.1016/j.tourman.2020.104242.
Huang, M., Rust, R., 2018. Artificial intelligence in service. J. Serv. Res. 21 (2), 155–172. https://doi.org/10.1177/1094670517752459.
Hutton, G., Keep, M., Ward, M., Brien, P., 2024. Fiscal support for tourism and hospitality in coastal areas – House of Commons Library. House of Commons Library. 15 April. ⟨https://commonslibrary.parliament.uk/research-briefings/cdp-2024-0035/⟩ (Accessed 10th August 2025).
Ivanov, S., 2020. The impact of automation on tourism and hospitality jobs. Inf. Technol. Tour. 22 (2), 205–215. https://doi.org/10.1007/s40558-020-00175-1.
Ivanov, S., 2024. Is "machina" a "deus ex machina" solution to the labour shortages in tourism and hospitality? Worldw. Hosp. Tour. Themes 16 (5), 566–570. https://doi.org/10.1108/WHATT-06-2024-0113.
Ivanov, S., Webster, C., Garenko, A., 2018. Young Russian adults' attitudes towards the potential use of robots in hotels. Technol. Soc. 55, 24–32. https://doi.org/10.1016/j.techsoc.2018.06.004.
Ivanov, S., Webster, C., 2017. Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies–a cost-benefit analysis. Artificial intelligence and service automation by travel, tourism and hospitality companies–a cost-benefit analysis. ⟨https://ssrn.com/abstract=3007577⟩.
Jerez-Jerez, M.J., 2025. A study of employee attitudes towards AI, its effect on sustainable development goals and non-financial performance in independent hotels. Int. J. Hosp. Manag. 124, 103987. https://doi.org/10.1016/j.ijhm.2024.103987.
Kim, C., Cha, S., 2024. Customers' value changes on robot-serviced restaurants. Int. J. Tour. Res. 26 (1), 26–31. https://doi.org/10.1002/jtr.2631.
Kim, H., Choi, S., Shin, H., 2025. Artificial intelligence in the kitchen: can humans be replaced in recipe creation and food production. Int. J. Contemp. Hosp. Manag. 0959–6119. https://doi.org/10.1108/IJCHM-04-2024-0549.
Kim, S.S., Kim, J., Badu-Baiden, F., Giroux, M., Choi, Y., 2021. Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic. Int. J. Hosp. Manag. 93, 102795. https://doi.org/10.1016/j.ijhm.2020.102795.
Kömürcü, S., Ertamay, S.İ., Güler, M.E., 2021. Impacts of technological development on employment structure of tourism industry. J. Manag. Econ. Res. 19 (1), 146–165. https://doi.org/10.11611/yead.814765.
Koo, B., Curtis, C., Ryan, B., 2021. Examining the impact of artificial intelligence on hotel employees through job insecurity perspectives. Int. J. Hosp. Manag. 95, 102763. https://doi.org/10.1016/j.ijhm.2020.102763.
Li, F., Zhu, D., Lin, M., Kim, P., 2024. The technology acceptance model and hospitality and tourism consumers' intention to use mobile technologies: meta-analysis and structural equation modeling. Cornell Hosp. Q., 19389655241226558 https://doi.org/10.1177/19389655241226558.
Lin, I., Mattila, A., 2021. The value of service robots from the hotel guest's perspective: a mixed-method approach. Int. J. Hosp. Manag. 94, 102876. https://doi.org/10.1016/j.ijhm.2021.102876.
Liu, X.S., Yi, X.S., Wan, L.C., 2022. Friendly or competent? The effects of perception of robot appearance and service context on usage intention. Ann. Tour. Res. 92, 103324. https://doi.org/10.1016/j.annals.2021.103324.
Lu, L., Cai, R., Gursoy, D., 2019. Developing and validating a service robot integration willingness scale. Int. J. Hosp. Manag. 80, 36–51. https://doi.org/10.1016/j.ijhm.2019.01.005.
Lu, C.C.A., Yeh, C.C.R., Lai, C.C.S., 2025. The role of intelligence, trust and interpersonal job characteristics in employees' AI usage acceptance. Int. J. Hosp. Manag. 126, 104032. https://doi.org/10.1016/j.ijhm.2024.104032.
Majid, G., Tussyadiah, I., Kim, Y., 2024. Exploring the potential of chatbots in extending tourists' sustainable travel practices. J. Travel Res., 00472875241247316 https://doi.org/10.1177/00472875241247316.
Marghany, M.N., Elmohandes, N.M., Mohamad, I., Elshawarbi, N.N., Saleh, M.I., Ghazy, K., Helal, M.Y., 2025. Robots at your service: Understanding hotel guest acceptance with meta-UTAUT investigation. Int. J. Hosp. Manag. 130, 104227. https://doi.org/10.1016/j.ijhm.2025.104227.
Mingotto, E., Montaguti, F., Tamma, M., 2021. Challenges in re-designing operations and jobs to embody AI and robotics in services: findings from a case in the hospitality industry. Electron. Mark. 31 (3), 493–510. https://doi.org/10.1007/s12525-020-00439-y.
Mogaji, E., Viglia, G., Srivastava, P., Dwivedi, Y., 2024. Is it the end of the technology acceptance model in the era of generative artificial intelligence? Int. J. Contemp. Hosp. Manag. 36 (10), 3324–3339. https://doi.org/10.1108/IJCHM-08-2023-1271.
Morosan, C., Bowen, J.T., 2022. Labor shortage solution: redefining hospitality through digitization. Int. J. Contemp. Hosp. Manag. 34 (12), 4674–4685. https://doi.org/10.1108/IJCHM-03-2022-0304.
Nam, K., Dutt, C.S., Chathoth, P., Daghfous, A., Khan, M.S., 2021. The adoption of artificial intelligence and robotics in the hotel industry: Prospects and challenges. Electron. Mark. 31 (3), 553–574. https://doi.org/10.1007/s12525-020-00442-3.
Nissim, G., Simon, T., 2021. The future of labour unions in the age of automation and at the dawn of AI. Technol. Soc. 67, 101732. https://doi.org/10.1016/j.techsoc.2021.101732.
Öksüz, M., Bulut, Ç., Candemir, A., Bozkurt, İ., 2025. Digital or physical satisfaction? The effects of consumers' digital intentions and physical experiences on revisiting the restaurants. Int. J. Hosp. Manag. 125, 104011. https://doi.org/10.1016/j.ijhm.2024.104011.
Pan, Y., Lin, Y., Wong, J., 2025. The dark side of robot usage for hotel employees: an uncertainty management perspective. Tour. Manag. 106, 104994. https://doi.org/10.1016/j.tourman.2024.104994.
Parasuraman, A., Colby, C., 2015. An updated and streamlined technology readiness index: TRI 2.0. J. Serv. Res. 18 (1), 59–74. https://doi.org/10.1177/1094670514539730.
Park, H., Lee, M., Back, K.J., 2023. A critical review of technology-driven service innovation in hospitality and tourism: current discussions and future research agendas. Int. J. Contemp. Hosp. Manag. 35 (12), 4502–4534. https://doi.org/10.1108/IJCHM-07-2022-0875.
Parvez, M.O., Arasli, H., Ozturen, A., Lodhi, R.N., Ongsakul, V., 2022. Antecedents of human-robot collaboration: Theoretical extension of the technology acceptance model. J. Hosp. Tour. Tech. 13 (2), 240–263. https://doi.org/10.1108/JHTT-09-2021-0267.
Pericleous, K., Liasidou, S., Dyankov, T., 2025. AI and hotel employees' coexistence: a helpful tool or a threat to job loss? Worldw. Hosp. Tour. Themes. https://doi.org/10.1108/WHATT-01-2025-0001.
Pillai, S., Haldorai, K., Seo, W., Kim, W., 2021. COVID-19 and hospitality 5.0: redefining hospitality operations. Int. J. Hosp. Manag. 94, 102869. https://doi.org/10.1016/j.ijhm.2021.102869.
Pizam, A., Ozturk, A., Balderas-Cejudo, A., Buhalis, D., Fuchs, G., Hara, T., Chaulagain, S., 2022. Factors affecting hotel managers' intentions to adopt robotic technologies: a global study. Int. J. Hosp. Manag. 102, 103139. https://doi.org/10.1016/j.ijhm.2022.103139.
Qiao, S., Yao, T., Wu, S., Chen, Y., 2026. Two sides to every coin: the mixed impacts of intelligent technology disruption and employees' implicit belief on taking charge. Tour. Manag. 113, 105311. https://doi.org/10.1016/j.tourman.2025.105311.
Ratna, S., Saide, S., Putri, A., Indrajit, R., Muwardi, D., 2023. Digital transformation in tourism and hospitality industry: a literature review of blockchain, financial technology, and knowledge management. Eur. J. Bus. 19 (1), 84–112. https://doi.org/10.1108/EMJB-04-2023-0118.
Rogers, E., 2003. Diffusion of Innovations, Free Press trade paperback ed. Free Press, New York.
Rukumnuaykit, P., Pholphirul, P., Phaphimolwat, W., 2025. Post-COVID-19 adoption of service robots in Thai tourism enterprises: assessing impacts on job displacement and job creation. Soc. Sci. Humanit. Open 12, 101784. https://doi.org/10.1016/j.ssaho.2025.101784.
Sadangharn, P., 2021. A multidimensional analysis of robotic deployment in Thai hotels. Int. J. Soc. Robot. 14 (4), 859–873. https://doi.org/10.1007/s12369-021-00833-2.
Santiago, J., Borges-Tiago, M., Tiago, F., 2024. Embracing RAISA in restaurants: exploring customer attitudes toward robot adoption. Technol. Forecast. Soc. Change 199, 123047. https://doi.org/10.1016/j.techfore.2023.123047.

Seyitoğlu, F., Atsız, O., Acar, A., 2023. The future of restaurant labour: evidence from the US restaurants. Curr. Issues Tour. 1–18. https://doi.org/10.1080/13683500.2023.2280150.
Seyitoğlu, F., Atsız, O., Acar, A., 2025. The role of technology in the future of restaurant labor. J. Hosp. Tour. Technol. 16 (4), 665–683. https://doi.org/10.1108/JHTT-03-2024-0174.
Seyitoğlu, F., Ivanov, S., Atsız, O., Çifçi, İ., 2021. Robots as restaurant employees – a double-barrelled detective story. Technol. Soc. 67, 101779. https://doi.org/10.1016/j.techsoc.2021.101779.
Shaker, A., Mostafa, R., Elseidi, R., 2023. Predicting intention to follow online restaurant community advice: a trust-integrated technology acceptance model. Eur. J. Manag. Bus. Econ. 32 (2), 185–202. https://doi.org/10.1108/EJMBE-01-2021-0036.
Shin, H., Perdue, R., Kang, J., 2019. Front desk technology innovation in hotels: a managerial perspective. Tour. Manag. 74, 310–318. https://doi.org/10.1016/j.tourman.2019.04.004.
Shin, H., Ryu, J., Jo, Y., 2025. Navigating artificial intelligence adoption in hospitality and tourism: managerial insights, workforce transformation, and a future research agenda. Int. J. Hosp. Manag. 128, 104187. https://doi.org/10.1016/j.ijhm.2025.104187.
Sigala, M., 2018. New technologies in tourism: from multi-disciplinary to anti-disciplinary advances and trajectories. Tour. Manag. Perspect. 25, 151–155. https://doi.org/10.1016/j.tmp.2017.11.003.
Slade, E., Williams, M., Dwivedi, Y., Piercy, N., 2015. Exploring consumer adoption of proximity mobile payments. J. Strateg. Mark. 23 (3), 209–223. https://doi.org/10.1080/0965254x.2014.914075.
Soliman, M., Ivanov, S., Elgammal, I., Webster, C., Al-Alawi, A., 2024. Pursuing the drivers of consumer behaviour toward service robots in the hotel industry. Int. J. Hosp. Manag. 120, 103752. https://doi.org/10.1016/j.ijhm.2024.103752.
Tian, J., 2024. Does technological innovation have an impact on employment in the hospitality industry? Int. J. Contemp. Hosp. Manag. 36 (4), 1025–1043. https://doi.org/10.1108/IJCHM-03-2022-0370.
Tlili, A., Altinay, F., Altinay, Z., Zhang, Y., 2021. Envisioning the future of technology integration for accessible hospitality and tourism. Int. J. Contemp. Hosp. Manag. 33 (12), 4460–4482. https://doi.org/10.1108/IJCHM-03-2021-0321.
Tornatzky, L., Fleischer, M., 1990. The Processes of Technological Innovation. Lexington Books, Lexington, MA.
Tussyadiah, I., Park, S., 2018. Consumer evaluation of hotel service robots. In: Information and Communication Technologies in Tourism 2018: Proceedings of the International Conference in Jönköping, Sweden, January 24–26, 2018. Springer International Publishing, pp. 308–320. https://doi.org/10.1007/978-3-319-72923-7_24.
Tussyadiah, I., Tuomi, A., Ling, E., Miller, G., Lee, G., 2022. Drivers of organisational adoption of automation. Ann. Tour. Res. 93, 103308. https://doi.org/10.1016/j.annals.2021.103308.
UK Government, 2021. Hospitality strategy: reopening, recovery, resilience. Available at: ⟨https://www.gov.uk/government/publications/hospitality-strategy-reopening-recovery-resilience⟩ (Accessed 1st March 2025).
UKHospitality, 2023. Hospitality workforce strategy: one year on. Available at: ⟨https://www.ukhospitality.org.uk/insight/hospitality-workforce-strategy-one-year-on/⟩ (Accessed 7th September 2025).
Venkatesh, V., 2000. Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. Inf. Syst. Res. 11 (4), 342–365. https://doi.org/10.1287/isre.11.4.342.11872.
Venkatesh, V., Davis, F., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. Manag. Sci. 46 (2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926.
Venkatesh, V., Davis, F., Morris, M., 2007. Dead or alive? The development, trajectory and future of technology adoption research. J. Assoc. Inf. Syst. 8 (4), 267–286. https://doi.org/10.17705/1jais.00120.
Venkatesh, V., Morris, M., Davis, G., Davis, F., 2003. User acceptance of information technology: toward a unified view. MIS Q. 27 (3), 425–478. https://doi.org/10.2307/30036540.
Wang, P., 2024. Personalising guest experience with generative AI in the hotel industry: there's more to it than meets a Kiwi's eye. Curr. Issues Tour. 1–18. https://doi.org/10.1080/13683500.2023.2300030.
Wang, Y., Li, H., Li, C., Zhang, D., 2016. Factors affecting hotels' adoption of mobile reservation systems: a technology-organization-environment framework. Tour. Manag. 53, 163–172. https://doi.org/10.1016/j.tourman.2015.09.021.
Wang, Y., Uysal, M., 2024. Artificial intelligence-assisted mindfulness in tourism, hospitality, and events. Int. J. Contemp. Hosp. Manag. 36 (4), 1262–1278. https://doi.org/10.1108/IJCHM-11-2022-1444.
Wang, Y., Wang, Y., Yang, Y., 2010. Understanding the determinants of RFID adoption in the manufacturing industry. Technol. Forecast. Soc. Change 77 (5), 803–815. https://doi.org/10.1016/j.techfore.2010.03.006.
Webster, C., Ivanov, S., 2020. In: George, B., Paul, J. (Eds.), Robotics, Artificial Intelligence, and the Evolving Nature of Work. Digital Transformation in Business and Society, Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-08277-2_8.
Wu, S.H., 2025. Deep affection: service robots increase brand love of restaurants. Br. Food J. 127 (1), 129–147. https://doi.org/10.1108/BFJ-06-2024-0631.
Wu, I., Li, J., Fu, C., 2011. The adoption of mobile healthcare by hospitals' professionals: an integrative perspective. Decis. Support Syst. 51 (3), 587–596. https://doi.org/10.1016/j.dss.2011.03.003.
Wünderlich, N.V., Blut, M., Brock, C., 2024. Enhancing corporate brands through service robots: the impact of anthropomorphic design metaphors on corporate brand perceptions. J. Prod. Innov. Manag. 41 (5), 1022–1046. https://doi.org/10.1111/jpim.12726.
Yang, H., Song, H., Cheung, C., Guan, J., 2021. How to enhance hotel guests' acceptance and experience of smart hotel technology: an examination of visiting intentions. Int. J. Hosp. Manag. 97, 103000. https://doi.org/10.1016/j.ijhm.2021.103000.
Yeoman, I., McMahon-Beattie, U., 2024. The future of tourism work: is technology a substitute for labour supply? Curr. Issues Tour. 1–19. https://doi.org/10.1080/13683500.2024.000000.
Yoon, C., 2023. Technology adoption and jobss: the effects of self-service kiosks in restaurants on labour outcomes. Technol. Soc. 74, 102336. https://doi.org/10.1016/j.techsoc.2023.102336.
Yuan, B., Liu, X., 2025. Machines replace human: the impact of intelligent automation job substitution risk on job tenure and career change among hospitality practitioners. Int. J. Hosp. Manag. 126, 104099. https://doi.org/10.1016/j.ijhm.2025.104099.
Zhu, D., 2022. Effects of robot restaurants' food quality, service quality and high-tech atmosphere perception on customers' behavioural intentions. J. Hosp. Tour. Technol. 13 (4), 699–714. https://doi.org/10.1108/JHTT-01-2021-0022.



Dr. Nirmeen Elmohandes is a Lecturer in Business and Tourism Management at GBS, Canterbury Christ Church University, UK, and an Assistant Lecturer at the Faculty of Tourism and Hotel Management, Helwan University, Egypt. She formerly lectured at the postgraduate level and supervised many master's dissertations. Dr. Nirmeen has obtained a PhD from the Doctoral School of Business and Management, Faculty of Economics and Business, University of Debrecen, Hungary, where she also secured research grants. Her work has been published in highly ranked academic journals, and she has presented at several international conferences. Her research interests include digital transformation in hospitality, hospitality workforce dynamics, employment in the digital age, technology-driven HR practices, people management, technology and sustainability.

Dr. Károly Pető has been serving as the General Vice Rector of the University of Debrecen since 2022. He is also a professor and the Director of the Institute of Rural Development, Regional Economics, and Tourism Management within the Faculty of Economics and Business. He is responsible for bachelor's and master's programs in rural development agricultural engineering, with his teaching portfolio covering regional economics, rural and regional development, and business consulting. As a regular member of the Ihrig Károly Doctoral School of Business and Management, he has successfully supervised numerous doctoral researchers. Previously, he served as the Dean of the Faculty of Economics and Business from 2013 to 2022. From 2011 to 2013, he was the Deputy Chairman of the Strategic Center for Agricultural and Economic Sciences, and between 2002 and 2011, he acted as the Deputy Dean of Education at the Faculty of Agricultural and Rural Development. He has an extensive publication record in academic journals and has actively participated in numerous conferences. His primary research interests include sustainable tourism, health tourism, rural development, gastronomic tourism, and the social, environmental, and economic impacts of digital technologies.

Dr. Katalin Csobán is a senior lecturer at the Department of Tourism and Hospitality Management at the University of Debrecen, Hungary. She obtained her BA in tourism and hotel management at the College of Commerce, Hospitality and Tourism in Budapest and her Ph.D. in business and management at the University of Debrecen. She has been awarded research grants to conduct research at Indiana University, USA, as well as at Oxford Brookes University, UK. Her research interests focus on sustainable tourism development, visitor management and rural development.

Dr Mostafa Marghany is a Lecturer and PGR Director at the Edge Hotel School, University of Essex, UK. He is also a Lecturer at the Faculty of Tourism and Hotel Management, Helwan University, Egypt. He completed his PhD at Swansea University, UK, in 2022 and is a Fellow of the Higher Education Academy in the UK. Dr Marghany has successfully supervised and examined several Master's dissertations and has a number of publications in academic journals. He has contributed to multiple conferences and serves as a reviewer for various academic journals. His research interests include, people management, employment and technological change, technological advancements, technology-driven HR practices, hospitality and tourism industry.