

Emotional intelligence or artificial intelligence– an employee perspective

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Emotional intelligence or artificial intelligence– an employee perspective

Abstract

Emotional intelligence as a personal intelligence and artificial intelligence as a machine intelligence have been popularising in the relevant literature over last two decades. The current study integrates these two and explores how emotional and artificial intelligences influence employee retention and performance with a focus on service employees in the hotel industry. Employee performance is operationalised into internal and external dimensions that capture employees' task efficiency over both internal and external service encounter with co-workers and customers respectively. The data were collected from different rankings of hotels. The results show that emotional intelligence has significant effects on employee retention and performance; whereas artificial intelligence plays a significant moderating role in employee performance. Discussion of the findings and implications concludes the paper.

Keywords: emotional intelligence; artificial intelligence; hotels; customer service; service encounter.

INTRODUCTION

Emotional intelligence (EI and emotional intelligence are used interchangeably in this paper) as a personal intelligence has been a buzz word for individual and organizational success over last two and half decades, despite the debates on its conceptualisations, measurements and applications. Individuals with a high level of emotional intelligence tend to enjoy life satisfaction, better personal and social relationships, and career success (e.g. Amdurer et al., 2014; Coetzee and Harry, 2014; Fitness, 2001; Law et al., 2008; Schutte et al., 2001; Sony & Mekoth, 2016). From an organizational perspective, emotional intelligence exhibited in employees is related to organizational outcomes including job satisfaction, performance, organizational commitment, (Kafetsios and Zampetakis, 2008; Nikolaou and Tsaousis, 2002; Rozell, Pettijohn and Parker, 2004; Prentice and King, 2011; 2012; Sy, Tram and O'hara, 2006), as well as customer satisfaction (Darvishmotevali, Altinay and De Vita, 2018; Kernbach and Schutte, 2005; Yao, Wang, Yu and Guchait, 2019). These outcomes have implications for employee job efficiency and business profitability (Heskett et al., 1994; Yao, Wang, Yu and Guchait, 2019). EI is particularly useful for service organizations and employees occupying the customer – contact positions (Bardzil and Slaski, 2003; Prentice, Chen and King, 2013; Yao, Wang, Yu and Guchait, 2019).

Artificial intelligence (AI) is referred to as machine intelligence demonstrated by humanoid or non-humanoid robots that behave like humans, and can be applied in businesses to improve and enhance operational efficiency (Russell and Norvig, 2016). Although founded as an academic discipline in 1950s, not until recently has AI gained its popularity in the relevant literature. AI permeates in various industries and has potential to generate substantial financial profitability for businesses, particularly in the service sector such as banking, human resources recruitment, healthcare transit, tourism and hotel industry (e.g. Buhalis & Leung, 2018; Kim, 2011; Yu and Schwartz, 2006). For example, AI likely adds 1.2 trillion dollars to

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3 financial services by 2035 (Vochozka et al., 2018). Surveying more than 3,000 Japanese
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5 firms, Morikawa (2017a) found that firms with highly educated employees expect more
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7 positive impacts of AI-related technologies in their business. Table 1 and Figure 1 show its
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9 applications and functions in various industries.
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12 Table 1. AI applications in industries.
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Sector	Description of use	Example
Banking	Digital banking opportunities, Players/brands have to be more helpful, available, relevant	Online banking apps for smartphones, Chatbots that deal with customers, Banking behaviour analysis tools
Recruitment	Smart computers are able to analyse considerable amount of data (e.g.: company details, culture codes, hiring trends)	Job recommendation apps, search tools
Agriculture	Farmers use drones in order to monitor the condition of the soil. This way they are able to understand if soils need watering or seeding	Drones, cameras, software to estimate total milk production
Healthcare	Data management and analysis allow better healthcare services	The Electronic Patient Record and machine learning can predict disease outcomes, Heart rate monitors, Insulin pumps, Other medical apps
Transit	Sensors allow transit providers to predict to predict wear and to avoid accidents	Self-driving cars, Real time information apps, Maps from Apple, Google Maps

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44 In the service industry, Wirtz et al. (2018) analysed how service robots in conjunction
45
46 with AI would impact the service organisations and employees across micro, meso and macro
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48 levels. AI not only improves operational efficiency by automating mundane tasks but also
49
50 enhances customer experience (Bolton et al., 2018). For instance, large hotels rely on
51
52 sophisticated computer programs that use AI to scan historical data and track patterns,
53
54 resetting overbooking levels every 15 minutes, based on their goal reservation systems (Ma et
55
56 al., 2018). Using Chatbots and messaging, AI allows service organizations to improve service
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quality in both functional and technical processes (Chung, Ko, Joung & Kim, 2018; Ivanov and Webster, 2017; Larivière et al., 2017) and to automate tasks that are traditionally performed by service employees. Restaurant managers use robotic servers and AI to assist self-service ordering. AI can also be used to improve energy consumption in hotel building (Wang et al., 2015). Hilton Hotels & Resorts has adopted Connie as their first AI robot to provide information to tourists and improve interactions with customers (Solomon, 2016). AI plays different roles in the service encounter, such as augmentation and substitution of service employees, and network facilitation (Larivière et al., 2017) Figure 1 shows the functions performed by AI.



Figure 1. The use of Artificial Intelligence in worldwide companies (Tata Consultancy Services, 2017)

Whilst acknowledging its prevalence and impact on improving the business efficiency, AI also sparks growing concern on its replacement of human jobs (Larivière et al., 2017). Robinson (2017) refers to the “Momentum Machines Project” as a one step closer to

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2
3 reduce fast-food jobs. In the case of hotels and restaurants, around 25% activities can be
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5 automated by the existing technology (Chui, Manyika and Miremadi, 2016).
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8 A report by Organization for Economic Co-operation and Development (OECD,
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10 2016) shows that 9% of jobs could become automated in 21 countries. 2017 McKinsey report
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12 predicts a loss of 5% of jobs caused by AI (Manyika et al., 2017). An Oxford University
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14 research predicted that 47% of jobs could be automated by 2033 (Ramaswamy, 2017). About
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16 50% of financial services and insurance jobs that are related to activities such as collecting
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18 and processing data are very likely to be replaced by AI (He and Guo, 2018).
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21 Reports from Pew Research Internet (Smith and Anderson, 2017) show that about 72
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23 percent Americans express concern about replacement of human jobs by AI, only about 33
24
25 percent are enthusiastic about capabilities of AI. However, research (Morikawa, 2017b;
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27 Smith and Anderson, 2017) also shows that AI can only play a dominant role in low-level
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29 mundane jobs; whereas high level jobs such as science and engineering can be complimented
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31 by AI and robotics, which play a very minor role in human-intensive services such as
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33 occupation-specific skills acquired by attending professional schools or holding occupational
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35 licenses (Smith and Anderson, 2017).
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40 Previous research (e.g. Ghahramani, 2015; Moravčík et al., 2017; Russell and Norvig,
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42 2016) on AI is primarily focused on its functionality and technical efficiency. No research to
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44 date to the best of our knowledge has attempted to understand how AI may affect
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46 organizational outcomes from an employee perspective. As previously discussed, EI
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48 contributes to employee job-related outcomes. Consistent with foregoing discussion, the
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50 current study approaches from employees' perspective and explores how EI and AI
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52 contribute to employee-related outcomes with a focus on the hotel industry. The applications
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54 of AI in hotels have been growing considerably including marketing intelligence, customer
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56 service, chatbots and messaging (see <https://www.revfine.com/>) and its importance in the
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3 future of hospitality marketing and management will continue to increase (Gursoy, 2018). As
4 the study is intended to understand how the respective impacts of EI and AI on employees,
5 the outcomes opted for this study are employee retention and performance. Although
6 employee-focused, these outcomes have implications for organizational performance. The
7 following section presents the relevant literature on EI and AI and forms hypotheses. The
8 methodology of testing these hypotheses is outlined, followed by data analysis and
9 presentation of results. Discussion of the findings and implications is highlighted for
10 researchers and practitioners.
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21 **LITERATURE REVIEW**

22 **Emotional intelligence**

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26 There are various definitions and conceptualisations of EI in the literature, and each of
27 them bears little resemblance on their own. The theoretical paradigms underpin emotional
28 intelligence conceptualisations from one of two perspectives: as a form of pure intelligence
29 consisting of cognitive ability only (Mayer and Salovey, 1997), or as a mixed intelligence
30 consisting of both cognitive ability and personality aspects, the differences in which are
31 attributed to the different beliefs of what constitutes emotional intelligence (Bar-On, 1997;
32 Goleman, 1998). The two perspectives, although different, are more complementary than
33 contradictory (Ciarrochi, Chan and Caputi, 2000). However, the ability model proposed
34 Salovey and Mayer (1990) that represents cognitive intelligence popularises the academic
35 community and is opted for discussion herein.
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49 Subsuming EI under the domain of intelligence, Mayer and Salovey (1997) define EI
50 as the ability to perceive, respond and manipulate emotional information without necessarily
51 understanding it and the ability to understand and manage emotions without necessarily
52 perceiving feelings well or fully experiencing them. EI consists of four branches. The first
53 branch is emotional perception, indicating the ability to identify and express emotions
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3 accurately and to discriminate expressions of feelings. The second branch is emotional
4 assimilation, indicating emotion-prioritised thinking by directing attention to important
5 information. The third branch is emotional understanding, indicating the ability to label and
6 recognise emotions among the words and the emotions themselves. The fourth branch is
7 emotion management, indicating the ability to stay open to pleasant and unpleasant feelings, to
8 reflectively engage or detach from, monitor and manage emotions in relation to oneself and
9 others. The four branches function hierarchically with the perception of emotions acting as the
10 most basic or bottom branch, and emotional management as the most complex or top branch
11 (Mayer, Salovey, Caruso and Sitarenios, 2001). If an individual lacks the ability to process the
12 lowest level of emotional input, he or she would also lack the ability to manage emotions at a
13 higher level described in this model. Once perception has gained, emotions can be utilized to
14 facilitate thought consciously or unconsciously.

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Emotional intelligence has potential of accounting for some portion of the remaining
variance in predicting work performance and career success which are left unexplained by
traditional intelligence. People with high levels of emotional intelligence experience more
career success (e.g. Poon, 2004), build stronger personal relationships (e.g. Schutte et al.,
2001), lead more effectively (e.g. George, 2000; Gupta & Bajaj, 2017), and enjoy better health
than those with low levels of emotional intelligence (e.g. Austin, Saklofske and Egan, 2005;
Schutte et al., 2007).

In work settings, emotional intelligence has been found to affect a wide variety of job
attitudes and behaviours. First, emotional intelligence has a positive influence on job
satisfaction because it affects one's ability to succeed in coping with environmental demands
and pressures, thus managing stressful work conditions (Bar-On, 1997; Shi et al., 2015), and
on employee commitment because emotional intelligence facilitates communication, and
emotionally intelligent people make others feel better suited to the occupational environment

(Goleman, 1998; Nikolaou and Tsaousis, 2002; Rozell, Pettijohn and Parker, 2004). Job satisfaction and commitment are common precursors of employee retention (e.g. Brown and Yoshioka, 2003; D'Amato and Herzfeldt, 2008; Saari and Judge, 2004). Consequently, the following hypothesis is offered:

H1a. Emotional intelligence is significantly related to employee retention.

Emotional intelligence has been extensively discussed as a valid predictor of job performance (Carmeli and Josman, 2006; Cote and Miners, 2006;). The efficiency of emotional intelligence in predicting job behaviours depends on the type of job and the nature of the business. For jobs that require teamwork, research (Clarke, 2010; Mayer and Salovey, 1997) shows that emotional intelligence significantly impacts employee job efficiency with co-workers (hereafter internal service performance) because emotionally intelligence people have better personal skills which are needed for group work. Emotional intelligence is particularly important for jobs that require social skills and interpersonal interactions, such as the frontline positions that involve interactions between service employees and customers (Ashkanasy and Daus, 2005; Caruso, Mayer and Salovey, 2002; Darvishmotevali, Altinay and De Vita, 2018). Employees with a high level of EI are better at dealing with the service encounter with customers and achieve better service performance (refer to external service performance herein). Consistent with the foregoing discussion, the following hypotheses are offered:

H1b, EI is significantly related to internal service performance.

H1c: EI is significantly related to external service performance.

Artificial intelligence

AI is the science of designing and building computer-based solutions for performing human tasks (Simon, 1980). AI finds its origins in various disciplines such as philosophy, mathematics, economics, neuroscience, psychology, computer engineering, cybernetics and

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3 even linguistics (Russell and Norvig, 2009). AI can be defined as “a system’s ability to
4 correctly interpret external data, to learn from such data and use those learnings to achieve
5 specific goals and tasks through flexible adaptation” (Kaplan and Haenlein, 2019). Russell
6 and Norvig (2009) approached AI from four different categories to operationalise AI:
7 thinking humanly; acting humanly; thinking rationally. Rijsdijk et al. (2007) propose six
8 dimensions of AI: autonomy, ability to learn, reactivity, ability to cooperate, humanlike
9 interaction, and personality.
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19 AI can be classified on the basis of its evolution and applications. Evolutionarily AI
20 includes artificial narrow intelligence, artificial general intelligence, and artificial super
21 intelligence (Kaplan and Haenlein, 2019). Artificial narrow intelligence is the first-generation
22 AI, applying to specific tasks (e.g., Siri, Tesla). The second-generation AI is referred to as
23 artificial general intelligence, which is able to solve different problems autonomously. The
24 third-generation of AI is referred to as artificial super intelligence. This generation is
25 anticipated to be capable of scientific creativity and social skills. Based upon the range of
26 tasks that AI is capable of, Wirth (2018) classified AI into weak AI (i.e., AI tailored to
27 specific tasks), hybrid AI (i.e., AI blending multiple solutions and can adapt to new tasks),
28 and strong AI (i.e., AI as intelligent as human and deal with a variety of tasks).
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Kaplan and Haenlein (2019) divide AI into analytical AI, human-inspired AI, and
humanized AI. Analytical AI uses cognitive intelligence and learning (i.e., past data) to guide
future decisions, and has been used in a variety of scenarios. Human-inspired AI has both
cognitive and emotional intelligence. This AI system can understand human emotions and
incorporate them into their decision making. Kaplan and Haenlein (2019) indicate that
human-inspired AI is becoming more popular. For example, Walmart used facial recognition
tools (i.e., human-inspired AI) to identify unhappy customers waiting at checkouts, thus
applying intervention (e.g., open new cashiers). Humanised AI is anticipated to possess

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3 cognitive, emotional, and social intelligence, and can be self-conscious in their interactions
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5 with others. However, this AI system is yet to come.
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8 AI tools have been used in different industries. For example, in retailing, Amazon has
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10 used analytical AI to support inventory management. In entertainment, newspapers such as
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12 The Los Angeles Times have used analytical AI to write articles. In museum, AI tour-guide
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14 robot has been used to increase the attendance (Burgard et al. 1999). Analytical AI in human
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16 resource management can help screen and select candidates.
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19 In marketing, AI is widely used to improve customer service (Bolton et al., 2018;
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21 Bolton et al, 2013; Chung et al., 2018). For example, chatbots applying analytical AI can
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23 generate automatic responses to customer inquiries (Chung et al., 2018). AI has also been
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25 deployed in contact centres to improve the customer service experience (Kirkpatrick, 2017).
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27 Despite its widespread use in businesses, however, the role of AI in organisations is
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29 dependent upon the type of jobs and the level of complexity. In general, AI is used to
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31 automate mundane and low-level tasks. Based on the four taxonomies of analytical
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33 intelligence (mechanical, analytical, intuitive, and empathetic intelligence) proposed by
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35 Huang and Rust (2018), Wirtz et al. (2018) propose an intuitive understanding of service
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37 delivery based on the complexity of emotional and cognitive tasks (see Figure 2). The authors
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39 indicate that complex emotional-social task will tend to be performed by humans, and
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41 complex cognitive-analytical task will tend to be executed by robots.
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47 The job of service employees is deemed to be complex emotional-social tasks as it
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49 involves interpersonal interactions with customers (Prentice, Chen and King, 2013), and this
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51 type of job requires emotional intelligence to manage the interactions (Ashkanasy and Daus,
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53 2005; Caruso, Mayer and Salovey, 2002; Sjoberg and Littorin, 2005). Although it may not
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55 play a dominant role in these tasks, AI can enhance these social tasks. For example, AI can
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57 facilitate the job of human agents from contact centres by interpreting customers' questions
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(e.g., language translation), searching business knowledge system, and preparing human-friendly responses (Kirkpatrick, 2017). AI can also provide information including change fees and scheduling issues when customers request to change their tickets, facilitating employee task efficiency. In the travel industry, Serbanescu and Neculescu (2013) show that analytical AI can enhance the task performance and efficiency. Consequently, employees would get their work done more effectively which likely affects their job retention. This discussion leads to the following hypotheses:

H2a: AI moderates/enhances the relationship between EI and employee retention.

H2b: AI moderates/enhances the relationship between EI and internal service performance

H2c: AI moderates/enhances the relationship between EI and external service performance

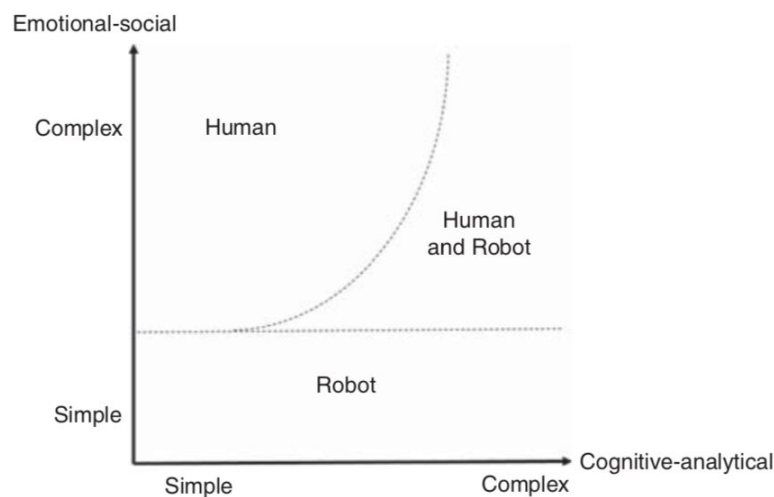


Figure 2: Relationship between tasks and performers (human vs. robot) (Wirtz et al., 2018)

METHOD

Sample

To understand how EI and AI affect service employees' retention and performance respectively, the study was undertaken at 60 hotels of different types (based on star rankings,

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3 namely, five, four, three and 2 stars hotels) in Portugal. Hotels have increasingly used various
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5 AI tools to support their business and provide services to customers. Examples include
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7 chatbots, concierge robots, digital assistance, voice-activated services, and travel experience
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9 enhancers. Those analytical tools can collect a variety of information that facilitates hotels
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11 understanding better their business and customers. Data were collected from service
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13 representatives who have direct contact with customers and work with some kind of artificial
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15 intelligent tools. About 12 percent of the employees were from 5-star hotel, 56% of 4-star
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17 hotels, 28% of 3-star hotels and 4% of 2-star hotels.
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21 **Instruments**

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23 All items that were used to measure the study variables on a seven-point Likert scale,
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25 with 1 indicating strongly disagree, and 7 strongly agree. *Emotional intelligence* was
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27 measured by Law, Wong and Song's (2004) self-report emotional intelligence scale (WEIS).
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29 Several measures are available in the literature for assessing emotional intelligence. WEIS
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31 was opted because it is based on four ability dimensions described in the ability EI model
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33 (see Brackett and Mayer, 2003) and has been widely used and cited in the literature. WEIS
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35 has been cross-validated with great reliability and validity. The original WEIS contains 16
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37 items (statements), and four dimensions. These four dimensions are labelled as self-emotion
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39 appraisal (SEA), other-emotion appraisal (OEA), use of emotion (UOE), and regulation of
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41 emotion (ROE). Each dimension has 4 items. The dimension self-emotion appraisal includes
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43 items, "I have a good sense of why I have certain feelings most of the time" and "I have good
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45 understanding of my own emotions". The dimension other-emotion appraisal items includes,
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47 "I always know my friends' emotions from their behaviour". Items such as "I always set
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49 goals for myself and then try my best to achieve them" are included in the use of emotion
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51 dimension. The dimension regulation of emotion items include "I am able to control my
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3 temper so that I can handle difficulties rationally.” The reliabilities were .85 for SEA, .88 for
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5 OEA, .84 for UOE, and .88 for ROE.
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8 Employee performance was measured on the internal service performance that is
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10 focused on work behaviours with co-workers over the internal encounters and mandatory
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12 tasks within the organization, as well as external service performance that is based on
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14 customer-oriented behaviours over the service encounter with customers that is reflective of
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16 customer service performance. The items that were used to measure internal service
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18 performance were adapted from O’Reilly and Chatman (1986) to reflect each employee’s
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20 general job performance within the organisation. To ensure item appropriateness and
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22 consistency with general job descriptions for employees working in different hotels, four
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24 items that reflect employee performance over internal encounters and are associated with the
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26 systems of the hotel organizations were retained for further analysis. Self-reporting was
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28 deemed to be more appropriate as this study is approached from an individuals’ perception of
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30 job accomplishment. Self-reporting has been widely used in performance research. Churchill
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32 et al.’s (1985) meta-analytical study shows that employees’ anonymous self-reported
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34 performance has good validity, with a less restricted range and less error than other ratings or
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36 objective measures. The items measuring external service performance were adapted from
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38 Hallowell (1996) with regards to employee service that is specifically aimed for satisfying
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40 customers. These items are indicative of employees’ consistent, reliable, prompt and
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42 individualised service.
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49 Employee retention was measured by indicating their willingness to stay with the
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51 company, and by asking the respondents to indicate their intention to leave the job and
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53 explore other career opportunities within next 12 months. The items assessing this variable
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55 were adapted from Kelloway, Gottlieb and Barham (1996). For example, “How likely do you
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57 think you would get out of your current job within next 12 months;” and “How likely it is that
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3 you would explore other career opportunities within next 12 months.” A seven-point Likert
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5 scale was used to show respondents’ degree of agreement (1 - strongly disagree to 7 -
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7 strongly agree). The reliability value for this scale was .91.
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10 The measure that assessed employees’ perception of AI was adapted from Wixom and
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12 Todd (2005). This measure has multiple dimensions including comprehensiveness, format,
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14 accuracy, currency, reliability, accessibility, flexibility, integrity, and timeliness. Each
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16 dimension has 3 items. The items that were used to measure comprehensiveness include "AI
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18 tools provide me with a complete set of information". The dimension format includes items
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20 such as "The information provided by AI tools is well formatted". Items such as "AI tools
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22 produce correct information" are included in the dimension accuracy. The items used to
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24 measure currency include "AI tools provide me with the most recent information". The
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26 reliability was measured by items such as "AI tools operate reliably". Items such as "AI tools
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28 allow information to be readily accessible to me" are included in the measurement of
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30 accessibility. The items measuring flexibly include "AI tools can be adapted to meet a variety
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32 of needs". The integrity was measured by items such as "AI tools effectively integrate data
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34 from different areas of the company". Items such as "AI tools provide information in a timely
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36 fashion" are included in measuring timeliness. The reliabilities for each dimension were all
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38 above .70.
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45 **Data collection procedure**

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47 The survey was conducted online through SurveyMonkey. The researchers had a
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49 thorough discussion with AI experts from various hotels on the original questionnaire relating
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51 to AI dimensionality prior to the survey. To confirm the validity of the questionnaire
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53 (Tabachnick et al., 2007) and ensure the survey completion time less than 15 minutes to
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55 minimise respondents’ fatigue, a pilot test was conducted with 20 randomly selected
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57 employees who have experience with AI tools working in the hotels. After this testing, the
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questionnaire was modified on the basis of inputs provided by these participants.

Modifications were applied with a view to improving face validity and readability.

The research assistants contacted the management from different hotels for permission to conduct the survey. The online survey was disseminated via two stages. First, the trained research assistants contacted hotel employees personally, and provided a detailed explanation of the research purpose and the specificities of the questionnaire. Subsequently, e-mail was sent with a brief description of the project and a hyperlink with a QR code that directed participants to the survey host SurveyMonkey. The SurveyMonkey options that might reveal the identification of the participants (such as I.P. address, etc.) were de-selected. This procedure is to ensure anonymity and no violation of privacy. Additionally, the survey's welcome page contained external links to the 'Project's Description' as well as the draw's "Terms and Conditions", which were accessible to participants at any point in time. Respondents were informed of that the completion of the questionnaire was taken as implied consent. The employees who agreed to participate in this study were provided with an iPad tablet. The research assistants stood by during the survey to provide assistance in case there are any questions raised from the respondents.

Of the total usable dealer sample, 51.8% of respondents were male, and 48.2% were female. The age of participants ranged from 18 to 55 years old and above. About 33 percent of respondents fell in the age group of 18-24, 30 percent from the age group of 25-34, 20% in the 35-44 group, 13% in the 45-54 group, and only 5% in the 55 or above group. The majority (90%) had university degrees. About 46% had bachelor degree or above. Table 2 shows the demographic characteristics of the respondents.

Table 2: Demographic description of respondents

Variables	Taxonomies	Percentage
Gender	Male	45.8%
	Female	54.2%

Age group	Under 18	0.4%
	18-24	32.6%
	25-34	29.9%
	35-44	19.7%
	45-54	12.5%
	55 or more	4.9%
Academic qualifications	Elementary school	4.9%
	Some college	35.2%
	College	13.6%
	Bachelor degree	35.2%
	Post-graduation	5.3%
	Other	5.7%
Professional experience	1-2 years	19.3%
	3-5 years	20.8%
	6-10 years	21.2%
	11-15 years	15.2%
	16-20 years	7.2%
	Over 20 years	6.1%
Position	Top management	5.7%
	Middle management	12.9%
	Supervisor	9.5%
	Non-supervisory	39.4%
	Other	32.6%
Income group	Less than €20 000	83.3%
	€20 000 - €39 999	8.7%
	€40 000 - €59 999	3.4%
	€60 000 - €79 999	1.1%
	€80 000 - €99 999	0.8%
	€100 000 and above	2.7%
Country of origin	Portugal	97.%
	Other	2.3%

Common method variance

Both ex-ante and ex-post remedies suggested by Lindell and Whitney (2001), Chang, Van Witteloostuijn, and Eden (2010) and Podsakoff et al. (2003) were implemented to minimise response errors and examine common method variance. For instance, previous validated scales were used in this study and thoroughly checked with the relevant researchers and experts in the field. Respondents were assured that there were no right or wrong answers. To minimise response bias, similar questions were dispersed throughout different sections in

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3 the survey to refresh respondents' memories and ensure identical responses. Negatively and
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5 positively wordings were used for the same items.
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8 Statistical remedies include Harman's single factor test, partial correlation procedure,
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10 and controlling for the effects of an unmeasured latent methods factor (see Podsakoff et al.,
11
12 2003). First, exploratory factor analysis was performed by loading all study variables to
13
14 examine the number of factors and respective variance explained. The results showed that 11
15
16 factors were present and the first factor explains 39.46% of variance. Confirmation factor
17
18 analysis procedure was also conducted to check the model fit for one factor and multiple
19
20 factor models (Iverson and Maguire, 2000; Korsgaard and Roverson, 1995). The one factor
21
22 ($\chi^2(1652) = 9944.80, p < .001, CFI = .47; TLI = .45; RMSEA = .13$) has a very poor model
23
24 fit compared to the 16 factors model ($\chi^2(1532) = 3035, p < .001, CFI = .90; TLI = .90;$
25
26 $RMSEA = .06$). Following the recommendation of Podsakoff et al. (2003), the last procedure
27
28 was to control for the effect of an unmeasured latent factor and to compare the item loadings
29
30 with and without adding an unmeasured latent methods factor. No great difference between
31
32 two sets of loadings (all less than .01) were identified. Diagnosis of multicollinearity using
33
34 the variance inflation factor (VIF) shows no issue of multicollinearity, as all VIFs are below
35
36 3.0 (Johnson and LeBreton, 2004).
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42 DATA ANALYSIS AND RESULTS

43 Confirmatory Factor Analysis

44
45 AI and EI are multidimensional constructs and were treated as second-order factors in
46
47 the current study as suggested by the scale developers (Law, Wong and Song, 2004). First,
48
49 we assess the validity of AI following the procedures described in Kumar and Pansari (2016).
50
51 A confirmatory factor analysis (CFA) with a hierarchical model was performed to assess AI
52
53 and its nine dimensions (completeness, format, accuracy, currency, reliability, accessibility,
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55 flexibility, and timeliness). The second-order CFA model fit was acceptable: $\chi^2 = 882.14, d.f.$
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3 = 316; CFI = .93; TLI = .92; RMSEA = .06. The path coefficients between the indicators and
4
5 their respective first-order factors were significant at the .05 level. In addition, all the path
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7 coefficients between the second-order construct and its three dimensions were significant at
8
9 the .05 level. We also examined the second-order factor structure by conducting a one-factor
10
11 CFA on the average scores of the four first-order constructs. The model fit was $\chi^2 = 158.48$,
12
13 d.f. = 27; CFI = .94; TLI = .92; RMSEA = .06. All the path coefficients were significant at
14
15 the .05 level.
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18
19 The results through the same procedure described above for assessing EI show that
20
21 the second-order CFA model fit was acceptable: $\chi^2 = 383.13$, d.f. = 101; CFI = .91; TLI =
22
23 .90; RMSEA = .06. The path coefficients between the indicators and their respective first-
24
25 order factors were significant at the .05 level. In addition, all the path coefficients between
26
27 the second-order construct and its three dimensions were significant at the .05 level. We also
28
29 examined the second-order factor structure by conducting a one-factor CFA on the average
30
31 scores of the four first-order constructs. The model fit was $\chi^2 = 2.24$, d.f. = 2; CFI = .99; TLI
32
33 = .99; RMSEA = .04. All the path coefficients were significant at the .05 level. Thus,
34
35 consistent with common practice (e.g., Jayachandran et al. 2005), the aggregated scale
36
37 consisting of the average scores of the dimensions of EI for further analyses.
38
39
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42 Next, CFA was performed for the proposed model in this study. The results show that
43
44 the model had acceptable fit indices: $\chi^2 (367) = 858.58$, CFI = .93, TLI = .93, RMSEA = .06
45
46 SRMR = .04. All items have significant loadings on their corresponding constructs. The
47
48 composite reliabilities for all factors were acceptable, and the average variance extracted
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50 (AVE) for each factor was over .50, indicative of adequate convergence (Table 3) (Fornell
51
52 and Larcker, 1981). The results of standardized residuals and modification indices show no
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54 conspicuously significant changes to the model. Table 4 shows the correlations among
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variables. The square root of average variance extracted for each construct exceeds the correlation between constructs, indicating discriminant validity.

Table 3. Confirmatory factor analyses results

Items	Loading	Alpha	CR	AVE
Artificial intelligence				
<i>Comprehensiveness</i>		.90	.90	.76
AI tools provide me with a complete set of information	.86			
AI tools produce comprehensive information	.91			
AI tools provide me with all the information I need	.84			
<i>Format</i>		.91	.91	.77
The information provided by AI tools is well formatted	.85			
The information provided by AI tools is well laid out	.91			
The information provided by AI tools is clearly presented on the screen	.87			
<i>Accuracy</i>		.77	.80	.58
AI tools produce correct information	.83			
There are few errors in the information I obtain from AI tools	.60			
The information provided by AI tools is accurate	.83			
<i>Currency</i>		.92	.92	.80
AI tools provide me with the most recent information	.89			
AI tools produce the most current information	.92			
The information from AI tools is always up to date	.88			
<i>Reliability</i>		.89	.89	.74
AI tools operate reliably	.91			
AI tools perform reliably	.98			
The operation of AI tools is dependable	.65			
<i>Accessibility</i>		.92	.91	.76
AI tools allow information to be readily accessible to me	.88			
AI tools make information very accessible	.87			
AI tools make information easy to access	.87			
<i>Flexibility</i>		.93	.92	.79
AI tools can be adapted to meet a variety of needs	.88			
AI tools can flexibly adjust to new demands or conditions	.91			
AI tools are versatile in addressing needs as they arise	.89			
<i>Integrity</i>		.94	.94	.83
AI tools effectively integrate data from different areas of the company	.89			
AI tools pull together information that used to come from different places in the company	.92			
AI tools effectively combine data from different areas of the company	.93			
<i>Timeliness</i>		.75	.82	.60
It takes too long for AI tools to respond to my requests (RC).	.60			
AI tools provide information in a timely fashion	.83			
AI tools return answers to my requests quickly	.87			
Emotional intelligence				
<i>Self-emotion appraisal</i>		.85	.90	.70
I have a good sense of why I have certain feelings most of the time	.79			

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2					
3	I have good understanding of my own emotions	.87			
4	I really understand what I feel	.87			
5	I always know whether or not I am happy	.80			
6					
7	Others' emotion appraisal		.88	.90	.70
8	I always know my friends' emotions from their behaviour	.77			
9	I am a good observer of others' emotions	.88			
10	I am sensitive to the feelings and emotions of others	.78			
11	I have good understanding of the emotions of people around me	.91			
12					
13	Use of emotion		.84	.88	.64
14	I always set goals for myself and then try my best to achieve them	.81			
15	I always tell myself I am a competent person	.66			
16	I am a self-motivated person	.81			
17	I would always encourage myself to try my best	.90			
18					
19	Regulation of emotion		.88	.91	.62
20	I am able to control my temper and handle difficulties rationally	.82			
21	I am quite capable of controlling my own emotions	.92			
22	I can always calm down quickly when I am very angry	.74			
23	I have good control of my own emotions	.90			
24					
25	Employee retention		.91	.91	.78
26	It's very likely to leave your current employer	.84			
27	It's very likely you would search for a job in another organization	.91			
28	It's very likely you would actually leave the organization within	.89			
29	the next year.				
30					
31	Internal service performance		.84	.85	.60
32	Adequately complete assigned duties with co-workers	.78			
33	Fulfil responsibilities specified in job descriptions	.94			
34	Perform tasks that are expected of me interacting with co-workers	.72			
35	Fulfil performance requiring teamwork with co-workers	.63			
36					
37	External service performance		.96	.96	.75
38	Friendliness to customers	.89			
39	Willingness to help customers	.91			
40	Having a concerned and caring attitude towards customers	.90			
41	Providing prompt customer service	.87			
42	Being capable and competent with customers' queries and requests	.88			
43	Giving customers undivided attention	.81			
44	Being consistently courteous to customers	.85			
45	Properly handling any problems that arise	.85			
46	Understanding customers' specific needs for hotel services	.80			

Table 4. Correlations and square root of AVE (diagonal)

	AI	EI	ER	TP	CS
AI	.84				
EI	.44**	.82			
ER	.04	.24**	.88		
IEP	.44**	.57**	.17**	.77	
EEP	.49**	.56**	.03	.49**	.87

Note: Values in bold are squared root Average variance

AI = artificial intelligence characteristics, EI = emotional intelligence, ER = employee retention, IEP = Internal service performance, ESP = external service performance

** $p < .01$

Hypotheses Testing

Structural equation modelling was performed to test our hypotheses. Our analysis shows that emotional intelligence has a significant effect on employee retention ($\beta = -.28, p < .001$), internal service performance ($\beta = .47, p < .0005$), external service performance ($\beta = .43, p < .0005$). H1a-c were supported. Further analysis was performed to examine whether AI has direct effects on the proposed outcome variables. The results show that AI only has a significant effect on internal service performance ($\beta = .23, p < .001$), and external service performance ($\beta = .30, p < .001$). Those results are summarized in Table 5.

Table 5. The Direct Effect of EI and AI

Variables	Employee Retention	Internal service performance	External service performance
Artificial intelligence	-.08	.23**	.30**
Emotional intelligence	.28***	.47***	.43***
R ²	.06	.37	.39

*** $p < .001$

H2 proposes AI as a moderator between EI and the outcome variables. The results show that AI significantly moderates the effect of EI on task performance Internal service performance ($\beta = -.15, p < .05$), and customer service External service performance ($\beta = -.32, p < .001$). The moderation effect exerted are graphed below (Figure 3 and Figure 4).

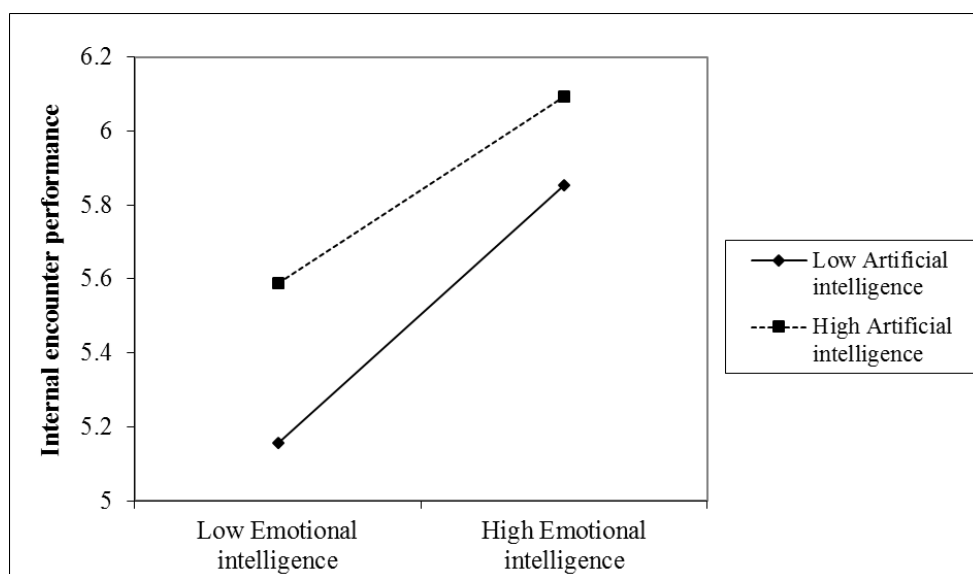


Figure 3. The moderation effect of artificial intelligence on EI and internal service performance

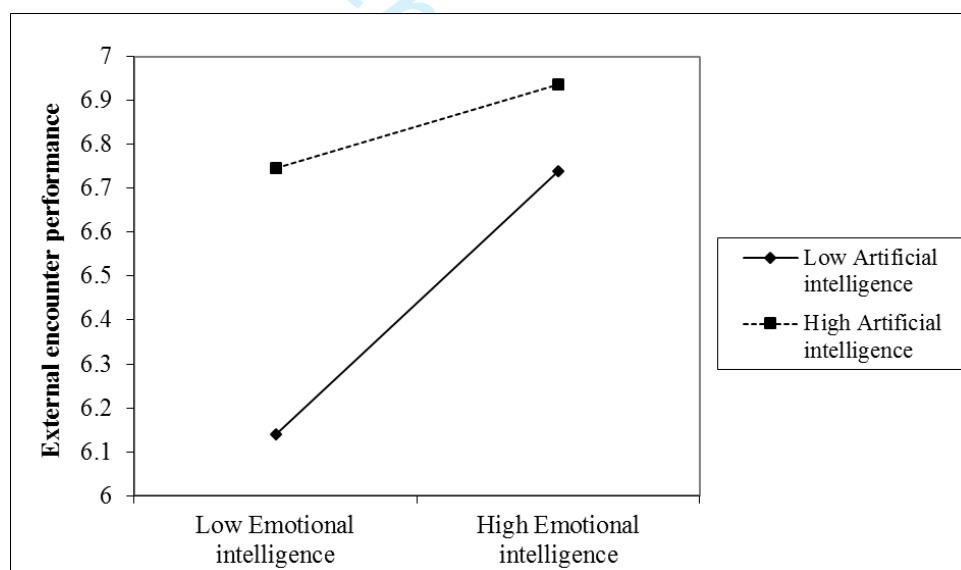


Figure 4. The moderation effect of artificial intelligence on EI and external service performance

To gain more insights into the influence of AI and EI on the outcome variables, further analyses were performed to understand the unique variance explained by each dimension of AI and EI. Interestingly, none of AI and EI dimensions had a significant effect on employee retention. In the case of internal service performance, only the effect of self-emotional appraisal ($\beta = .49, p < .001$) and use of emotion ($\beta = .19, p < .05$) were significant.

For external service performance, accuracy ($\beta = .19, p < .05$) exerted a significant effect' whereas the effects of self-emotion appraisal ($\beta = .17, p < .05$), others' emotion appraisal ($\beta = .15, p < .05$), and regulation of emotion ($\beta = .17, p < .05$) were also significant.

Table 6. The influence of AI and EI dimensions on the proposed outcome variables

Variables	ER	ISP	ESP
Artificial intelligence			
Comprehensiveness	-.02	-.12	-.03
Format	-.11	-.06	.04
Accuracy	.00	.13	.19*
Currency	.11	.10	.10
Reliability	-.00	.11	.05
Accessibility	-.15	.07	.11
Flexibility	.19	.11	-.02
Integrity	.02	.05	.08
Timeliness	.03	-.08	.04
Emotional intelligence			
Self-emotion appraisal	-.05	.49***	.17*
Others' emotion appraisal	.12	-.03	.15*
Use of emotion	.14	.19*	.15
Regulation of emotion	.07	-.01	.17*
R ²	.06*	.39***	.31***

Note: ER= employee retention, ISP = internal service performance, ESP= external service performance.

DISCUSSION

Emotional intelligence has been popularising in both scientific and no-scientific communities as a new domain of human intelligence to predict individual and organizational success. Artificial intelligence has permeated the business world as a transformational evolution of utilising machines for human jobs (Gursoy, 2018). The controversies over the

1
2
3 role of artificial intelligence in replacing human jobs prompted the current research to
4
5 examine how human and machine intelligence respectively affect employee retention,
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7 internal and external service performance with a focus on the hotel industry since artificial
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9 intelligence is broadly used in hotels and emotional intelligence is critical for hospitality
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11 employees (e.g.: Larivière et al., 2017). The results show that emotional intelligence has a
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13 significant and larger impact on all proposed outcomes, whereas artificial intelligence has no
14
15 significant and larger impact on all proposed outcomes, whereas artificial intelligence has no
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17 direct effect on employee retention, although it is significantly related to employee
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19 performance. However, artificial intelligence does play a moderating role in the relationships
20
21 between emotional intelligence and the proposed outcome variables. Detailed discussion of
22
23 these findings are as follows.

24 25 26 **Emotional intelligence, employee retention and performance**

27
28 Emotional intelligence has been widely acknowledged as a valid predictor of
29
30 employee performance and job satisfaction. Although very few studies have examined the
31
32 direct impact of emotional intelligence on employee retention, this study provides evidence
33
34 that employee retention to stay with the hotel organization is largely attributed to their
35
36 emotional abilities. Service employees in most hotels, despite the prevalent use of advanced
37
38 technologies still play a significant role in serving and interacting with customers (e.g.:
39
40 Larivière et al., 2017). These interpersonal encounters with customers can be emotionally
41
42 charged (Prentice, 2014; 2016; Prentice and Thaichon, 2019) and they play an important role
43
44 in the customer experience (Yachin, 2018). Employees with a high level of emotional
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46 intelligence are able to manage the encounter with customers and create positive customer
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48 service experience which affects their evaluation of employee service performance and their
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50 satisfaction with the employees then with the hotel. Numerous studies (e.g. Nasution and
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52 Mavondo, 2008; Wu and Liang, 2009; Xiang et al., 2015) have shown that customer
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54 experience is mostly attributed to employee service performance over the service encounter.
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3 Each encounter experience forms cumulative impression of the hotel service. A negative
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5 experience with a hotel employees (e.g. a receptionist, a bellboy, a housekeeping employee)
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7 would affect the customer's perception of the hotel. Therefore, employees are required to
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9 perform emotional labour that requires appropriate acting strategies to ensure positive
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11 customer experience. Emotional labour strategies generate positive organizational outcomes,
12
13 however also have detrimental effects on service employees given the acting requires
14
15 emotional management skills. Employees with a high level of emotional intelligence suffer
16
17 less negative consequences from performing emotional labour, hence, have more positive
18
19 attitude toward working at the hotel. Consequently, they are more likely to stay with the
20
21 hotel.
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26 Post hoc analysis shows that only self-emotion appraisal and utilisation of emotions
27
28 explain significant variance in internal encounter performance. This is plausible. Service
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30 employees must be able to understand their own emotions and have their ability to utilise
31
32 their emotions to manage the internal encounter that involves interactions with co-workers.
33
34 Appropriately managing the internal encounter has implication for external service
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36 performance that is aimed at satisfying customers. Knowingly customer satisfaction with the
37
38 hotel has implications for their subsequent behaviours such as being referrals, spreading word
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40 of mouth communications, and revisiting the hotel. Customers are not always right, and can
41
42 be emotional when their requests and demands are not fulfilled. Employees bear the onus of
43
44 managing their emotions and demands so that an optimal outcome can be reached for
45
46 benefiting both the organization and the customers. This onus entails employees
47
48 understanding their own emotions before they are able to assess others' emotions as indicated
49
50 in self-emotion appraisal, and using their own emotions to guide their behaviours as indicated
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52 in utilisation of emotions. This ability would facilitate their service performance.
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3 On the other hand, customer satisfaction is affected by employee external service
4 performance which entails employees' ability to appraise the emotions of oneself and others,
5 as well as regulating emotions. To be able to perform well over each service encounter with
6 customers, it is important to understand their emotions, either positive or negative, this
7 understanding helps them manage emotions, turning negative emotions to be positive and to
8 reinforce their positive emotions. For instance, an effective service recovery strategy by
9 offering better service (more than expected) to a complaining customer, or by addressing the
10 issues in a timely manner often leads to better customer-related outcomes (loyalty
11 behaviours). This is in line with Ogbeide, Boser, Harrinton & Ottenbacher, 2015; Wu,
12 Qomariyah, Sa & Liao, 2018; Xu & Li, 2016). Based on the different roles played by
13 employees presented by Larivière et al. (2017), emotional intelligence can lead employees to
14 play the role of differentiator, i.e., employees become a differentiating attribute in service
15 encounter situations (e.g.: Bowen, 2016; Larivière et al., 2017).

32 **Artificial intelligence, employee retention and performance**

33 Although it has a significant effect on employee performance, artificial intelligence is
34 not related to employee retention. The effects are less weighted compared to those exerted by
35 emotional intelligence. Furthermore, AI plays a moderating role in facilitating employee
36 efficiency in performing their internal job tasks (internal service performance) and improving
37 customer satisfaction (external service performance). These findings are consistent with
38 claims and reports that artificial intelligence will not replace human tasks, but facilitate them
39 (Bowen, 2016; Larivière, 2017; McKendrick, 2018; Mohanty, 2018). The Gartner reports
40 show that artificial intelligence creates more jobs than it destroys. The level of replacement or
41 facilitation is dependent upon the nature of the jobs. Reports from Pew Research Centre
42 (2017) show that only low-level human jobs may be replaced by robots or artificial
43 intelligence.

IMPLICATIONS

The study examines the influence of emotional intelligence as a human intelligence and artificial intelligence as a machine intelligence on employee retention and performance. The endeavour to achieve the optimal level of these outcomes has implications for researchers and practitioners.

From research point of view, this is the first research that is aimed to reveal the respective and integrated impacts of different types of intelligence on organizational performance through employee behaviours (retention and performance). This research confirms that human intelligence, compared to machine intelligence, has a dominant influence on employees, particularly in the people-intensive industry. Artificial intelligence plays a facilitating role in enhancing the influence.

Emotional intelligence has been acknowledged as a valid predictor of employee attitudes and behaviours (e.g. job performance, organizational commitment, employee retention). The findings of this study confirm these relationships in the hotel industry. In particular, this study extends this scope into customer loyalty research domain by linking emotional intelligence and customer service which has impact on customers' attitudes and behaviours.

This study also extends artificial intelligence research that has been primarily focused on its technical and functional efficiency in the relevant literature into human intelligence research in the organizational context to understand its impact on employee and organizational performance. The findings provide insights into the role of machine intelligence in employee behaviours and business efficiency.

The research has particular implications for practitioners. The findings provides management and the relevant EI and AI consultants with a guideline on what should be focused on in order to optimise organizational performance through managing the behaviours

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3 of employees and customers. Although artificial intelligence has become a buzz word to
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5 improve business operations, it is human intelligence with regards to emotional abilities that
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7 plays a dominant role in managing employees and customers. In comparison customers today
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9 still prefer to interact with employees rather than machines or robots which can be an
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11 instantaneous novelty. The study confirms that artificial intelligence can facilitate human
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13 tasks but not replacing human jobs. The significant impact on employees and customers
14
15 exerted by emotional intelligence indicates that the organizational resources should be
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17 allocated for the relevant training to enhance employee emotional competence. This finding
18
19 is in line with that in Hewagama, Boxall, Cheung and Hutchison (2019) and in Yao, Wang,
20
21 Yu and Guchait (2019). The management should identify the tasks that artificial intelligence
22
23 is able to perform or better at so that human resources can be optimised for other tasks.
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28 **LIMITATIONS AND FUTURE RESEARCH**

29
30 The researchers made every endeavour to ensure rigorousness of this study. However,
31
32 collecting data on employees from multiple hotels was not an easy task. There are some
33
34 limitations we would like to acknowledge. First, despite the justification of self-reported
35
36 performance that only employees themselves would understand how they have accomplished
37
38 their job tasks, we understand that other or objective ratings would be ideal. The number of
39
40 employees from different hotels is rather different. A similar portion of employees from each
41
42 hotel would help compare the findings among hotels. Customer service was rated by
43
44 employees. Dyadic ratings (i.e. one customer vs one employee who have had interactions)
45
46 may provide more insights. Finally, the data were only collected in hotels in Portugal.
47
48
49 Although Portugal presents high standards of hospitality, winning several World and
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51 European Travel Awards in 2018 (e.g.: *World's Leading City Hotel*, *World's Leading Classic*
52
53 *Hotel*, *World's Leading Design Hotel*, *World's Leading Fine Dining Hotel Restaurant*,
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55 *Europe's Leading All-inclusive Resort*, *Europe's Leading Beach Resort*, *Europe's Leading*
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3 *Boutique Resort, Europe's Leading Family Resort, Europe's Leading Lifestyle Hotel &*
4 *Villas, Europe's Leading Meetings & Conference Hotel, Europe's Most Romantic Resort),*
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6 the findings may be limited to this region. Future research should look into these aspects to
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8 improve rigorousness and generalisability.
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19 [mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet](https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet)
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