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# The future of hospitality jobs

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ABSTRACT: This article reviews the literature on artificial intelligence (AI)-driven technology and looks at its effects on the future of hospitality jobs, and the skills needed for the future. The purpose of this article is to understand and describe how developments in AI-driven robotics and automation will shape the future of hospitality jobs, the skills in demand, and their impact on the design of education and training. Various input parameters are significant in understanding the future of hospitality jobs. For an optimised understanding, literature has been critically reviewed and investigated from different angles, namely academics, technological advancements, developments in the industry, and governments and policymakers. The literature reveals that AI-driven technology is developing at a very high speed and shows its extensive application in tourism and hospitality management and other related industries. Many of today's jobs will be lost to AI, automation and robotics, and new jobs with new skill-set requirements will emerge. Education establishments will have to adopt a new futureproof educational system or risk becoming obsolete. This review article will be beneficial for industry and education. The article reveals the detailed literature review on jobs that are at high risk of disappearing and offers an insight into what future jobs might be and what skills and competences will be required.

KEYWORDS: artificial intelligence, employment, skills, hospitality, human resources, training and education

## Introduction

Technological advancements today are significantly affecting the way humans lead their lives and run their businesses. Artificial intelligence (AI) is at its centre, and we can see it everywhere, starting from the effect on the quality of human relationships and interactions (Facebook, Tinder and other social or dating applications), to the influence on consumer behaviour (through algorithms, embedded cookies and targeted advertisements), to the impact on culture and entertainment (Netflix, Youtube, Spotify), to urban surveillance and panopticism through facial recognition, to the transportation sector (autonomous vehicles) and even its impact on armed conflicts and human rights through the use of autonomous drones and smart weaponry (Rocheleau-Houle, 2019).

## Artificial intelligence

AI, as a term, was first introduced by the American computer and cognitive scientist, Professor John McCarthy, in 1955 (Moore, 2019). McCarthy defined AI as

> the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to biologically observable methods (McCarthy, 2007, p. 2).

Since 1955, AI has gone through many changes and developed so far that today we can observe many advancements and tools implemented across different industries. These developments are creating a lot of benefits and risks, including many ethical concerns (Floridi et al., 2018). In January 2015, a conference in Puerto Rico brought together the world's leading AI scientists from academia and industry. The conference, titled "The Future of AI: Opportunities and Challenges", resulted in an open letter that has collected nearly 7 000 signatures in support of more research into the benefits of AI while avoiding the potential pitfalls. These almost 7 000 signatories included academics, entrepreneurs and AI scientists, like Elon Musk and Stephen Hawking. The letter concluded that developments in AI have the potential to bring extraordinary benefits to humankind, and thus it is vital to research how to maximise the benefits while avoiding negative impacts. Equally, the growing capabilities of AI are significantly impacting human society; therefore, it is up to AI researchers to ensure that the future impact is beneficial (Russell, Dewey & Tegmark, 2015). Stephen Hawking clearly expressed his concerns when he described AI as "the best or worst thing ever to happen to humanity" (Hern, 2016, Para. 1).

Ethical concerns around the implementation of AI-driven technology remains a hot topic. In January 2020, both the European Commission and US lawmakers called for a ban on the use of AI-driven facial recognition technology in public spaces for up to five years (BBC, 2020a; 2020b). Companies like Google, Facebook, Microsoft, and Amazon are among the many that are currently working on developing technology related to facial recognition. Facial recognition allows technology to recognise a face using biometrics to map facial features from a photograph or a video and compares it to a database to help verify personal identity (Symanovich, n.d.). This technology could be considered a threat to personal privacy and data rights. The technology

is still inaccurate as a recent study shows, especially when it comes to identifying African-American and Asian faces in comparison to Caucasian faces (BBC, 2020a). While the West remains cautious about this technology, China is a big supporter, implementing the technology across the country and more recently in pharmacies in Shanghai to prevent potential abuses from drug addicts or criminals (*Tech Wire Asia*, 2020)

## Risks and opportunities

Frey and Osborne (2017) conducted one of the first studies on AI, and its effect on employment. The research considered technologies currently being used in 702 different jobs in the USA. The study concluded that 47% of activities linked to employment are at a high risk of being lost to automation in the next two decades and that the salaries are inversely proportional to the probability of automation. It proposes that automation will come in stages: first, a blockage concerning a technology will lead to a technological breakthrough, that will, in turn, lead to automation (Frey & Osborne, 2017).

The 2019 edition of the Organisation for Economic Co-operation and Development's (OECD) report *Employment Outlook: The future of Work* presented new evidence on the effect of automation and AI on job stability (OECD, 2019). This report provides an annual assessment of key labour market developments and prospects for OECD member states.[1] The study concluded that the risk of automation to employment exists, but will vary from country to country. 14% of jobs are likely to be completely automated, while 32% will significantly change. While new technologies will make specific occupations obsolete, it will also create new roles.

A study published in July 2019 by McKinsey Global Institute titled the *Future of Work In America* confirms that daily tasks could change in the future for all jobs as intelligent machines become an essential part of the American work environment. The study analysed more than 3 000 counties[2] and showed that millions of jobs would cease to exist by 2030 (Lund et al., 2019).

The Fourth Industrial Revolution, "the advent of cyber-physical systems involving entirely new capacities for people and machines" (Davis, 2016, para. 4) has introduced AI, automation, and robotics and has led to their strategic implementation in the hospitality industry, intending to solve many of the daily management challenges (Makridakis, 2017). Hotels today are using more and more AI to modernise their operating procedures and render flawless processes traditionally provided by the employees in guest relations, check-in/check-out, room service, bartending, chatbots, reservations and bookings management, and virtual avatars (Cain, Thomas & Alonso, 2019; Ivanov, 2019; Ivanov, Gretzel, Berezina, Sigala, & Webster, 2019; Pesonen & Neidhardt, 2019; Tussyadiah & Miller, 2019). AI-driven robots are quickly becoming an essential asset of many hospitality establishments, driven by shortages in staff, the need for increased multilevel communication, and the need to create a memorable guest experience through flawless use of available customer data (Bowen & Morosan, 2018).

Even though today's technology cannot fully replace employees, developments in AI, automation and robotics are significantly influencing the human element. Significant effects are already reflecting on job profiles, hours worked, employee relationships with their peers and managers, and compensation packages. Hotels today are more likely to implement new technologies involving AI to positively impact economic growth by improving efficiency in the workplace (Li, Bonn & Ye, 2019). AI, automation, and robotics are starting to directly change low-skilled positions, although the majority of jobs requiring human interaction remain extremely difficult to automate (Brougham & Haar, 2018). Yet, supercomputing might even have an impact on cognitive tasks such as those of doctors, people working in healthcare, or even lawyers, judges, lecturers and researchers (Salla, Pikkarainen, Leväsluoto, & Blackbright, 2018). Café X in San Francisco has invested USD 25 000 in a new consumer-friendly robotic barista that can serve 120 cups of coffee per hour, fulfilling 300 to 400 orders a day (Hochman, 2018). The risk of being put out of business by automation is much higher for a barista in comparison, for example, to a barman (although robot cocktail-making machines were on display at the recent HORECAVA trade fair in Amsterdam). It could be argued that while the barista's job is about mixing and serving drinks, the barman job is interactive, unpredictable and involves conversing with customers (Kosslyn, 2019). With a high demand and curiosity factor, more cafés and restaurants across the world are investing in robotic baristas, an example of which can be found at Mr Mofongo Distillery in Groningen, the Netherlands, where the primary objective behind this investment was to attract more visitors (RTV Noord, 2013). Kosslyn (2019) believes two kinds of jobs are more challenging to automate: tasks involving emotion, and taking context into consideration. Emotion plays a vital role in verbal and nonverbal communication; it helps humans prioritise and contribute to the decision-making process. Context as well can be quickly taken into account by humans while making decisions, but is a challenge for automation (Kosslyn, 2019).

On 28 November 2019, Erik-Jan Ginjaar, the General Director of Postillion Hotel group (six hotels and three conference centres in the Netherlands), introduced "Michiel" to a group of academics representing the Dutch hotel schools in Amsterdam (El Hajal, personal notes, November 2020). Michiel is the Artificial Intelligence reservation employee of Postillion Hotels, and with "him" the hotel group has taken the lead in deploying AI in the hospitality industry. Michiel provides a flawless response to all sales lead requests with a correct e-mail, and a customised offer letter after all options are taken into account. This state-of-the-art "AI-colleague" as Ginjaar called him, uses natural language processing techniques such as named entity recognition and classification (NERC) and deep learning to read an e-mail and translate it into a quotation. Michiel is linked to reservation systems and can make offers 24 hours a day, seven days a week and within a few minutes. In one year, Michiel has achieved a significant reduction in employee costs and created an increase in financial turnover. Ginjaar expressed that Michiel can do much more and that this kind of innovation brings him one step closer to his dream of a hotel without back offices, but with people focused on delivering sincere hospitality (van Laatum, 2019).

## The impact on human resources

The hospitality industry remains explicitly labour-intensive and requires a vital face-to-face exchange between guests and hospitality professionals. Because of these intense interactions, academics and service industry executives alike underline the importance of putting employees at the centre of a company's

focus (Heskett, Jones, Loverman, Sasser, & Schlesinger, 2008), emphasising that this human element is a critical factor in driving profitability in the delivery of service (Hogreve, Iseke, Derfuss, & Eller, 2017). The hospitability of the human element is what makes a product unique and differentiates between one service provider and another (Tasci & Semrad, 2016). Yet, AI is also affecting the way companies manage human resources. It is argued that through continually evolving smart technologies and tools, managers will be free of tasks deemed difficult or less exciting and will instead be focusing on tasks that are perceived to be more stimulating, leading to a combination of reduced staffing costs, improved staff satisfaction with their jobs, and happier guests and customers. AI will allow managers to predict individual performance, facilitate the recruitment process, facilitate workforce planning, and analyse employee satisfaction.

A report published by the Ethics Committee of the Government of Quebec in August 2019 presents what the commission considers to be the two most critical impacts of AI on human resource management practices from an ethical perspective. The first impact is about predictive behaviour and performance of employees, and the second concerns the supervision and control of employees (Rocheleau-Houle, 2019). Through the combination of machine learning and people analytics, managers can discover relations and tendencies between, for example, job applicants and staff turnover intentions (Strohmeier & Piazza, 2015). Even though predicting behaviour is a form of control, new developments in text, voice and facial recognition are already being used to supervise and control employees. A more intrusive form of AI follows, monitors and measures the productivity of employees through wearables (clothing or accessories) that monitor physical movements or use software that measures the speed and efficiency of an employee doing their job.

In July 2019, *Time*, published an article describing how Amazon is treating its employees working at its fulfilment centres (warehouses), as employees were protesting the dehumanising day-to-day treatment in the workplace. In addition to having to walk more than 24 kilometres a day, employees found it appalling to be held to the productivity standards of a robot. Amazon was using AI technology to enforce a "no-room for inefficiency" workplace policy. Employees were required to carry scan guns with them at all times. The scan guns measure how much time the employee requires to complete the job in addition to the time off employees take to go to the bathroom or have a drink of water. The article described that this harsh system pushed employees into a constant state of low-panic, and the isolation and monotony drove them to their breaking points (Guendelsberger, 2019).

A report published by the *Guardian*, a British daily newspaper, describes how dozens of companies based in the United Kingdom are using AI to monitor staff activity and how labour unions and academics are warning that the use of such systems increases work pressures and distrust among staff (Booth, 2019). The AI tool discussed (Isaak) was developed by a London-based company called Status Today that obtained the award for the Best AI Startup in 2017 (Kaplan & Haenlein, 2020). As per the company website, Isaak offers real-time well-being insights into employees: from e-mail overload to focus hours, management can use this software to "understand" employee email responsiveness, work that is being done outside working hours, and time spent without distractions (*Isaak | AI-Powered People Analytics*, n.d.). Isaak provides insight into who the critical influencers and change-makers are in an organisation, but at the same time is used by companies to track employees in real-time, looking at who is exchanging emails, working on specific files and even who meets whom and when (Booth, 2019; Kaplan & Haenlein, 2020).

AI is affecting the relationship between employees and machines and, as experts predict, by 2030 robots will make up 25% of employees working in the hospitality industry. Bowen and Morosan (2018) believe that the adoption will be a disruptive paradigm shift as it will lead to the success of many hospitality establishments, but also the ruin of many. Robots will have different roles in the working place; they will assist, manage, and work alongside human employees.

## New advances

In 2019, the Chinese e-commerce giant, Alibaba opened a hotel in Hangzhou, China, that it describes as a "290-room ultra-modern boutique hotel, where technology meets hospitality" (Biron, 2019, Par. 1). Robot butlers make the rounds delivering toiletries and food. Chinese users can check in to the hotel using facial recognition and, instead of traditional keys, the hotel uses facial recognition technology for guests to access their rooms and the elevators.

Hotel companies in Singapore also started testing facial recognition technology, linked to the city-state's immigration authorities. This technology is being piloted in three hotels, allowing their guests to check in using their phones or dedicated booths. This procedure is reducing check-in time from five minutes to approximately one, and guests are delighted (Rajagopal, 2019). This system, called E-Visitor Authentication (EVA), was launched in November 2019. The Singaporean Minister of State for Trade and Industry, Chee Hong Tat, announced that he expects the EVA system to save more than 11 000 hours annually for front-office staff at a large hotel, freeing them to focus on engaging with customers (*Business Times*, 2019). In addition to saving time, facial recognition will help hotels generate more revenue by contributing to a more personalised customer experience, expanding a hotel's customer database, and increasing security (Rajagopal, 2019).

## Changes in demand for services jobs

In the USA, trucks are responsible for much of the goods transportation, and the old industry saying still applies: "if you bought it, a truck brought it". In 2017, trucks shipped more than 70% of all goods transported both in terms of value and weight of freight. The "Amazon Effect", or door-to-door delivery services, is one of the main reasons behind the expansion of the trucking industry (Joseph et al., 2019). With fast-developing AI, many companies like Boston-based, Emabark Trucks, already started moving freight autonomously between Los Angeles and Arizona (Barack, 2019). Long-haul trucks that drive themselves on the highway will be available in the next five to ten years. With key players like Otto, Volvo, and Daimler heavily investing in these new technologies, the pay of 1.7 million truck drivers in the USA will decrease, and AI will eventually replace them altogether (Freedman, 2017). With the trucking industry in the USA supporting thousands of gas stations, highway hotels, motels and diners, AI-automated trucking will impact and reshape the face of many roadside hospitality establishments.

## Future-proof skills

Employees and leaders in the future AI-created roles will need a new set of skills. Learning and development will be the key to ensure the humans are well developed to understand AI, and develop strategic objectives that incorporate interrelated functions of technology, knowledge management and the AI it initiates (Moldenhauer & Londt, 2019). But how can we futureproof and prepare today's students for the jobs of the future? If we look back to the rate at which AI is developing, it would be impossible to foresee precisely how the jobs of the future will look and what technical skills they would require exactly. One approach could be to identify a broader set of abilities and aptitudes, ones that robots are unlikely to master, and look to develop those further in today's students and thus as some would argue, give them a crucial skill for the future: the ability to adapt (Wade, 2019). Wade describes and divides the skills of the future into three categories: cognitive, interpersonal, and attitudinal, and sums these up as the ability to recall, the ability to understand and apply, the ability to analyse, the ability to evaluate and the ability to create. Clearly, the need to develop critical thinking has never been more important in education because the continuing advances in artificial intelligence (AI) increase the need to cultivate skills required to work with and complement AI. This is where critical thinking skill sets come to the fore because the skill sets include analysis, and the ability to question everything, including algorithms.

In the last decade, many researchers have studied and identified what is foreseen to be the desirable skills of the future, skills like entrepreneurship and ICT competencies (Cincera et al., 2018; Crișan, Joița, Zwaga, & Sebea, 2014; Miller, Wesley & Williams, 2012; Zupan & Nabergoj, 2016) leadership (Iordanoglou, 2018; Mumford, Zaccaro, Connelly, & Marks, 2000; Schad & Smith, 2018; Virick & Greer, 2012), communication and critical thinking (Chikeleze, Johnson, & Gibson, 2018; Kek & Huijser, 2011; McCafferty, 2014) and innovation (Gelinas, 2016; Peschl, 2019).

A national survey by the Association of American Colleges and Universities (where the respondents include 400 US-based employers with more than 25 employees and 613 college students) published in 2015 shows that 91% of employers agree that the ability of a candidate to demonstrate critical thinking skills, communication skills, and an ability to solve complex problems is more important than his or her undergraduate major. 96% of employers agree that all college/university students should learn how to solve problems with different-minded people. 78% of employers believe that students should gain intercultural skills. When selecting a potential candidate, all employers placed the most urgent priority on proficiency in skills like written and oral communication, teamwork, ethical decision-making, critical thinking and the ability to apply knowledge in a real-world setting (Hart Research Associates, 2015). In 2018, the same survey showed that employer priorities in terms of sought-after skills did not change as the most practical skills sought remained oral and written communication, teamwork skills with a diverse group, critical thinking and analytic reasoning, complex problem-solving, information literacy, innovation and creativity, technological skills and quantitative reasoning (Hart Research Associates, 2018).

## Education for the future

In November 2017, the Australian government published a plan for Australia to thrive in the global innovation race. The *Australia 2030: Prosperity through Innovation* plan has highlighted five significant areas of development to make Australia one of the best places in the world to undertake innovation, science and research. The development areas that were highlighted are education, industry, government, and research and development. When it comes to education, the plan sets as an imperative the ability to adapt to the changing nature of work by equipping all Australians with skills relevant to 2030. The essential skills for 2030 highlighted by the report are science, technology, engineering and mathematics (STEM), basic digital literacy skills and advanced digital skills. By 2030, jobs will require employees to spend more time using 21st century skills including interpersonal, creative, problem-solving and entrepreneurial skills. Workers of the future will spend less time on predictable physical and administrative tasks, but instead will communicate and empathise with other workers and customers. Today's education system needs to evolve to support both STEM skills and humanities, art and sciences skills (Innovation and Science Australia, 2017).

The Worldwide Educating for the Future Index, commissioned by the Yidan Prize Foundation and compiled by the Economist Intelligence Unit, ranks fifty of the world's biggest economies, representing the majority of the world's population, on how they are equipping people aged between 15 and 24 with skills for the future. The 2019 report showed that the 50 indexed communities agreed to the vital roles of critical thinking, creativity, communication, entrepreneurship and digital skills to help students meet the challenges of the future. The report offers evidence of this accord as governments change their national educational policies. The report underlines the need to develop the ability to analyse, reason and question decisions, including those made by algorithms (AI). The report also discusses the rise of nativism and nationalism in 2018, making it more urgent for students to apply these future-oriented skills to fight back (The Economist Intelligence Unit, 2019).

The importance of education and training is paramount, and digital technology will significantly change the way education is delivered. With an increase in the demand for complex problem-solving skills in the workplace of tomorrow, lecturers are more likely to spend less time preparing for and lecturing, while devoting more time to one-on-one tutoring (Payton & Knight, 2018). Many schools and universities today are still not able to adapt to this fast pace of change and, unfortunately, they are still preparing students for jobs that might no longer exist. Learning institutions should adjust their approaches to learning to the business ecosystem of the future. Schools and universities need to adapt to the skillsets of the future world or face the risk of becoming obsolete (Tarabasz, Selaković, & Abraham, 2018).

## Future research — the next step

This review article is the first phase of a longitudinal research project with a descriptive design that will use quantitative methods to look at how university students in hotel management perceive the future of hospitality jobs and the new set of required skills. The study will also consider the perceptions of lecturers and support staff of the same hotel

school. The sample of this research will comprise students, lecturers and support staff of a Dutch hotel management university of applied sciences.

We will conduct a survey with the cohort of hospitality management students in years one, two, three and four. The survey will make a distinction between the students at different stages of their academic journey. The objective is to understand at each step the student awareness and perception of the future of hospitality jobs and the necessary future-proof skills they will need. The research aims to identify a potential gap in perception among students themselves and between students and educators, and thus recommend ways to dimish it by comparing, contrasting and connecting the findings to current literature, industry developments, policy and future trends. The study will contribute to educational and curriculum redesign and highlight potential areas for staff, student and institutional development.

## Conclusion

So, to conclude: this review article has given an insight into artificial intelligence (AI)-driven technology and its effects on the future of hospitality jobs, and the human skills needed for the future. Technological advancements today are affecting significantly the way humans lead their lives and run their businesses.

The changes brought about by AI and technology will change job descriptions and job design in the future. This will increase and change the demand for human resource management (HRM). New thinking will be required by HR managers and the strategies relating to people analytics will need to change. Developing the future-proof skills needed will be just one of these demands. HR managers will be able to use AI to predict and measure individual employee performance, and hence facilitate the future recruitment process and workforce planning.

Recent articles have described in detail the dehumanisation of employees treated more as autonomous workers. Artificial intelligence (AI) is at the centre of this disruption. Dozens of companies based in the United Kingdom are using AI to monitor staff activity, and trade union leaders and academics are warning that the use of such systems increases work pressure, work-related illnesses and creates distrust among staff (Booth, 2019).

Governments are waking up to the changes AI and technology bring, and many government are now working on strategies and plans to help them thrive in global innovation development. Many of these strategies include developing changes to employee skill sets to 2030 through education policy, these include; science, technology, engineering and mathematics; the so-called STEM skillsets. Clearly, the importance of education and training is paramount to future success, and digital technology will significantly change the way education is delivered.

Many schools and universities today are not able to adapt to this fast pace of change and, unfortunately, they are still preparing students for jobs that might no longer exist in the near future. Learning institutions should adjust their approach to learning to the business ecosystem of the future. Schools and universities need to adapt to the skillsets of the future world or they will face the risk of becoming obsolete in the future.

## Notes

1. OECD member states are Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.
2. The United States of America has 3 141 counties and county equivalents.

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