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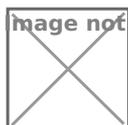
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The Impact of the Fourth Industrial Revolution on the Hotel Industry Workforce

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Senior Capstone Project

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Contents

Abstract

The recent technological advancements have had everyone in awe of the fast development and benefits they bring along. However, they have also started a heated conversation among scholars, companies and employees who are concerned about what changes this Fourth Industrial Revolution is going to bring, and how it will affect the workplace. Through examining the history of automation, existing HR challenges in the modern era, current technological implementation and the skill demand in such new environment, the aim of this paper was to verify whether or not the hotel industry jobs are susceptible to automation. By conducting an extensive meta-analysis, the author of this research demonstrates that the future is brighter than it might seem. Jobs will evolve and technology will have a major impact on hotel industry yet these jobs remain highly dependent on human, soft skills, demanding a switch in focus from occupation to tasks approach, and setting a higher focus on the individuals' skill-set and its proper utilization.

Keywords

Purpose

Automation is slowly taking over our daily and mundane activities and although entertaining from a customer's perspective it poses a big threat for currently existing hospitality jobs. The examples in which robots and machines have taken over human jobs are countless; we already have self-driving cars, holograms greeting us at the airports and there is a hotel in Japan that has exclusively robots as employees. Technology is advancing at a rapid speed, but is automation here to assist us, or to replace us?

The scenarios for the future of HR in the hospitality industry predict either complete evolution of the sector or vanishing due to combination of outsourcing and technology (Davidson, McPhail, & Barry, 2011). Furthermore, all predictions point out that there is inevitable change expected for hospitality jobs in the future. Hence, the purpose of this research is to identify current hotel industry positions (jobs held by humans) that are under the threat of disappearance due to technological advancements that are upon us.

One of the arguments for further development of robots and machinery is to give us more time to focus on more important tasks, while the robots would be taking care of the repetitive, back of the house jobs. This argument still fails to acknowledge the fact that many people still rely on those jobs, no matter how small they may seem. The question of one's career and life isn't only impacted by country's or organization's economic state or by the competition of equally qualified individuals with the same career goal in mind. When looking ahead, we will have to add another factor into that equation and that is if the position we are applying for, or currently hold, even going to be an option.

Companies argue that implementing robots into the workplace is cheaper and more efficient, but do the robots have the skills needed to satisfy the customers? Experts argue that the only way to survive in such a workplace is with impeccable soft skills, putting a big emphasis on emotional intelligence, critical thinking and problem-solving.

The author of this research argues that automation is definitely going to impact the future of hospitality jobs in a way that the number of currently available jobs is going to decrease. Primary concern of this research is to answer which jobs in hotel business, and at what level, are endangered due to technological advances, and is automation our aid or our enemy in the long run? Additionally, this research will look into the skills needed to survive in such environment, since such change in economy is definitely going to require adaption. Finally, the author of this research is going to examine the recent trends in this research area in order to notice if there has been a significant evolution in this field in the past 15 years?

Literature Review

The Fourth Industrial Revolution has had economists, employers and workers questioning the future of the workforce for the better half of the past decade. Automation, computerization and recent increases in the use of technology, namely AI and robotics, have made changes in the way companies run their business. Hospitality and Tourism industry is no exception. Although primarily a people-oriented industry, the examples of the automation are countless and the perception of employees varies. This paper is going to aim to answer the question of which hospitality jobs are at risk of disappearing, the reasoning behind it and the skills needed to survive in such a workplace. In the first part of the literature review, this paper will elaborate on the history of computerization. Following that, the second part will be a brief overview of common HR issues such as labor turnover, labor shortage and migration of workers. The third section of the literature review will give some examples of the current technological advances in the industry, while the last one will conclude with the general idea of the new set of skills that is to be required in the next 10-15 years, and the predictions based on current and previous trends on the market.

1. *Automation through decades*

The human labor has had many ups and downs throughout the past two centuries as the employment to population ration rose and fell either because of social movements or because of the automation and technological progresses (Autor D. H., 2015). There have been many examples in the history of labor, about the technological progress shifting the roles and taking over the basic human roles in agriculture, manufacturing to service and management occupations (Frey & Osborne, 2013). Indeed in 1900, 41% of the US workforce was employed in agriculture, and that number fell down to only 2% in the matter of a century, and that was mainly because of

the machinery invented to replace the repetitiveness of the motion in the occupation. (Autor D. H., 2015) However big this concern was, the historical facts prove that occupations have rarely disappeared because humans always found a way around them and created the new jobs that would enable them to put the other sets of skills to a more efficient and beneficial use. Textile industry is one of the great examples of why the fear for technological unemployment is reasonable: it was the most important industry at the time, and it was the first to be mechanized. During Industrial Revolution, it was the invention of the machines that performed the mundane jobs faster and with more precision, which led to increased production, but also lower employment and wages. (Allen, 2017). Following the development and innovation, computers have been installed as substitution for humans in numerous job positions. However, this concern is hardly a new phenomenon. After the fall in agriculture and textile industry, the late 90s were the period when the professional, technical and managerial occupations grew, while the blue-collar occupations took a completely different turn. Indeed, in the latest reports, there have been many records of the decline in the routine intensive occupations (Frey & Osborne, 2013). Autor (2013) defines routine tasks as those that can easily replace human performance by following explicit rules, and specified programmed instructions installed into a machine's software. On the other hand, "nonroutine" tasks are those that do not have clearly defined and understood roles that could be copied into a program, and the general idea is that technology will complement the employees in performing these specific tasks (Autor, Levy, & Murnane, 2003). The Fourth Industrial Revolution however, brings more than just machinery that will take over the customizable occupation (Harari, 2017). The recent developments in artificial intelligence go beyond a simple software, and scientists are working on creating programs that are going to be able to decipher human emotion and provide personalized service, and that poses a serious threat to those working in the hospitality and service industry.

2. *The challenges and role of human resources in the new age*

The new age of technology and innovation isn't a concern for all industry leaders. Human Resources now have an important decision to make: who is better at performing the job, humans or machines, and at what cost? Solnet D, et al., analyzed the drives influencing the hospitality workforce in the future. In their research, they recognized three main drivers: demographic change, growing demand for experience and environment. Among these and their sub-drivers, they predict that the ageing population, both among employees and guests, is going to impact the way that hospitality HRM run their operations. They predict that due to financial pressure, older people will be forced to remain in the workforce, which is more than likely to affect their performance and focus, forcing managers to create a new business model that would overcome the traditional barriers and force them to train and navigate their workforce in another direction than what they're used to. Moreover, the lack of skilled young workers is going to force the HR managers to recruit a very diverse workforce that, although inclusive, is most likely going to result in technological implications that will be more skilled to perform the tasks. Additionally, implementation of technology to replace human workforce might even lead to hotels modifying their offer and services. Mainly, the research predicted that the HR processes will become more structured, that will lead to less motivated HR managers, because most of their functions will be transferred online in a form of self-service technology. (Solnet, Baum, Robinson, & Lockstone-Binney, 2015). These changes in the function of HRM are probably going to impact the way the whole department is structured. HRM in hospitality industry is most likely going to undergo a serious change – either adapting to the technology and rising with the advancements, or failing to do so and disappear under the threat of outsourcing and computerization (Woods 1999, as cited in (Davidson, McPhail, & Barry, 2011). Currently, the human resources department is battling three

major concerns, as recognized in Enz's (2009) survey: attraction, retention, training and morale of staff (Enz, 2009 as cited in (Davidson, McPhail, & Barry, 2011). The development of skills and organization of staff training has been a long challenge, mostly because of the seasonality and high turnover of the staff, as well as market challenges of the industry (Davidson, McPhail, & Barry, 2011). According to (Jolliffe & Farnsworth, 2003) seasonality is a major factor in contemporary hospitality industries that creates cyclical employment and forces human resources managers to adapt their recruitment, selection, training and retention of staff very frequently. However, seasonality is not likely to stop growing, and companies are meeting the rising costs of seasonality with hiring of the migrant workers who are more often than not, a cheaper work force and an easy way out. Labor mobility is another highly used term in HRM. It describes the freedom of workers to chose where they want to put their skills to use and practice for the preferred occupation according to where the opportunity exists and if it fits their aspirations (Joppe, 2012). Labor mobility makes it harder for human resources managers to attract the skilled workers, meaning the higher-paid and higher-skilled positions most likely require higher cost of hiring. To compensate for the loss, the HRM is most likely to encourage acquisition of workers with lower expectations and less skill (Joppe, 2012). Such negative relationship creates a perfect environment for the technology to take over the previously mentioned routine-task jobs as it most likely saves the recruitment costs while at the same time delivers the higher production output.

3. Current Technological Implementations

According to Ivanov, et al (2017), automation refers to the process of using programs and machinery installed to deliver products and service in a predetermined structured manner. Ivanov et al (2017) also suggest that robots can be described as intelligent physical devices that can perform tasks without the human intervention. Based on what they're programmed to do, we can

categorize robots into industrial robots designed to perform industrial tasks and service robots, created to support humans through their interactions, and they can be used by both, companies and individuals (Ivanov, Webster, & Berezina, 2017). The automation can influence the job in two ways: it can either completely replace, and take over the responsibilities of human work, or it can complement it (Melián-González & Bulchand-Gidumal, 2017). Today, there are many examples of the automation and use of robotics and other intelligent devices in hospitality industry. As stated in Ivanov, et al (2017) the Wynn hotel in Las Vegas has Amazon's Echo voice installed in 300 rooms, there are self-service check-in kiosks at hotels that reduce waiting time, and robots serving customers in different departments of the hotels, among many others mentioned in their research. Restaurant industry is no exception to this trend, as they have successfully automated both sides of the restaurant business: preparation and service. Many restaurants are hopping on the trend of automated food delivery method as well as robots taking orders directly from customers. Some restaurants have even gone that far that they have automated the entire front-of-the-house, eliminating the need for cashiers, servers and replacing them with tablets that take their order and charge them directly for it (Ivanov, Webster, & Berezina, 2017). Airports, theme and amusement parks, museums and galleries, meetings and events are no exception to this continuous trend of technology implementation. According to the RBC Global Management study cited in West (2015), the cost of robots has fallen and is converging with the low-wage labor. However, robots are just one example of the emerging technology threatening to take over the workforce as we know it. In addition to robotics, there are also computerized algorithms taking over transactions, augmented reality bringing 3-D graphics into real life, medical sensors and machine-to-machine communications automating health care area, 3-D printing revolutionizing the production, manufacturing and delivery and autonomous vehicles, eliminating the need for humans to operate the moving vehicles (West, 2015). There is

another technological advancement that has long been considered impossible and is currently being incorporated into various aspects of our lives. Artificial intelligence refers to a machine that can interpret human behavior and mimic it using critical reasoning and judgment (West, 2015). As such, AI poses a big threat to occupations that were considered untouchable due to their high dependency on soft skills.

It is clear that even though most of this technology is not at its highest peak yet, the increased potential that is going to be discovered in the future is only going to make automation and robots an attractive alternative to the future leaders of hospitality and tourism industry.

4. The skills needed to survive the Fourth Industrial Revolution

It is important to make a distinction between tasks, which are units of activity that produce output, and skills, which is referred to as a collection of employees' ability to perform those tasks in exchange for wages (Autor D. H., 2013). The change in working environment will obviously require a skill adaption. A study of 17 developed countries conducted by Natraj and Van Reenem (2014) concluded that increased use of IT resulted in higher work hours of high-skilled workers against those at the middle-skill level (Natraj and Van Reeenem, 2014, as cited in Borland and Coelli, 2017). Similarly to that research, another one conducted by Graetz and Michaels (2015) showed that the hours of high-skilled workers remained the same, but at the expense of the low-skilled workers (Graetz and Michaels, 2015 as cited in Borland and Coelli, 2017). On the other hand, Goos & Manning suggest that there will be a rising demand in well-paid skilled jobs and low-paid least-skilled jobs, while the demand for middle skill jobs is going to decline (Goos & Manning, 2007). The issue of job polarization is still a very big question, as there still isn't a consensus on which skill-level job is at the highest or lowest risk of technology supplementation.

When talking about the demand for skills in the future, it is important to recognize the difference in the occupation and task approach. The occupation approach was highly popularized by the research done by Frey & Osborne (2013), but many researches went back to the task approach introduced by Autor et al (2003) who argue that an occupation is split in many different tasks that cannot be automated, meaning that the occupation cannot be observed as a whole but should be divided. Following this argument, the tasks can be grouped into three broad tasks that require different set of skills. First, there are routine tasks that are repetitive and manual, easy to be programmed into software and many argue that these tasks will be the first to get replaced by technology as no human skill holds any advantage to the precision and efficiency of a machines' operation in this respective field. Then, there are abstract analytical and managerial tasks that are more dependent on human skills such as creativity, problem-solving, and negotiation. Finally, there are nonroutine tasks that may require physical flexibility and adaptability, visual recognition and are highly dependent on communication and emotional intelligence. The latter two are less likely to get replaced by, and will most likely rather be complemented by technological advancements (Autor D. H., The "task approach" to labor markets: an overview, 2013). These investigations proved that implementation of computer based technology increases demand for workers who can perform the non-routine tasks, and who preferably have a higher degree of education. Furthermore, hotels are going to be looking for individuals who are experts in nontraditional areas where they will have to express new forms of customer care. There is going to be a lot more focus on customer relationship as the service is going to have to become more customizable and attentive and the skills of workers are going to have to match this change in environment. With that in mind, there is a high probability that back-of-the-house jobs are going to be operated by machines (Solnet, Baum, Robinson, & Lockstone-Binney, 2015).

However, the results of a survey conducted by the World Economic Forum for their Future of Jobs Report 2018 suggest that roles expected to grow in the future are going to be those highly human skills, such as Customer Service Workers, Sales and Marketing Professionals, as well as they expect accelerating demand for the roles that are going to emerge as necessary for dealing with latest emerging technologies. Furthermore, the research suggests growing skill instability and a re-skilling imperative, with an expectancy of around 54% requirement for re- and up-skilling of employees, ranging from six months, to more than a year. The expected focus will be on "human skills" such as negotiation, critical thinking, innovation, attention to detail and problem solving, among others, and a big emphasis is projected to be on the development of emotional intelligence. It is important to highlight that new technologies can drive business growth and create new opportunities, but can also increase the threat of skill gaps. These gaps are expected to be covered in one of the three strategies: hire new employees capable of handling the new technology, automate certain tasks completely and retrain existing employees. A new approach called "augmentation strategy" suggests an automation of some tasks in order to aid the human workforce and assist workers in achieving their full potential. This is highly dependable on the employees' will and readiness to accept re-training and change, and keep a positive vision with a learning mindset, shifting from routines to new and unknown list of possibilities (Centre for the New Economy and Society, 2018).

Method

The study of technological impact on the future of jobs has generated a substantial attention in literature. To have a better understanding of the field and gain appreciation for this body of knowledge, the author of this research decided to approach this exploration using meta-analysis. The number of research analyzed for this purpose is 26, and among those 26, 12 sources have

been handpicked for detailed study using the meta-analysis. These 12 sources have been picked out because the authors have been recognized as key research leaders, and their work has generated some important breakthrough in this area. We examined, analyzed and synthesized the literature according to three major clusters that, although overlapping, had a distinct angle that they were addressing. The data taken from the sources has been sorted into 5 categories, with the first two identifying author's name and year of publication. The third category was the main predictions highlighted in their research and the category following reviewed the impact of technological change mentioned, like focus on task or occupation, routine or nonroutine jobs and the distinction between low, middle, and high skilled workers. The final category focused on skills and examined whether skills are going to change with the technological advances, and in what way do humans hold the advantage over the machines.

Results

The analysis of the information, in accordance with the meta-analysis method described previously, has been made on 12 articles selected from a pool of total of 26 sources read for this research, that deal with the topic of the risk of automation and computerization with the current jobs. Illustration 1 is a visual representation of the finding from the conducted meta-analysis. The squares represent key ideas and concepts that are common among the majority of the articles analyzed for this research. The D and A represent Disagreement and Agreement either among the concepts or among the authors discussing the same idea. For example, Frey & Osborne (2013) were the ones that fueled the discussion about the apocalyptic result of the Fourth Industrial Revolution. In their research, they said that 47% of the US jobs are going to disappear due to automation and computerization, which is a result that many in the following years openly disagree with. The "task model" that was introduced by Autor in 2003 has been used as an

approach by many, except Frey and Osborne who opted for the occupation approach. This conflict resulted in different outcomes of the similar research, where for example Arntz et al (2016) proved that by focusing on the tasks, the prediction of 47% of the US jobs at risk of disappearance falls down to 9%. Even though there is a disagreement in the approach, the research done in the task approach is in an agreement where the general consensus is that specific tasks within the occupation will be automated, but we can't conclude the same for the entire occupation, and such outcome is very unlikely.

Most of the research done following the task model has recognized a distinction within routine and nonroutine tasks. Generally speaking, there is a major agreement that the routine tasks are those that can be easily programmed and replaced by technology, while nonroutine tasks are highly dependent on human skills that cannot be substituted but rather complemented by technology. However, when the research came down to job polarization and the different level of skill required to complete specific tasks was discussed, there was a disagreement among the researchers. The major disagreement comes from the prediction for which level of skill is going to be at the lowest or highest risk of replacement. While they all agree that high skill jobs are going to be in higher demand, Autor (2015) argues that the middle-skill workers are going to still be in demand with technological advances, while the extensive survey conducted by the World Economic Forum in 2018 predicts that the middle-skill workers will be the ones to lose the battle with technology the fastest. Meanwhile, the rest of the researchers do not focus on middle-skill workers, but rather agree that high skill workers are the least susceptible to automation, while the low skill workers are either going to require up-skilling, have greater competition among each other or be eliminated.

Finally, no matter all previous disagreements and conflicts among researchers, those who included analysis of the skills within the new age of technological advancement all agree that the skills needed to survive in this new competitive environment are going to change. All resources emphasize the high growing demand for human skills that cannot be programmed such as creativity, interaction, managing, emotional intelligence, social skills, communication, design, and similar. Furthermore, World Economic Forum survey suggests that more than half of the current employees across various industries are going to require re-and up-skilling, among which some training is going to have to be from up to six months to more than a year.

Based on this visual, it's evident that there is no direct impact of time on the ideas and concepts about this topic. The task model was introduced by Autor in 2003, and it was only 13 years later when Frey and Osborne (2013) took occupation approach, after which the most recent practices have been moving back towards the task model. This boomerang effect also had no effect on other key concepts and ideas like distinctions between routine and nonroutine tasks and skills.

Discussion

The primary focus of this research was the question of the future for hotel industry jobs under the threat of automation and computerization. The main hypothesis stated at the beginning of this paper predicted that the number of jobs currently available is going to decrease with the upcoming advancements of the Fourth Industrial Revolution. However, upon conducting the meta-analysis, the author of this research paper would like to challenge that argument, as the most recent findings prove that although the number of jobs is decreasing, the creation of new jobs is significantly making up for the loss (Gregory et al, 2018). Even though nothing can be predicted with precise accuracy, the recent growing trend in applying the task model (Autor,

2003) shows that the occupations are not at such a high risk as the research by Frey and Osborne (2016) suggests. On the contrary, the specific tasks within the occupation is going to change, shifting the focus of the specific job in a different direction, but not necessarily eliminating it as an option.

The second focus of this research was to analyze whether the skills needed to survive in the expected changed environment are going to alter. In accordance to the predictions, the skills expected to be in high demand are those highly human skills that cannot be easily programmed into the machine's software. While doing this research, the topic of routine and nonroutine tasks came into the discussion, and there is a definite consensus that the skills suitable for nonroutine tasks such as creativity, communication, and emotional intelligence that will complement the technology are going to be more and more in demand. The author of this research would like to add that, as the technology continues to advance, it is going to be less important which jobs are going to exist, as the emphasis is going to be put on looking for workers with the right skill-set. What this means is that, instead of chasing a specific career and concerning ourselves with the perseverance of the tasks or occupation, human workforce should focus on developing a competitive skill-set that will benefit their employers and ensure job security.

What this all means for the hotel industry is that despite negative, sometimes even cataclysmic predictions, jobs will naturally evolve over time. In a long run we can expect a major shift in hotel job structure. Current (traditional) hotel jobs that are predominantly labor intensive will be transformed. The change is inevitable, especially in the departments that can be associated with the routine performance, but because this is an industry that is highly depended on soft human skills and personalization, the jobs are not at a highest level of risk. For example, the author of this research predicts that the finance department is going to be the first to get automated because

of the repetitiveness within the position that can be easily programmed into the machine's software. However, the need for financial analysts and advisers is going to grow because although machines can analyze numbers faster and with more precision, they cannot take into consideration the direction, mission and vision of the company, especially when compared to their competition.

Furthermore, we can anticipate that certain tasks within the front of the house departments like F&B and Front Office are going to be automated as well. Check-in and check-out of the hotel, as well as table reservations and room service orders are already being globally computerized through use of various apps, and in the future, there will be no need for the receptionists to stay at the front desk swiping the room keys and credit cards upon payments, as well as for servers and greeters to check guests' reservation numbers. However, we can expect a shift to a greater personalization of the service and very personal guest interaction with front desk employees becoming proficient in guest experience and concierge services, and both departments working on long term customer relationship management.

With the departments like Facilities Management and Housekeeping which seem routine in the sense that the day to day tasks are repetitive, these departments will be one of the best ways in which human skills will complement the technology, rather than get replaced by it. For example the tools currently used for Housekeeping and Facilities Management are going to get replaced by the smart technology, but the attendants are going to be necessary to supervise the equipment in order to ensure the level of quality, cleanliness and repair performance expected by all stakeholders. Housekeeping remains one of the departments with the highest level of ambiguity where no conclusive prediction can be developed regarding the impact of automation on jobs within that department.

Finally, Sales and Marketing department are mostly likely going to remain mostly the way they are today, because those departments are very *human* dependant in their core, and they can only be complemented by technology, rather than substituted by it.

In addition to already existing departments of the hotel, the author of this paper predicts that some new departments are going to be added or strengthened, and that there will be a bigger emphasis on the IT segment within the hotel. The reasoning behind this is because there will be a greater demand for those who understand the new technology and can operate it and take of the maintenance, and there will be a specific need for those who can train the hotel personnel about efficient use and incorporation into their respected jobs.

In conclusion, the last concern about this topic was the evolution of the key ideas throughout the years, and upon completing the meta-analysis, we can see that the flow is not linear but rather has a boomerang effect. What this means is that, as the more research is being conducted on this topic, more professionals are going back to the ideas proposed in the beginning of last decade, such as the task model introduced in 2003 by Autor D. This means that nothing has yet been proven with certainty, but even though the danger of automation has been present throughout all previous Industrial Revolutions, humanity has always found a way to complement the changes rather than be substituted by the advances. This applies to technological innovation and advancements, but the question of Artificial Intelligence, the true AI in its most narrow definition, where the emphasis is on intelligence remains elusive and highly unpredictable when it comes to its impact on jobs however, this was not the focus of this research.

Limitations

The author of this paper would like to state that there are certain limitations within this research that could have impacted the end result. For example, the entire research was conducted in less than 15 weeks which might have limited the number of sources reviewed and picked for the meta-analysis. Additionally, this is only one of the methods that could have been used to approach this topic, so due to the limitations of time and resources, the opportunity to hold a focus group or conduct interviews with the professionals in the field of this research, technology and hospitality could not have been conducted. The author of this research would like to add that the topics of wage polarization and educational readiness for the upcoming change have been disregarded from this research and should be taken into consideration in the future.

Further research

Although this paper provides a summary of the major research done on this topic and provides an insight into the future of the hospitality jobs, the author suggests that the further research on this topic should adopt a different approach to examine the possible similarities and differences as well as other areas of interest. For example, one of the biggest current HR issues for Hospitality Industry is labor shortage and none of the sources analyzed for this paper included that factor into their research. Additionally, since net gain of jobs is a fairly new topic among researches in this area, further focus in this field should be put on comparing the net gain on the country level to the net loss, or gain, at the hotel level. Finally, the highest emphasis should be put on answering the question of resources allocation, since that is most likely going to be the biggest economical issue humanity is going to face with Fourth Industrial Revolution.

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Appendix

Illustration 1