# EXPECTED IMPACTS OF ARTIFICIAL INTELLIGENCE SOLUTIONS IN THE LABOUR MARKET – NEW JOBS AND JOBS TO BE ELIMINATED

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*ABSTRACT*

The entire environment of companies has been transformed due to significant, new digital solutions in the last years. The main trend is called digital transformation. New solutions have appeared in the life of companies such as cloud computing, social media, big data analysis and the variety of new mobile tools. In addition, these solutions have also major impacts on the company culture and on the expectations of the employees as well. Artificial Intelligence solutions belong to the brand new part of this trend. The AI solutions are expected to substantially transform the job market. My analysis focused on the new types of jobs that will emerge in the labour market and on the types of jobs that will probably disappear from the market due to new AI solutions. Based on my research works, I have identified and determined the main areas that will be affected in the job market in the near future.

## 1. Introduction

In the last decades, new solutions were introduced that have significantly changed the economic environment of companies. The first technological wave may be contributed to the appearance of personal computers, the internet and after that, the launching of numerous company and office management programmes. The current wave has just started a few years ago. We may call it digital revolution or digital transformation. The main characteristics of these changes are new digital platforms in communication, sales and in numerous management functions. IT skills have become necessary to be adopted by employees, managers and the entire company as well as they have to learn read and write. All new ways of communication are based on IT managed platforms. All communication channels have become faster due to the digital solutions and the proactive method has also become their main feature (Accenture 2017:5).

In addition, the main change is that the partners of a company such as suppliers, customers can already provide prompt feedback and reply at a much

earlier stage than ever before. Companies can receive customers' opinions and react to them even in the planning phase. As a result, cost management aims have also gained a huge support. Since customers can express their opinion at an early stage of planning and production, therefore, the so-called "redundant" product ideas do not even need to be developed further. Companies do not need to carry out an entire development process chain if customers do not prefer it. As a result, a significant amount of development cost can be avoided (Earley 2014:58).

These changes have also led to modifications in the services companies render and the way they develop new services. The digital services (and products) are not traditional goods in a sense that they are „only" placed into a digital environment. The digital customers have new kind of requirements and therefore, these services have to perform in a new and digital environment. The main focus of companies will be the digital customer and the aim they want to reach is the digital customer satisfaction.

From a technological perspective, these new changes in the new digital environment for companies were based on the introduction of social media, mobility, big data analysis and cloud computing technologies. The main impacts that influence the new environment as mentioned above are shown in Figure 1: Main actors in the new digital environment (see Appendix) (Kaltenbrunner 2014:3).

The latest technological trend is that not even the human being create digital networks and communicate but also computers can create their own new networks and analyse the vast amount of data generated as result of introducing these new technologies. Computers actually "teach themselves" by analysing this huge amount of data. Artificial intelligence (AI) solutions make it possible for machines to learn from experience. Machines can also learn to modify their inputs and even to perform human-like tasks. Applying these new IA technological solutions, computers may even be trained to carry out specific tasks by processing large amounts of data and even analysing patterns in the data. As a result, machines can be able to replace human workforce in several jobs and at the same time, the introduction of these new technologies will also lead to job creation in different areas as well. The expected impacts are the main focus of my research (Campbell, Kunisch, Müller- Stewens 2011:3).

## 2. Main features for digital and innovative companies

These new technological changes have already led to significant changes in the operational patterns of companies. Most of the companies has already started to adjust its business operation to the new challenges and tasks. First, companies have changed their internal operational methods to meet the customers' needs and expectation in this new digital market. The main changes are (Deloitte 2016:2):

- Dramatic reductions in the time it takes to make critical product enhancements.

- The ability to test new ideas quickly and cheaply, run experiments, and back out if there are any problems.
- Large decreases in costs by eliminating the waste of fully developing features that may fail in the market - customer reactions incorporated in the early product development phases
- Rapid revenue increases from products that are continually on target, with more and better features.

In a nutshell, companies started to gather a huge amount information due to these new technologies and analysed them in order to meet the expectations of their customers. The main change was that the focus was shifted from the sale phase to the product development phase. This means that the customers could intervene at a much earlier stage. Only those product plans have only reached the production phase that were judged positively by the customers in these pre-production digital surveys (Deloitte 2016:10).

In the second phase, companies have started to adjust their internal, operational processes as well. After learning the new ways of consumer information gathering, companies could rethink their internal information channels and the management processes as well. The main changes regarding the internal working processes within companies applying new digital technological solutions were (Ernst & Young LLP 2016:2)

- To keep the overheads at a minimum level, such a company is organized around small teams that are responsible for the building blocks of products (mainly called "services") and have full-time leaders.
- To make numerous fast changes, they automate testing and making product updates.
- To quickly and inexpensively ensure customer value and eliminate the risks of product changes, they conduct lots of small experiments.
- To keep product developers in touch with customers, developers are continuously informed on how their product is performing in the market.
- To maintain perpetual customer relationships, companies emphasize services over product transactions.

The latest trend as mentioned above are the Artificial intelligence solutions. These new solutions have also led to significant changes in operational processes of companies. Looking at the main trends in this area we may find see that in the industrial sectors in the Western high-labour cost countries, automation and use of production robots lead to considerable savings with regard to the cost of labour and products. In addition, an autonomous computer system does not depend on external factors meaning that it works reliably and constantly, they can work all day long and even at weekends. Furthermore, it is also essential for employees that they have to do less manual or hard work; since repetitive, monotonous work can be performed by autonomous systems (Freeman 2016:4).

Summarizing the above, new technologies were introduced, companies have adjusted and restructured their internal processes, this phenomenon may also to new types of management tasks and new types of jobs that have not been existed before. Of course, these process changes do not only create new types of jobs, but also make old types of jobs disappear.

## 3. New features and challenges in the labour market

The new technological solutions have led to new ways of companies manage their business and even significant operational changes were also introduced within these companies. Since, the main operational tasks have been changed in customer management, product planning, new jobs have also been created, while some existing but no longer necessary types of jobs have disappeared. At the same time, we can also realize that mainly all types of jobs have been affected by these new digital changes to some extent (Hutson 2017:2).

If we summarize that new types of jobs that have emerged, we may identify them in the area of IT, data management and development support in technological fields. The new types of jobs belong that of developers, big data analysts and electrical engineers for smart grids. If we review jobs that have high chances to disappear from the market, we may find physical jobs in the first place. The automation process and the installation of machines will probably replace these types of jobs easily. We can already see very good examples in the manufacturing industry. For example, the Tesla car manufacturing factory has installed numerous robots in its productions chain by setting up its first factory. Since then, we can see that traditional manufacturing companies also introduce machines to carry out all tasks relating to a production chain on its own. This trend will probably significantly decrease the number of physical workers in the manufacturing industry and increase the number of robots (Kaltenbrunner 2014:3).

Another key trend can also be visualized in the job market. We may assume that, practically, all types of jobs will have to be modified to some extent in order to perform in this new environment. The main shift in the case of these jobs will be from manual jobs to knowledge-based jobs. The manual office jobs will probably be replaced soon, since the automation and digitalisation processes may lead to new and cost effective solutions in that work area shortly. Based on international job market studies, further areas where the new technological solutions may also replace human workforce from manual jobs are sales, commerce and transport (Meister 2017:2).

At the current phase of surveys and research work, we may presume that management, human resources management, scientific professions and engineering jobs will not be restructured significantly. The reason for that the communication with human beings and by human beings is necessary in these areas as well as innovative thinking or the right to make decisions. The main assumptions in this case are that these types of job tasks may not be transferred to

machines in the near future. However, we also have to mention that the circle of jobs that are or will be at risk due to digital transformation may be enhanced. The borders between the jobs that stay "protected from the change" and the ones that will disappear is not solid. Based on the latest changes, even those jobs that are believed to stay „protected" may even meet new challenges. The endangered areas may even include legal service providers, for example, which area was thought to remain protected. The new AI solutions that analyse and search numerous amount of legal texts easily and attach explanations to the text excerpts, may be a challenge for the legal offices as well (Rendall 2017:2).

## 4. New generations coming to the market

Meanwhile, technological changes have significant impact on the internal process within companies and heavily restructure the job market, a new global, digital generation is entering the job market in the coming years. Based on international studies, we may state that generation Z members have similar behavioural features both in the USA and in the European countries. Furthermore, studies even underpin that Asian young people also have similar digital customs. This generation will probably have major impact not only as customers in the markets, but also as employees. Their attitude to companies is different from that of previous generations, therefore, their integration into the current job market will create new challenges for the companies (Google 2017:2).

The main characteristics of this generation are that they are going to school right now and more than 800.000 of Z generation members live in Hungary. Based on international and Hungarian studies, we may state that their third priority on their wish list is the smart phone following driving licence and graduation at high school. Nearly 30% of them even use their smart phone to communicate with each other even if they are physically in the same room. In addition, more than 50% of them thinks that the number of its followers in the social media platforms is important, since this gives them self-confidence. They are much better embedded digitally in this culture than the members of previous young generations. A main signal for this phenomena is that they have got their smart phones already at the age of 11-12 years of age, while the members of the previous generation (e.g. X generation) were about 20 years old when they got their first smart phone (Gallup 2016:2).

Besides their characteristics towards the digital world as mentioned above, there are two major factors that will have significant impact on the future job markets. First, they put their own individual aims in life and in profession in front of the aims of a company. Therefore, more flexibility will have to be provided to them by the companies. The second major factor refers to digital openness of a company. The members of this generation grew up as they can comment on any news right away honestly and receive fast replies. This feature will also probably appear in the internal company culture. On one hand, they will work for a

company that they see from inside, while on the other hand, they also see how the company communicates to the external world. In their mind, a company cannot behave differently in these two environment. Transparency will receive a much higher attention in the internal company culture as the new generation steps into the job market (Ernst & Young LLP 2016:2).

## 5. New skillset to be expected in the job markets

Due to new AI solutions and the automation processes, the professional requirements for future employees will significantly change. As mentioned above, the appearance of new types of jobs and the adjustment of numerous types of jobs to the needs of the new digital world will cause remarkable changes in the skillset that an employee has to possess in the future to become competitive in the job market. As a result of automation solutions in the manufacturing industry, there will be hardly any need for employees who do simple or repetitive work. We may also expect that demand for workers will decrease, while the companies' appetite will grow for highly qualified employees. The new technological solutions will require more qualified labour who can make programmes and manage these tools in the daily operation of a company. In addition, an individual employee, who is currently in the job market, will also need additional qualification to remain competitive in the long run. Based on expectations of international companies, we may state that mainly creativity and flexibility will be the two key features that companies will look for in the future. By elaborating the main skills, critical and problem-orientated thinking will be expected of employees as the most important requirement. From a professional perspective, people who are talented in mathematics and sciences are best qualified for the new labour market (Meister 2017:2)

As a result of digital transformation, there is a phenomena developing to be analysed further. Concerning skills and needs in the job market, we have seen that individual employees will need new digital skills to meet employers' needs, however, these skills will also be necessary to function well in society as a whole. These skills may range from basic digital literacy to advanced technical skills. In addition, it is the combination of general job-specific skills and skills related to technologies that are relevant for the job (i.e. double-deep skills). Nevertheless, these double-deep skills make individuals more employable and make them able to function successfully in the society as well. Looking at the example of accountants, we can state that bookkeepers in the future will not be fit for the job market if they merely possess the knowledge regarding the relevant accounting rules. Since these rules are available online and can only be accessed through new digital channels, the accountants will have to build their digital skills as well. Without these new skills, they will not be able apply them and work with customers. Besides the professional skills technological skills will also be a must for them to be able to work at all (Rendall 2017:2).

## 6. The types of jobs to be expected to disappear and to appear in the job market due to digital transformation

### 6.1. Jobs to be eliminated

Based on international surveys with multi-national companies and studies relating to IT and AI solutions, we may expect that mostly high-routine occupations will disappear from the job market. By scrutinizing the types of jobs, court clerks and desk officers at fiscal authorities will be highly endangered. Due to the high level of routine in their performance, their types of jobs will probably be done independently by software. In fiscal administration, online forms and tax returns will probably replace their work (Rendall 2017:2).

The second major group of jobs to be eliminated will belong to simple physical work or manual work. These types of jobs will be gradually replaced by machines and robots even in low-wage cost countries. The use of a machine instead of a human employee can only be carried out if the process is done independently and repeated with certain regularity. Furthermore, we also have to see that dismissals are also expected due to digital transformation. In this case, retraining of employees may be a solution, otherwise downsizing may not be circumvented (Deloitte 2016:10).

### 6.2. New types of jobs to appear in the job market

Due to new technological developments, the new types of jobs will mainly appear in the field of IT and data management. One of the new jobs that has already come to the market is data scientist. In this case, comprehensive IT knowledge is vital for this complex task. This job will require the knowledge of relevant programming languages and writing complex programming codes. Furthermore, a data scientist will also have to be familiar with the business processes of a company to be able to create reasonable links among different company functions. Analysing the expected future demand in the job market, we may also assume that IT management and science jobs will appear in the market as well. In addition, media science and humanistic professions will probably profit from the increase in investments in digital economy areas and in the area of Industry 4.0. Regarding creative skills as a necessary skill for the job market in the future, we expect that humanistic, social science and artistic professions will also be in demand (Rendall 2017:2).

Apart from jobs that are directly affected by digital transformation, we will also see that numerous types of jobs that even today face huge demand in the market, will also stay in the demand side in the future. These types of jobs are mainly teaching professions, specialized legal experts. Medical jobs will face high demand in the coming years as it is today. Mostly medical doctors and nursing staff are they key professional areas where we see even today an

increasing demand. Concerning teaching professions, the digital transformation will even increase the demand for them, since further and advanced training for adults will be required. We will also see that companies will allocate more funds to education of employees in order to provide key qualifications for new and existing employees as well (Deloitte 2016:10).

Besides types of jobs that require high-level professional skills as above, jobs that require practical skills to manage smaller, daily operational tasks of a company in this new digital environment will also be demanded in the market. In this new world, a new expression has been created for these types of jobs: crowdworking. It is a symbol of a changing world of work for white-collar workers in the gig economy. This covers smaller tasks, such as writing product reviews, searching for phone numbers, and more comprehensive work, such as testing software, providing legal advice, ghost-writing or designing and programming a website. The more meaningful tasks may be collected under the term "crowdsourcing" (Ernst & Young LLP 2016:2).

I mentioned above that physical work with repetitive tasks may disappear from the job market, however, new types of physical work may also be demanded in the market. As mentioned above, we expect that new high-end jobs will be created, but there will also be an increase in the low-wage sector as well. In-person services will increase in this part of the labour market as well. Based on labour market predictions, one new high-tech job will probably create between 2.5 to 4.4 new low-wage jobs in a local area. These jobs will mainly require low-skilled and medium-skilled workforce regarding in-person services. These jobs will particularly be in the service sector. Jobs such as such as janitors, gardeners, manicurists or home health aides belong to this category (Rendall 2017:2).

## 7. Summary

The main changes in the job market are related to introduction of new technologies such as mobility, big data systems, social media, automation of machines and artificial intelligence. The introduction of these new technologies have changed first the internal company procedures and the communication channels with customers as well. As a second step, these technologies will lead to significant changes in the job market either. New types of high-end jobs will appear in the market relating to these new technologies and nearly all types of jobs will have to adjust to the application of these technological solutions. The technological skills will be double-deep skills that are required at the workplaces on one hand, and at daily life to manage in a society as well. The state administration, personal finance and banking and shopping will also be adjusted to these new technologies, therefore, people will have to gain this new type of skills to manage their daily life as well. We also expect that the current jobs in the market will have to be adjusted to the requirements relating to these new technological solutions. Therefore, additional technical skills will have to be

gained by each employee in the market to keep up with the new challenges (Deloitte 2016:10).

As a consequence of applying these technologies in a new and complex way, we may predict that the cooperation between humans and robots will reach new heights. Presumably, the introduction of artificial intelligence solutions will lead to new solutions and types of jobs in communication and connections between robots and people. Not every aspect has been clarified yet in this regard. This is still a developing area. We can even experience today that in some cases robots can already work alone with human clients such as customer relations and single operations in manufacturing. This new technological wave will also lead to new situations in the man and robot relationship. The main direction will probably be that robots will work next to human workers and support them. We assume that direct cooperation will also exist between humans and machines. In this case, robots will be able to simplify the work of employees. We also have to mention that employees will also have to gain additional technical knowledge to be able to perform in these new situations. Some studies even suggest that AI systems will even enable a better integration of older and severely disabled persons, since numerous personalized solutions will also be developed (Meister 2017:2).

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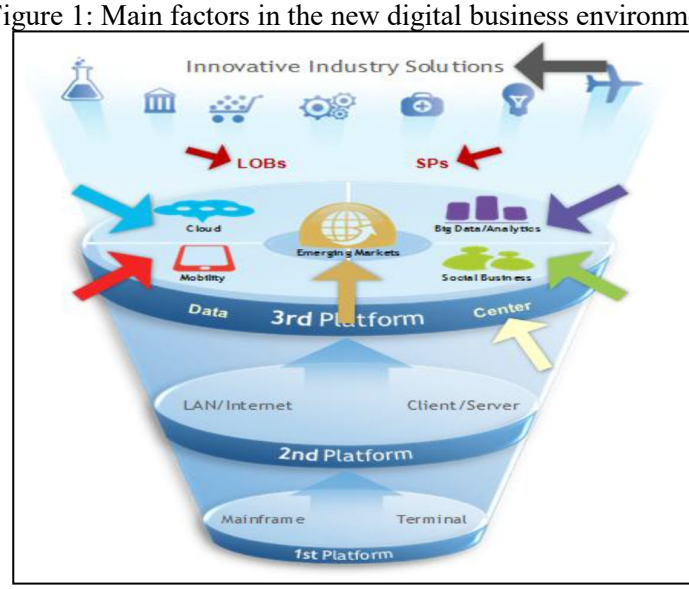
## APPENDIX

Figure 1: Main factors in the new digital business environment




Source: J. G. R. Kaltenbrunner (2014:3)