

Summary

The influence of technology on low-skilled employees in the grocery retail sector

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Automation can help businesses to develop their error-reduction, quality, speed and outcomes beyond human capabilities. As shown in the past, automation contributes to an increase in productivity that in turn will lead to economic growth and prosperity (Manyika, Chui, Miremadi, Bughin, George, Willmott & Dewhurst, 2017). The increased skill demand due to technological and organizational change, set in motion by automation, is a threat for low-skilled employees in the current labour market (De Grip & Zwick, 2005). Technological developments and ICT are the main reasons for the increasing importance of skilful employees (Maurin & Thesmar, 2003). Automation changes the content of tasks, as capital takes over tasks that used to be performed by labour. This process is described as the 'displacement effect', meaning that the share of added value by labour decreases (Acemoglu & Restrepo, 2019). Jobs that once were filled in by low-skilled employees can be changed in such a way by technological developments, that organizations seek for high-skilled employees to fill in these positions. High-skilled jobs contain jobs that are dependent on cognition and are non-routine, while low-skilled jobs are related to non-manual activities (Maurin & Thesmar, 2003).

The digitalization, initiated by the technological developments, is known as the transition from analogue to digital, which includes information and processes (Negroponte, 1995). The study of Ferry and Osbourne (2017) investigated whether this transition could be a possible threat for jobs. According to their research, employees that work within transportation and logistics, as well as administrative and office workers will be at risk. These jobs consist of routinized tasks, which therefore are mainly performed by so-called low-skilled workers.

In order to check whether the conclusions drawn from the research of Ferry and Osbourne (2017) are in line with practice, research from the McKinsey global institute is consulted (Manyika, 2017). Again, it is stated that the pace with which new developments arise, could disrupt the world of work. In their research they included 46 countries, that represents 80 percent of the global workforce. In total, over 2000 work activities were examined on the feasibility of automating them, of which 5 percent could be automated with current technology (Manyika, 2017). However, when an occupation cannot be fully automated, certain tasks can be. Of the activities studied, 60 percent of all occupations contain activities of which at least 30 percent can be automated. This means that all these jobs will be influenced on either a small or large scale, and not only jobs that are performed by less-educated people but even jobs of CEO's. According to calculations, automation technologies could affect half of the world economy within two decades, including 1.2 billion employees with a corresponding salary of 14.6 trillion dollar (Manyika, 2017). Even jobs of people with college or professional degrees are predictable and will face possible effects of automation in the future (McNeal, 2015).

Supermarkets have already implemented a lot of technologies that affected the workers, and

there are even more technologies developed at the moment. The first invention implemented in the supermarket, was the cash register. It was invented in 1879 by a bar owner. In the 1960's the cash register developed further into an electronic device. These registers could be used to scan barcodes that were implemented in the 70's, which replaced the manual process. In 2008 the first handheld scanner was introduced by the stop & shop. The device replaces the cash register since customers can scan the products themselves (Wells, 2018). These handheld scanners and self-checkout machines ought to be the most notable technological innovations for customers (Nanalyze, 2017). However, there is also a lot of ICT within the supermarket where the shopping public has less to do with. Electronic point of sale (EPOS) is the technology used to monitor the stock within the store, to which devices such as the cash register and stock terminals are connected (Revision world, n.d.). The first EPOS system was introduced in the 1970s by IBM for department stores and restaurants (Southerton, 2011). By using this device, the system can independently place orders based on the number of products already sold, products that are expected to be sold and the current stock. The system gives the manager insights in the sales analysis, such as buying patterns.

As we see in popular literature, the latest implemented development is the introduction of digitalized price tags. Although the concept of electronic shelf labels originates from 1991 and the first introduction was already in 1995, the widely introduction is still something recent (Atkin, 2016). In July 2019 it has been reported that the Dutch supermarket Albert Heijn is implementing these price tags in 150 stores. Because the prices can be changed centrally at once instead of printing price tags and replacing them manually. At the same time, dynamic pricing is introduced. This includes the process of automatic lowering the prices on price tags of products close to the expiring date, to limit the disposal rates. All in all, a big investment that is estimated around hundred thousand euro, but it will replace manual processes of replacing price tags and putting stickers on almost out of date products (RetailNews, 2019).

The latest developments in supermarket retail are robotic machinery that perform work activities, that are normally performed by workers. A robot that is already in use by 172 Giant stores and 325 Stop & Shop stores in the United states, is a robot produced by Badger Technologies called 'Marty' (Matthews, 2020). However, this robot does not replace manual labour, but is used as a communication device to alert shoppers about possible dangerous situations like slippery surfaces. The successor 'Millie' is still in development, but will be able to solve the dangerous situations by detecting and cleaning them. Another robot that is introduced in the grocery retail is 'Tally'. This robot is not focussing on detecting hazardous situations but is developed to contribute to the work process, as it collects data to inform workers which products are out-of-stock or at the wrong location. In December 2019 only three grocery stores of Giant Eagle had one. The introduction of Tally is slow, so retailers can monitor the performance and decide whether they want to purchase more Tally's (Matthews, 2020). The latest news on developments in the grocery retail are robots that help to keep the shelves stocked. The robot scans the shelves to monitor the quantity of products that are present. The machine replaces the shop floor employee that monitors the stock with a handheld terminal. There are also examples of robots that automatically pick the groceries for the customer, mop the floor or assist shoppers (Food Magazine, 2019). The company 'Zebra', introduced their model at the National Retail Federation trade show in January 2020. They state that the robot will increase the availability of inventory with 95% and will help to reduce manual labour by 65 hours per week (Matthews, 2020).

These developments seem to replace a lot of tasks from the employees, but do employees see this as a threat or enrichment? Price (2009) concluded that retail work is heterogenous as the departments are distinct and consist of different skill demands. The implementation of technology simplified and rationalised the labour process, but still workers need to have certain knowledge depending on the department they work. Next to simplifying the job by

taking over tasks, technology is consulted to measure the performance of employees. In this sense, technology is both a replacement as a measuring instrument for performance for employers. Based on these findings, one would argue that workers would experience technology as a threat of losing work activities or even the job, as the company is less dependent on them. On the other hand, one could argue that workers benefit from the technological developments as their work activities are getting optimized.

However, there is a debate whether skill levels have increased or decreased due to technology. According to Brynjolfsson and Mendelson (1993), organizations cannot keep up with the emergence of new technological developments, in adapting their labour pool to these changes. The demand for high skilled labour and employees that can work autonomously increases, because workers expected to run a whole process by analysing data and solve problems. Therefore, they are not anymore specialized in a certain function but responsible to control the whole process that is carried out by machinery (Hammer, 1990).

Although there is already a lot of technology implemented in the supermarket retail sector, the adoption of new technological developments is still ongoing. Therefore, employers need employees that are able to cope with these changes. These transitions need to be carried out in such a way in which employees feel comfortable, as this process will influence business results. On the other hand, from the viewpoint of the employees it is important to develop technological skills, as it will affect their career perspectives. This research is going to investigate how low skilled employees ‘within the grocery retail sector’ perceive the presence of technology, by answering the following research question: *How do employees (low-skilled) in the grocery retail sector experience the ‘latest’ technological developments?*

Theoretical framework

Our conceptualisation will be built on an intersection of job design, 21st century skills, and automatization of jobs. A preliminary overview of the conceptual views is given below:

<i>Determinants affecting employee experiences</i>	<i>Concepts</i>	<i>Content</i>
<i>Effects of technology on jobs</i>	<i>Skill-biased technical change (Manning, 2004)</i>	<i>Increase in technological implementation increases demand for skilled workers (Manning, 2004)</i>
	<i>Rising skill price hypothesis (Juhn, Murphy & Pierce, 1993).</i>	<i>High skilled workers get more productive due to the ongoing technological developments (Juhn, Murphy & Pierce, 1993).</i>
<i>Skill requirements</i>	<i>Digital skills (Van Dijk, 2019)</i>	<i>The knowledge and skills to work with digital devices, can be used to get information about attitudes, knowledge and skills.</i>

	<p><i>Dimensions of 21 century skills (Van Laar, 2019).</i></p> <p>Core dimensions</p> <ul style="list-style-type: none"> - Technical - information management - Problem solving <p>Contextual dimensions</p> <ul style="list-style-type: none"> - Flexibility - Self-direction 	<p><i>Skills necessary to keep up with the latest technological developments</i></p>
<i>Limitations of technology</i>	<p><i>Autor-Levy-Murmane hypothesis (Autor, Levy & Murmane, 2003),</i></p>	<p><i>Computers can only perform tasks that consist of a pattern due pre-filled instruction</i></p>
<i>Employee perspectives on career outcomes</i>	<p><i>Perceived organisational support</i></p> <p><i>Perceived supervisory (managerial) support</i></p>	<p><i>Symbolizes the relationship between the employee and the organization, whether their well-being is taken seriously and their contribution is valued</i></p>

A preliminary overview of important concepts derived from literature

The context: grocery retail sector

The effects of technology on the careers of supermarket employees can be drastic, as Brynjolfsson and McAfee (2011) are convinced that STARA is going to induce a revolution on the job market. It is expected that in 2025 one-third of the jobs are taken by STARA, making it necessary for employees to react to this changing labour market by planning their future career (Brougham & Haar, 2017). It is argued that employees will lose their jobs when they do not have the necessary skills to work with the new technologies and processes, because job complexity increases when new innovations in information technology arise. However, job complexity also increases due to workplace reorganizations and the introduction of new services (Machin, 2001). In this sense, one could argue that it is not only the innovations in information technology, but rather the combination with reorganization and new services that make jobs more complex (Caroli & Van Reenen, 2001; Bresnahan, Brynjolfsson & Hitt, 2002).

Since technologies within the retail sector such as the self-checkouts are much more cost beneficial, it is hard for supermarket to favour employees, from a financial point of view. Four lanes of self-checkout systems will cost approximately 125 thousand dollars, while employees have to be paid every week, needs breaks and costs the employer additional costs such as healthcare benefits, pensions and taxes (Human-Use Experience, 2015). Retail self-checkouts are also mentioned by Haar and Brougham (2017) as an example of technology that makes it difficult to keep employees in their role. These jobs that are performed by blue-collar workers are more vulnerable for technological developments since these routinized tasks can be performed by ‘Smart Technology, Artificial Intelligence, Robotics and Algorithms’ (STARA) (Brougham & Haar, 2017; Ramirez, 2002). However, as mentioned earlier, service occupations in particular are not prone for direct effects, such as computers that will replace the workers (Autor & Dorn, 2013).

When one would take service provision into account, cashiers have an extra added value. Providing service would benefit to the customer satisfaction, which has strong links with

revenue, retention, earnings per share and stock price. Therefore, cashiers have a benefit over technology as long as technology is not able to carry out this service aspect. Therefore, one could say that cashiers do have an influence on the financial and market performance of the firm (Williams & Naumann, 2011). Surprisingly, popular literature shows that current employment-rates within the retail sector are increasing a little bit. On top of that, the retail-related warehousing and couriers show even higher numbers (Maurer, 2019). Therefore, findings in literature and practice seem to contradict each other.

Methodology

For this research the Dutch supermarket concern is used, with the biggest market share in the Netherlands, namely 34.7 percent in 2019 (DistriFood, n.d.). The company consists of 984 stores in the Netherlands and 51 in Belgium. This organization is chosen because it already implemented self-scan with a device, self-scan with your mobile phone and scan&go (self-register). Due to the corona virus, the further implementation of self-scan has even accelerated because of the health benefits (Retailtrends, 2020). Therefore, this supermarket is an appropriate case to study the experience of technology (self-scan), as the employees have already experienced it for a while.

In total, 5 stores are included in the research, of which several cashiers were interviewed. There were 16 cashiers who participated in this study (1 male and 15 females), with a mean age of 46 ranging from 27 to 62 years with the Dutch nationality.

The interviews were recorded with the HD-audio recorder of an LG G7 ThinQ smartphone. After the interviews were transcribed, the transcripts were read through to get a clear overview of the collected data. Thereafter, the coding was performed in the program 'Atlas.ti'. The process was partly fixed as unfixed, as the variables were used as fixed codes just as some sub variables, while other sub variables arose during the coding process. After all documents were coded, the quotes were summed up to check if they fit the content of the (sub)variable and whether it was necessary to create new sub variables. The sub variables that arose during the coding process are part of the variables: managerial communication, perceived managerial support and career prospects. These variables are split up, because they included multiple concepts that would make it hard to interpret the results.

(Main) Results

It becomes clear that people differ regarding their opinions and experiences with automation due to technological developments. The interviews show that automation has replaced time consuming activities, making the process go faster and less prone to errors by using data instead of intuition. A critical factor in this is whether the devices are easy to use, which the interviews showed. Employees needed to get acquainted with the new technology at the self-checkout, but after getting both theoretical as practical support they manage to work with the system. The practical practices are mentioned as the most effective way of learning to master it.

The interviewees agree upon the successfulness of the training offered when the self-registers were introduced. The company arranges a meeting where employees get informed about the in content and usage of the system. Additionally, they provide the opportunity to

practice with putting it into practice by roleplaying with actors. In this way people can get used to possible situations that they may encounter. Next to this meeting, the employees visit another store where the system is already in action. They can practice what they have learnt in practice, while being supervised by employees who have had gone through the same route and can therefore use their experience in training. Apart from the fact that people are full of praise the introduction period, there are some comments about the tools that are offered to refresh current knowledge or obtain new knowledge. Not all interviewees are aware of the tools that the organization facilitates. Additionally, there are propositions for alternatives that are considered to be more helpful. However, input of employees does get valued. This can be seen in the updates that are based on the insights from the people that work with the devices.

Next to seeing things changed on a large scale due to issues that are reported throughout feedback, management also provides help on an individual level. Managers are reported to be easily approachable and helpful. People are feeling confident that their team leader is willing to think along with them, if the situation would occur that they want to be transferred or make a switch in career.

Secondly, among our sample population we noticed that some people do not regularly work with the devices, making it difficult to keep the information stored in their memory. Another reason is the fact that some people are not used to work with electronical devices and feel incapable to perform at the required level. Age is mentioned as a possible factor that could cause this insecurity, based on the fact that they have problems with storing and retrieving the information. Additionally, it was mentioned that it is sometimes hard to keep up with the pace. The speed a worker has, can be measured in the number of successfully completed actions. All in all, we have to admit that we saw that older people had more difficulties with the usage of electronics and personal computers compared to younger people in our sample, as they tend to make more errors and need more time to complete a certain task. The way people deal with new developments differed. Some are precursors, either to be sure they are well informed or because they enjoy the learning process. These people are studious and can be made responsible for monitoring their own progression, which is represented by the factor *self-direction*. As mentioned before, there are also people that don't feel comfortable with the usage of the devices. They mention that low-skilled workers will run into problems because they lack the technological knowledge. Together with the decreasing demand of low skilled due to digital technologies, this would be the reason why some low skilled workers are hesitant to changes of machine-based technologies to their work tasks.

References

Upon demand