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Human and Automation Resource Management: A Transformation Process Towards Integration

A qualitative case study in collaboration with Svenska Kullagerfabriken, SKF.

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“It is the human who is the center of attention in an automation transformation. People may not be specifically afraid of automation but are often afraid of change. The better one can integrate humans and machines in working together in a safe working environment, the better of it will be. One must see things in a different way and bring expertise around things.” –

Respondent 4

Abstract

Automation is a trend on the horizon for companies in different industries. In the automation transformation, the human capital is the challenging equation, where this research field is not that fully developed. Therefore, the research topic covers how the implementation of automation affects the demand for skills, working conditions and strategic consequences for human resource management. Through qualitative research with a case study with Svenska Kullagerfabriken known as SKF, the research uncovers how automation has shifted the planning needs, demand for skills, affected workers well-being and strategies. Through previous theory, interviews with twenty respondents and participation observation, the research found that the implementation of automation encourages human resources to change towards a people perspective to focus on competence development through internal training and development. The skills have shifted towards more process understanding and digital skills. The research further uncovered that working conditions have improved regarding physical, health and safety aspects due to automation, but there is a shift from physical to mental pressures. It has become more motivating to work with new equipment and job satisfaction has increased through mitigation of standardised tasks and fewer accidents. The research has identified a concept called Human and Automation Resource Management, HARM, which describes the integration process between humans and machines. This management style is a strategic consequence of automation and to achieve a successful HARM integration thirteen factors have been identified.

Keywords: Industry 4.0, Digitalisation, Automation, Human Resource Management, Automation Resource Management, Skills, Training and Development, Working Conditions, Job Satisfaction, Motivation.

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Abbreviations

AGV: Automated Guided Vehicle (Self driving forklift trucks)

ARM: Automation Resource Management

COVID-19: Coronavirus Disease 2019

GBO: Group Based Organisation

HARM: Human and Automation Resource Management

HR: Human Resources

HRM: Human Resource Management

Industry 4.0: Fourth Industrial Revolution

Industry 5.0: Fifth Industrial Revolution

IT: Information Technology

MNE: Multinational Enterprise

PX: People Experience (SKF's HR)

R&D: Research & Development

SKF: Svenska Kullagerfabriken

SME: Small and Medium-Sized Enterprises

1. Introduction

1.1. Background and Problem Discussion

Automation is a hot topic and is rapidly adopted by different industries (Acemoglu & Restrepo 2019; Dengler & Matthes 2018). Replacing standardised tasks with robots is an efficient and productive method for the business, which is on the horizon for many companies (Schwabe & Castellacci 2020; Acemoglu & Restrepo 2019). In this automation transformation, the human capital is the challenging equation in the transition towards automatic solutions, which is more complex than one can imagine (Acemoglu & Restrepo 2019; Stein & Scholz 2020). Human Resource Management, HRM, in relation to new technology is not that fully developed (Acemoglu & Restrepo 2019; Stein & Scholz 2020), therefore there is a necessity to gain a better understanding of the technological implications on the human capital (Fareri, Fantoni, Chiarello, Coli & Binda 2020).

Implementation of automation results in market changes (Fareri et al 2020), where automation influences the different labour demands (Horváth & Szabó 2019) and requires specific work skills (Buckley & Ghauri 2004). Automation requires both the right skills and talents to be accessible, which creates a change regarding building a new workforce (Fareri et al 2020). However, reskilling of workers in the most optimal way is still unclear for many organisations (Liboni, Cezarino, Jabbour, Oliveira & Stefanelli 2019). Therefore, there is a gap regarding knowledge and skills between the demand and the available workforce (Pio, Rampasso, Cazeri, Santa-Eulalia, Serafim & Anholon 2021). Additionally, workers' well-being in relation to automation is essential in organisations. However, this topic tends to be ignored in the literature (Nazareno & Schiff 2021; Cheng, Pien, Kubo & Cheng 2020). Automation affects workers' health in terms of job satisfaction and fear of replacement (Schwabe & Castellacci 2020), where motivation is the key factor to encourage workers to embrace the labour changes (Tan & Rajah 2019). Human capital is the greatest resource for the organisation. This resource is developed within an organisation and the organisation can navigate the human capital after their demand (Boxall 2013). If one does not have the human capital with the right skills regarding automation, the rest of the resources become of no value (Stein & Scholz 2020).

Neither human capital nor machines can be completely replaced (Badri, Boudreau-Trudel & Souissiet al 2018; Tan & Rajah 2019). Therefore, in an automated plant, a solution to manage the human capital and automation together is to integrate both HRM, and Automation Resource Management, ARM, into one management concept called Human and Automation Resource Management, HARM (Stein & Scholz 2020). This HARM integration can assist the management team with future planning of resources (Stein & Scholz 2020), which is needed due to the automation transformation. To achieve a successful integration process between humans and machines, there must be an acceptance and equal participation between the two parties (Pham, Madhavan, Righetti, Smart & Chatila 2018; Stein & Scholz 2020). The challenge is to balance this relationship (Nazareno & Schiff 2021; Stein & Scholz 2020; Badri et al 2018; Tan & Rajah 2019).

In this research, a case study has been conducted on Svenska Kullagerfabriken, SKF, which is a Swedish multinational enterprise, MNE. SKF has invested in an automation transformation called World-Class Manufacturing Concept, where they are in the process of automating their factory in Gothenburg called the D-factory. Therefore, SKF's is currently experiencing the challenges of automations impact on the human capital. The concept includes cost reduction, technological advancement, manufacturing footprint and production system (SKF 2021b). This investment started seven years ago, and it is a journey that will continue with further improvements (SKF 2022).

Through a case study with SKF, one has the opportunity to get a profound insight into how the automation transformation has shifted the demand for skills, changed planning needs, affected workers well-being and the strategic consequences for the HRM. Additionally, one can deepen the understanding of the HARM integration process regarding its challenges, benefits and advantages. Since automation in relation to HRM is not fully developed in the literature and is a relevant topic to many organisations in different industries, this research can be a valuable complement to the literature. The research can further add value as well as guidance to organisations that is planning on or are in the process of implementing an automation process on how to manage the human capital regarding changes of demand for skills, working conditions, and strategies for HRM.

1.2. Purpose and Research Questions

The purpose of this research is to get a profound understanding of *how automation changes the demand for skills, the working conditions, and the strategies for Human Resource Management in the manufacturing industry.*

This given purpose has formed the following research questions:

1. How does the implementation of automation plants shift in planning needs and the demand for skills?
2. How does the implementation of automation plants affect working conditions in terms of job satisfaction and motivation?
3. What are the strategic consequences of implementing an automation plant in an established factory for human resources management?

1.3. Delimitations

To identify the scope of the research, delimitations have been made. The research focus is on the effects of automation transformation on the current workforce in relation to skills, workers well-being and strategic consequences. The research does not focus on the recruitment process regarding how to attract new workers, nor does the research focus on electronic HRM or human resource information systems.

Another delimitation is that the research is conducted on one case study within the manufacturing industry, the Swedish MNE SKF. The case company is operating globally, but the research has been limited to the automation transformation, the World-Class Manufacturing Concept, at SKF's Gothenburg D-factory.

The research has been conducted on an MNE, where the results are based on an MNE's resources. Therefore, it may not be fully applicable for small and medium-sized enterprises, SME. The research has been of one company in the manufacturing industry. Therefore, this may not be fully applicable to other industries or to other companies within the manufacturing sector.

1.4. The Structure of The Thesis

There are six chapters in this research which are outlined in Figure 1. Each chapter will be presented to provide an overview of what the chapter contains.



Figure 1: The structure of the thesis.

2. Theoretical Framework

2.1. Human Resource Management

HRM in relation to automation is lacking and requires specific skills to be managed, particularly the future of automation activities and the effects on human's roles (Stein & Scholz 2020). HRM is a business function within international firms that is responsible for the organisation's human capital management (Kramar 2014; Stein & Scholz 2020) and is used as a resource to achieve both the organisation as well as the human's objectives. HRM's responsibility is to manage the challenges within the organisation's workforce (Stein & Scholz 2020). One challenge is to match the existing skills with the demand (Pio et al 2021) and obtain harmony between the organisation and workers (Stein & Scholz 2020).

The Human Resource department, HR department, is viewed as a separate function where they can either manage the human capital in this automation era or be replaced by technological advancements, which generates immense consequences for the human capital. Since many tasks become automated, the HR department may be seen as less important or even outsourced in the manufacturing industry. HRM must manage the technological progression that has transformed employment, shifted labour and caused unemployment (Stein & Scholz 2020). Therefore, the HR department needs to make some changes when planning for future needs (Ada, Ilic & Sagnak 2021; Pio et al 2021). The HR department should consider updating employment models, process, strategies, maintain and train employees (Pio et al 2021). Organisations that have information driven machines need a different operation management and not a traditional one (Stein & Scholz 2020), where organisations need to implement new HRM models to assist the adaptation toward technological changes (Pio et al 2021). This challenges the traditional perspective that the automation process often means transferring skills to machines (Adler 1987). To meet these rising issues and changes, business relies on HRM for support (Stein & Scholz 2020).

2.1.1. HRM Strategies

HRM has three sections: transactional, traditional and transformational. The transactional activities include standardised administrative tasks and services. The traditional activities include management of the workforce, recruitment, training and development. The transformational activities focus more on value creation for their stakeholders. Strategic HRM should aim for enhancing the workers performance and the organisation's competitive advantage (Abdul-Halim, Che-Ha, Geare & Ramayah 2016). Strategic HRM consist of the following six strategies (ibid):

- **Innovative**

The innovative strategy includes market research which enables the workers to use their knowledge and creativity.

- **Quality**

A quality strategy includes policies and practices that attract a qualified workforce. This strategy leans towards more a personal fit than a technical one. Since technical advancement is continuously evolving, it needs continuous training and development of workers. Training and development are an essential part of this strategy, which focuses on enhancing the overall quality.

- **Cost efficiency**

The cost efficiency strategy focuses on lowering production costs and increasing efficiency. One method to achieve this is stable and specific work tasks.

- **Commitment**

The commitment strategy focuses on employee commitment and skills. The HRM is supposed to care for the welfare and development as well as always encourage the workforce. Furthermore, this HRM strategy includes organising jobs that provide challenges, inclusiveness, autonomy, drive and motivation to generate a committed workforce.

- **Employee development**

The conventional strategy consists of training and development of the workforce. Furthermore, it is identified as having an internal labour supply. This strategy focuses on training to develop a highly skilled workforce to meet the dynamic environment challenges.

- **Conventional**

The conventional strategy focuses on specific areas such as recruitment, layoffs and salary. This strategy is identified as administrative activities where the value of the human resources is not the main focus.

Based on these six strategies, three common HRM practices in relation to labour changes have been outlined. The first one is reskill and upskill (Pham et al 2018; Card & Nelson 2019; Hou, Cheng, Wang, Xue & Chaudhry 2020; Pio et al 2021), this is connected to innovation, quality, employee development and commitment. The second one is outsourcing and offshoring, which is connected to cost efficiency. The third one is layoff (Boxall 2013), this is connected to the conventional strategy.

2.1.2. Reskill and Upskill

One common view is that humans perceive machines as a threat, where humans compete against the machines for the same working tasks. One practical example of this is Foxconn, where the human capital was replaced by one million automatic machines. One method to meet this challenge is to show workers that human skills are still relevant (Stein & Scholz 2020). The implementation of automation has resulted in less risk full jobs for humans. However, this has also created the status of stealing human jobs. The automation transformation heavily affects the human capital and has a similar pattern that occurred during the industrial revolution, where more new jobs were created than disappeared (Stein & Scholz 2020). During the 19th and 20th century, there were no remarkable job reductions. Instead, new jobs were created due to technical advancements (Gaponenko & Glenn 2020; Acemoglu & Restrepo 2019). The definition of work changed and will continue to do so during the 21st century with a rapid speed. The importance of human's skills is still relevant but needs to be integrated with machines to create value (Stein & Scholz 2020).

Automation is an important part of the future infrastructure, where the workforce must be ready to handle the technological advancement (Horváth & Szabó 2019; Pio et al 2021). In the automation transformation process together with lean manufacturing, training programs must be implemented for the current workforce to reskill and upskill in their adjustment towards new skill requirements (Pham et al 2018; Card & Nelson 2019; Doherty & Stephens 2021). Therefore, there is a critical need to reshape the human capital's position within automation before it becomes outdated (Stein & Scholz 2020). This will enhance the workers' empathic

ability, creativity and change their resilience (Card & Nelson 2019). The reskilling of workers in the most optimal way or attracting, retaining and replacing skills efficiently are still unclear for many organisations. It is important for managers and departments to collaborate with the HR department to identify the future needed skills and lack of knowledge, through reskilling and upskilling the workforce to meet the stakeholders demands (Liboni et al 2019). Through the mixture of technology, training and development, one can merge workers and job tasks in a specific way that was not possible before (Card & Nelson 2019). Technological advancement requires training to be able to interpret, understand and process new information (Stein & Scholz 2020). The development of the workforce should be included in the organisation's strategies (Pio et al 2021).

Technological advancement results in polarisation and enhances the gap between skilled and unskilled workers, this in the form of salaries and work opportunities (Schwabe & Castellacci 2020; Dengler & Matthes 2018). Furthermore, polarisation has affected workers' feelings towards their job tasks (Schwabe & Castellacci 2020). Automation has a greater impact on low skilled workers with standardised tasks, compared to high skilled workers (Fareri et al 2020; Schwabe & Castellacci 2020; Marengo 2019), where low skilled jobs will significantly decrease (Tan & Rajah 2019). Standardised tasks that easily can be automated usually do not require a high education. Meanwhile, tasks that are more advanced and are not easy to automate require a high education. However, both groups require training and education within an organisation (Stein & Scholz 2020). The standardised tasks that are easily replaced and performed better by automation are recording, scanning, tasks at the production line, sorting material and measuring (Tan & Rajah 2019).

Low skilled workers usually have a higher fear of replacement and job dissatisfaction (Schwabe & Castellacci 2020). The younger unskilled workers are more substitutable to machines. Meanwhile, machines are complementary to workers who are skilled and older (Stein & Scholz 2020; Schwabe & Castellacci 2020). Additionally, younger unskilled workers tend to view automation as a threat of job replacement since they have a long working life ahead and difficult to find new employment, while older skilled workers view automation as a positive impact on workers well-being and development in society. High skilled workers are more positively influenced by automation through an increase for labour, salary and more complex work tasks. However, workers with a high-income level tend to be more fearful of the automation's effects on their salary, compared to workers with a lower income (Schwabe & Castellacci 2020). Automation can at times have a negative impact short term with enhanced uncertainty and

replacement fear for low skilled workers with standardised tasks, but a positive impact long term in the form of societal and financial benefits (Schwabe & Castellacci 2020; Marengo 2019).

There should be policies regarding upgrading the workforce through training and development when tasks get automated (Ozkan-Ozen, Kazancoglu & Mangla 2020). Policies can also help with job insecurities for workers whose tasks can easily be automated, which would contribute to a safer and more stable employment (Cheng, Pien & Cheng 2021). Acquiring new knowledge together with training and development are essential for employability (Stein & Scholz 2020; Ybema, Van Vuuren & Van Dam 2020). One control factor for employability and fear of replacement is education (Schwabe & Castellacci 2020).

External institutions should support training and development in the automation transformation process, where workers that fear replacement can gain new skills to maintain the machines. This would result in increased well-being, qualifications and future work prospects (Schwabe & Castellacci 2020). There are different platforms for education, where training and providing dynamic programs are essential for changing the workforce attitude towards automation (Ozkan-Ozen et al 2020). Upgrading labour can be easier said than done, since workers might be reluctant and unmotivated towards learning new things (Stein & Scholz 2020). Within the manufacturing industry, vocational training is a common educational form which is a tool to keep employees skills updated (Vereycken, Ramioul, Desiere & Bal 2021), from unskilled to highly skilled (Dengler & Matthes 2018; Fareri et al 2020). To train and develop the needed workforce, there should be a mutual collaboration between industries, governments, universities (Marengo 2019; Fareri et al 2020) and initiative to encourage workers creativity regarding their capabilities. This since many organisations rely on external education institutions to build their workforce. It is important that managers are aware of the synergies between the external environment and the resources of the organisation (Kramar 2014).

Automation causes a change in demand for skills, where some working areas will have a higher demand (Fareri et al 2020). An empirical study in Germany showed that the decrease in employment in the manufacturing industry was compensated with the increased demand in the service sector (Schwabe & Castellacci 2020). In this automation era, soft skills are more important than hard skills (Fareri et al 2020). Therefore, there is a gap within the labour market regarding knowledge and skills between the demand and the available workforce (Pio et al 2021). There is a growing demand within data integration (Xu, Xu & Li 2018) and digital skills

which consist of problem solving, critical thinking, creativity, innovation, teamwork, engagement, communication, management and information (Vereycken et al 2021; Tan & Rajah 2019). Some of the growing job titles are software engineer (Pio et al 2021), coding, project manager and programmer. The current and future development of automation includes machine knowledge and creating systems that replace some human activities. This transformation encourages organisations to make financial investments in technology and the required methods (Ada et al 2021).

2.1.3. Outsourcing and Offshoring

Offshoring is a HR practice in the manufacturing industry, where the geographic location of the production is relocated domestically or globally within the MNE. Offshoring could at times include outsourcing. However, outsourcing involves external parties outside the MNE (Hummels, Munch & Xiang 2018).

Globalisation and changed market conditions encourage MNEs to relocate their activities. To stay competitive on the market, human creativity and skills are necessary (Abdul-Halim et al 2016). Technological advancement has made it easier for MNEs to outsource and control their activities (Balcet & Ietto-Gillies 2020). Therefore, many MNEs within the manufacturing industry decide to outsource activities, to be able to focus on their own core activities that are crucial for their competitiveness and survival on the market (Abdul-Halim et al 2016). When outsourcing occurs, the HR can implement fragmented strategies for the workforce which involves spreading the production across various organisations. However, this can integrate industries and sectors. Outsourcing can occur within the nation and abroad, where it also affects the global value chains (Balcet & Ietto-Gillies 2020). Outsourcing is viewed as a cost saving method for the MNE, where the HR department will have the ability to move away from administrative tasks towards more value-added activities (Abdul-Halim et al 2016). The effects of outsourcing depend on the activity that is being outsourced and the location. The workforce can at times be moved to another company, often a smaller one. However, due to different labour laws and regulations among countries the organisation of labour regarding ownership can be challenging (Balcet & Ietto-Gillies 2020). To address the shortages of human capital when outsourcing occurs, the HR department needs to be strategic (Abdul-Halim et al 2016). Additionally, since robots can communicate and have autonomy, it mitigates the need for outsourcing to countries with lower labour costs or downsizing (Cheng et al 2020; Stein &

Scholz 2020). Automation is common to implement in countries where labour intensive manufacturing is prominent (Cheng et al 2020).

2.1.4. Layoff

Some managers argue that a so-called leaner and meaner organisational structure upholds the organisation's competitive advantage, which can include layoffs (Cregan, Kulik, Johnston & Bartram 2021). The purposes behind a layoff are commonly cost savings, higher profitability and increased productivity (Bergström & Arman 2017). The type of layoff that is implemented depends on the organisation's motivation (Cregan et al 2021). When downsizing in terms of layoffs, it usually has a negative impact on the remaining workforce in terms of fairness. However, it could depend on the chosen layoff practice. There are two identified layoff practices: compulsory redundancies and voluntary redundancies. Compulsory redundancies are viewed as an unfair practice, where the decisions on how to layoff could depend on unethical and biased decisions. Voluntary redundancies include a more unforced layoff, where the workers are offered a beneficial package or early retirement. This practice is more transparent and reduces guilt that some people might feel. Furthermore, this practice could have a positive impact on the remaining workers (Bergström & Arman 2017).

One common layoff strategy is a calculative one, that is driven by financial gains, fosters a risk culture and relies on management authority. This calculative strategy causes changes in workers behaviour and attitudes. Furthermore, this strategy tends to be linked to low or non-union presence and managers autonomy (Cregan et al 2021). To have a better survivor reaction from the remaining workers, one should involve representatives from the workforce in the process of layoff (Cregan et al 2021; Bergström & Arman 2017).

2.1.5. Working Conditions

Technological advancement is both a threat and opportunity for employment and the work quality. There are several factors that affect job quality, where the salary is not the only attribute that matters (Schwabe & Castellacci 2020), health and safety are also important factors to consider in an automation transformation (Cheng et al 2021). Workers' well-being is essential in organisations. However, this topic tends to be ignored in relation to automation (Nazareno & Schiff 2021; Cheng, Pien, Kubo & Cheng 2020), especially regarding the psychosocial health risks (Cheng et al 2020). Factors that influence the working conditions are meaningfulness, social belonging, job satisfaction and motivation (Nazareno & Schiff 2021). Since automation

will result in a shift of skills, mental and physical pressures will increase due to changes and labour uncertainty (Pham et al 2018). However, a study from Denmark showed that automation resulted in higher job security, autonomy, work arrangements and a decrease in low skilled tasks (Cheng et al 2020). Additionally, working conditions will improve through enhanced freedom, autonomy and creativity (Nazareno & Schiff 2021).

Since automation commonly replaces standardised tasks, the job quality and working conditions can enhance while mitigating injuries. An example of this is reduction in heavy lifting, due to machines. Robots can also replace unsafe tasks (Cheng et al 2020; Schwabe & Castellacci 2020; Stein & Scholz 2020; Pham et al 2018). However, workers that are integrated with machines in their work tasks may not see the improvements in their working conditions (Pham et al 2018). The implementation of automation creates a psychosocial hazard, due to the change in tasks. Therefore, collective agreements with the government should be established to improve working conditions. Automation is estimated to improve the organisation's financial performance, the social policies should also be improved to protect and maintain the workers' health. Policies are especially important regarding the interaction between humans and machines, to avoid burnouts, hence sick leave costs (Cheng et al 2020).

There are different factors that affect workers' health, where automation has an impact (Schwabe & Castellacci 2020). One factor that encourages the fear of replacement is the social discussion about automation in the media where the term replacement is commonly used (Dengler & Matthes 2018; Schwabe & Castellacci 2020; Borjas & Freeman 2019). Although many media statements are not scientifically based it creates job uncertainty and has a negative impact on workers mental health, job satisfaction and working conditions (Schwabe & Castellacci 2020). Another factor is the machines' ability to perform more efficiently, rapidly and cost efficiently than a human (Gaponenko & Glenn 2020; Schwabe & Castellacci 2020). Workers have a fear of automation resulting in decreased salary and economic uncertainty. Therefore, if workers have a fear of automation replacing them, it can lead to anxiety, low productivity, decreased innovation (Schwabe & Castellacci 2020), higher stress (Schwabe & Castellacci 2020; Nazareno & Schiff 2021) and increased control (Nazareno & Schiff 2021). Workers within an industry that commonly is automated can experience fear even if their job tasks are not directly linked to automation. However, members of the union tend to be less fearful of replacement, since their membership provides them with a certain protection regarding working conditions and employment (Schwabe & Castellacci 2020). According to previous case studies in the USA and Norway, workers with the impression of automation

replacing humans and lowering wages was associated with a low job security and bad health (Cheng et al 2020).

2.1.6. Job Satisfaction and Motivation

As previously mentioned, automation is a growing trend within the manufacturing industry and affects workers' health in terms of job satisfaction and fear of replacement (Schwabe & Castellacci 2020). Job satisfaction consists of the level of satisfaction that a worker feels towards its task (Memon, Salleh, Mirza, Cheah, Ting, Ahmad & Tariq 2020). Job satisfaction is an important matter to address since the individual spends a large amount of time at work, which makes job satisfaction a significant part of their well-being (Schwabe & Castellacci 2020; Memon et al 2020). To improve the workforce performance, training and development increase job satisfaction, engagement, financial outcome, avoids burnouts and minimises turnovers. Training and development help the workers to meet the skill demand and fosters personal growth. The training outline should be designed in a way that makes the job more attractive, which increases the job satisfaction (Memon et al 2020). Low job satisfaction can result in unhappiness and job dissatisfaction, which leads to low efforts, motivation, increased staff turnover costs (Schwabe & Castellacci 2020) and can generate negative attitudes among the workers, where system failure can arise (Memon et al 2020). Job insecurities, job satisfaction and organisational justice are factors that are affected by organisational change (Tan & Rajah 2019).

Organisations could either enforce unique HR methods to specifically target their workers or a wider range of diverse HR methods to cover all aspects in enhancing workers' motivation, health and employability. One essential HRM practice is sustainable employability, that consists of the workers' motivation, knowledge, skills and health. Motivation is related to the working conditions, behaviour and performance through providing energy and guidance. This is essential for future participation in labour, productivity, low sick leave (Ybema et al 2020) and employee efficiency, which affects the success of the organisation (Schwabe & Castellacci 2020). Since human capital is one of the most important resources within a company (Boxall 2013), building the right workforce with the right mindset and skills regarding automation is essential (Nazareno & Schiff 2021). Motivation is the key factor to encourage workers to embrace the labour changes. In an area of automation, workers' support is necessary to implement new concepts, models and strategies. From a theoretical point of view, motivation is a method of directing and modifying human behaviours into a certain direction through an

impelling way that satisfies the individual's needs. Work motivation is defined as a process that maintains, encourages and directs workers behaviour (Tan & Rajah 2019). Improving working conditions results in a higher motivation (Ybema et al 2020). The factors that encourage motivation are multiple, therefore there is not only one action that must be taken (Tan & Rajah 2019). Some motivation factors for the workers are promotion opportunities, opportunities for training and development as well as mobility activities (Ybema et al 2020).

To encourage work motivation, it is important that workers can adapt to new models. Therefore, the organisation must provide workers with the essential inputs (Tan & Rajah 2019). Both the young and old generation of workers are affected by labour opportunities, job motivation and work ability. They need to stay motivated to develop their skills and drive the organisation forward. To achieve sustainable employability for the older generation, HRM methods to enhance their motivation, health aspects and employability are essential. This could further motivate the workers to delay their retirement (Ybema et al 2020). A higher salary can motivate the workers in their task efficiency. However, it may not motivate the workers regarding knowledge sharing, since the workers are focused on their individual task efficiency. It is important to acknowledge that work behaviour demands diverse stimulation of motivation (Tan & Rajah 2019).

2.2. Automation Resource Management

Digitalisation transforms the society, where the fourth industrial revolution called Industry 4.0 is the current transformation of automation within the manufacturing industry (Horváth & Szabó 2019; Xu et al 2018; Szász, Demeter, Rácz & Losonci 2020), which primarily consists of internet of things, blockchain technology, cyber physical systems and cloud computing (Xu et al 2018). Compared to the previous historical technical revolutions, Industry 4.0 demands diverse knowledge and skills from the workforce through new methods of automation (Tan & Rajah 2019). Industry 4.0 emphasises the importance of human and machine integration as well as collaboration (Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020), which will transform the labour market within the manufacturing industry (Stein & Scholz 2020). The methods used in lean manufacturing are very similar to a management style with a bottom-top perspective (Fareri et al 2020).

Automation is one of the most significant developments within the manufacturing industry (Stein & Scholz 2020; Horváth & Szabó 2019). Automation enhances the business effectiveness, productivity (Acemoglu & Restrepo 2019; Schwabe & Castellacci 2020), mitigates costs, optimises procedures, generates increased output with better quality, improved safety, better working conditions (Mohamed 2018) and results in fewer maintenance workers (Horváth & Szabó 2019; Marengo 2019; Stein & Scholz 2020). Automation is viewed as a gateway to access new jobs, knowledge, economic growth (Marengo 2019), enhances the production in manufacturing industries with new procedures and transforms the need for human capital (Horváth & Szabó 2019). This affects the labour market regarding the dynamics of jobs, conditions of work, skills and policies (Pio et al 2021). However, new technological advancement disrupts work (Tan & Rajah 2019; Pham et al 2018), resulting in a shift in labour demands regarding skills, income and work tasks (Acemoglu & Restrepo 2019). This technological change can result in unemployment, outsourcing and offshoring (Boxall 2013).

ARM is a management concept that consists of controlling, coordinating, designing and adapting machines to the systems of production and business processes (Stein & Scholz 2020). To manage the automation transformation there are different aspects that need to be considered in this process, where measures need to be implemented within different areas. These areas include local institutions and governance, economics and employment, technology and science, media and education (Gaponenko & Glenn 2020). To manage automation properly, data processing and distribution of information is vital and complex. Humans are the driving force

for technological advancement which is based on demand, economics, history and ideology. ARM is suitable for certain operation tasks in automation. However, it does not replace the human capital in the automation process (Stein & Scholz 2020).

Innovative technologies within manufacturing have led to automation and information systems, influencing the changes within automation, allowing interaction and communication among technology, employees and the organisation. Shifts in the manufacturing industry affect the human capital, which influences the business model and the value chain (Stein & Scholz 2020). The income effect is an economic theory that assumes that new technology will both create and replace jobs, where technological advancement will decrease costs of production, which results in low prices followed by enhanced demand. The result of this allows organisations to enhance their production and generate new jobs (Gaponenko & Glenn 2020).

Automation will affect some jobs within the near future which will require different competences where human and machine collaboration will be more extended, profound and complex (Gaponenko & Glenn 2020). Automation has a huge impact on work tasks where human skills are not essential and human characteristics have a little impact on work tasks (Schwabe & Castellacci 2020). More complex tasks such as analysing data, interpreting information, decision making, operational technologies and law interpretation are tasks that machines are starting to handle as well. Therefore, automation can reduce workers and at the same time improve quality as well as quantity (Tan & Rajah 2019). On the contrary, Stein and Sholz (2020) argue that there is a common misconception among unions, economists and employees regarding automation is technical unemployment, where if a work task or skill can be automated, it will. However, this misconception does not include the entrepreneurial mindset and social legitimacy that is necessary for the organisation's survival (Stein & Scholz 2020). There is a stigma that automation results in unemployment. However, according to conducted surveys, the decreased employee rates within the manufacturing industry during the last two decades was not significantly caused by automation, but due to international business, trade and competition as the determining factors (Schwabe & Castellacci 2020). The automation process challenges are institutional, technological and cultural barriers. This since different countries have different development levels within these areas. One method to meet this challenge is migration, where experts from developed countries migrate to developing countries to contribute with technological advancements on a global scale (Gaponenko & Glenn 2020).

2.3. Human and Automation Resource Management

2.3.1. HARM Concept

To meet the automation challenges, the HR department should collaborate with the department of research and development, R&D, regarding business strategies. To solve the issue of cyber systems (Stein & Scholz 2020) for the human capital to survive, it is essential to integrate both automation and the human resources (Stein & Scholz 2020; Gaponenko & Glenn 2020; Pham et al 2018; Ozkan-Ozena et al 2020).

One way to manage both humans and automation can be to combine both these terms into one concept called HARM. This integration will generate synergies for both parties and HARM can be a solution for the competition between ARM and HRM, where they will work with each other instead of against each other (Stein & Scholz 2020). For the interaction to be successful, there must be an acceptance and equal participation between the two parties to solve problems (Pham et al 2018; Stein & Scholz 2020). In the interaction process, the strength of ARM and HRM needs to be evaluated to decide which one should be incorporated in the HARM function. HARM integration permits full capability utilisation. The integration of humans and machines improves the quality of the output and does not mean higher costs (Stein & Scholz 2020). Furthermore, this integration includes sharing work tasks, which increases the production speed (Badri et al 2018). To reach an optimal HARM function, the human capital needs to be diversified to contribute with different technological experiences and mindsets to sustain competitive advantage (Stein & Scholz 2020).

Tesla illustrates an example that automation alone is not optimal, where they implemented a fully automated factory that was not successful. Although machines provide the benefit of cost efficiency, standardisation, higher productivity and mitigates error, humans are the primary source regarding innovation for evolution of competitive advantage (Stein & Scholz 2020). Neither human capital nor machines can be completely replaced (Badri et al 2018; Tan & Rajah 2019). Technology increases productivity through digital and physical support as a complement, not replacing humans (Tan & Rajah 2019). The tasks that cannot be fully replaced by machines are social intelligence, interpretation, manipulation (Nazareno & Schiff 2021), creativity (Nazareno & Schiff 2021; Stein & Scholz 2020) and social harmony (Stein & Scholz 2020). Robots are programmed to perform a specific task. However, when a change in the performance of tasks occurs the robots need reprogramming, which they cannot do by

themselves and therefore need human assistance (Pham et al 2018). This fosters a synergistic view, where humans and machines can benefit from each other and create a greater value. When humans and robots collaborate the work efficiency, location and flexibility get enhanced. Furthermore, research suggests that this form of collaboration has a positive influence on the labour market and is a better combination compared to having only humans or machines (Stein & Scholz 2020).

HARM's purpose is to composite technological advancements and human capital in the automation process towards a smart factory (Stein & Scholz 2020). This investment will affect the organisation's value chain (Mohamed 2018) and will optimise the profit (Fareri et al 2020). This includes programming, infrastructure, cyber security, skill supply, management routines and the psychology behind the collaboration between humans and machines. Furthermore, the main objective of the HARM function is to be resilient and decrease transaction costs. To establish a successful synergy relationship for both the human and machines, there are eleven factors that need to be incorporated (Stein & Scholz 2020):

- **Improve management effectiveness.**

The integration between the human and the robots on the work floor will have dynamic effects. Therefore, leadership qualities and characteristics need to be adjusted to lead the new workforce.

- **Be open to organisational transformation.**

It is important to be open to change regarding work tasks and shifts in demanded skills, particularly the automation's impact on humans. As previously mentioned, automation is an era where old jobs will disappear, and new jobs will be created. Therefore, the changes need to be handled both on a group and at an individual level.

- **Foster long-term relationships with the management.**

The organisational changes that will occur during the implementation of automation is a long-term project, where the management communication and action towards the workers is important. To obtain HARM's vision in organisational change there needs to be faith in this transformation process.

- **Strategy synchronisation.**

To implement automation successfully the technological strategies, need to be aligned and integrated with the organisation's main strategy and objectives. Additionally, there needs to be a strategic fit for the organisation's long-term survival and competitiveness.

- **Training and development.**

The HARM process will require a new capacity building, where new knowledge will be required. Additionally, workers need to adapt to the automation processes in terms of managing new technology. This change has a significant impact on particularly unskilled workers.

- **Equal participation.**

The future of automation progress will depend on the integration between humans and robots, where proactive humans will interact with robots to innovate new ideas for future automation processes.

- **Forster teamwork.**

The HARM's process foundation consists of the interaction between humans and robots, where they are integrated as a workforce. Within this teamwork, humans would be required to trust the robots as their colleagues, even though the robots might not trust the humans.

- **Transforming the organisational culture.**

The implementation of the HARM process will require a cultural change within the organisation, especially regarding workers attitudes regarding automation. The cultural aim of HARM is to foster a culture of teamwork, acceptance and beneficial exchange.

- **Improve and establish a joint communication.**

One of the HARM's process integration challenges is language and communication, where the interaction between humans and machines would require a different kind of language to avoid communication barriers. This challenge is essential to address to foster knowledge sharing between humans and machines.

- **Creating a HARM network and projects.**

The HARM process is estimated to participate in innovation network collaborations and projects to together create technologies within information systems. This will also prepare and integrate the workers in the new automation network structures.

- **Value creation in global production, national culture and regional diversity.**

The trend of outsourcing to low-cost countries can decrease with time due to the implementation of automation, where automation enables organisations to establish manufacturing in their home country. This will result in more and new jobs in the home country.

2.3.2. HARM's Integration Process

There are three theories that can help to gain a better understanding of the foundation of the integration process between automation and human capital. These are organisational sensemaking, transaction costs and social acceptance (Stein & Scholz 2020).

Organisational sensemaking includes workers accepting the automation process (Pham et al 2018; Stein & Scholz 2020), which changes work tasks as well as roles and the logic behind it (Stein & Scholz 2020). It makes sense to automate as it can be profitable and beneficial for the organisation as a whole (Gaponenko & Glenn 2020; Schwabe & Castellacci 2020; Stein & Scholz 2020). Since this theory includes changes in job tasks, this theory is relevant from workers perspective (Cheng et al 2020; Boxall 2013; Stein & Scholz 2020). Through implementing automation within the business strategy, it will demonstrate that automation makes organisational sense and can be viewed as a competitive advantage (Stein & Scholz 2020).

Transaction costs is a way to measure and compare the enhanced efficiency which is created by integrating automation and human capital. There are four aspects that make the HARM integration profitable according to Stein and Scholz (2020). This first aspect is a decrease in transaction costs due to standardised tasks and processes. The second aspect is that the resources are more utilised which includes the relationship between robots and humans. With more knowledge about each other's characteristics the more they rely on each other, this results in less errors. The third aspect is reduced uncertainty in terms of risk management which will generate lower transaction costs. The fourth aspect is that one should manage the human capital and robots together to lower costs and not separately (Stein & Scholz 2020), both humans and machines should be integrated to share information and knowledge (Gaponenko & Glenn 2020; Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020).

Social acceptance includes legitimacy which is embedded in institutionalism. This theory justifies the automation and human capital integration into the HARM concept. It challenges the mindsets of workers regarding job losses in automation processes, robots should not be viewed as competitors or threats (Stein & Scholz 2020). People tend to view robots as a threat, instead of a measure of liberation (Pham et al 2018). It is about having a positive attitude towards automation and viewing robots as a part of the workforce. The social acceptance further

shifts the social norms in terms of normative isomorphism and mimetic isomorphism, where organisations imitate each other's processes (Stein & Scholz 2020).

Technology and society influence each other in a cause-and-effect relationship where human and automation are linked in the same networks (Stein & Scholz 2020). The challenge is to balance this relationship (Nazareno & Schiff 2021; Stein & Scholz 2020; Badri et al 2018; Tan & Rajah 2019). Information Technology, IT, was assigned to assist the HR function. Nowadays, IT instead drives HR which results in outsourcing and standardisation (Stein & Scholz 2020). From previous technological advancement, the human capital directed the machines where human interaction was separated from the machine interaction (Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020). However, due to the latest technological advancement in automation, the machines can integrate with each other, known as machine-machine interaction, and they can also communicate with humans (Xu et al 2018; Marengo 2019; Tan & Rajah 2019; Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020). This makes them a part of the workforce (Stein & Scholz 2020).

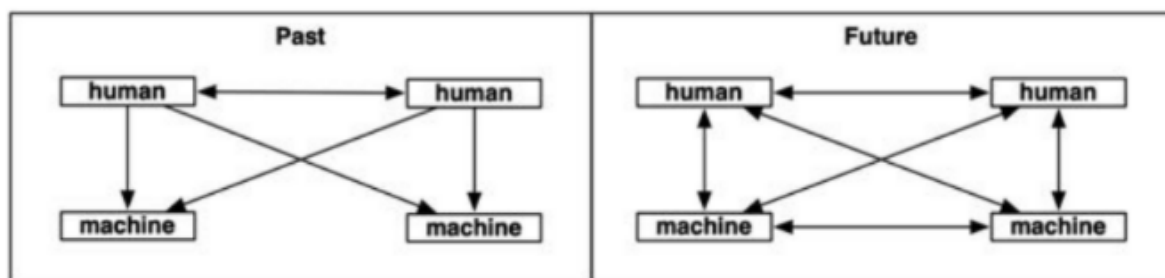


Figure 2: Shift of communicative interaction between humans and machines (Stein & Scholz 2020).

Figure 2 illustrates the communication transformation from technological advancement, where the separate human-human interaction and human to machine interaction has evolved to a mutual machine-human interaction and machine-machine interaction, due to automation. In this process knowledge sharing can occur from humans to machines, but also from machines to humans. Training is necessary for both machines and humans to develop, where machines also can teach humans (Stein & Scholz 2020). Furthermore, this integration process can decrease stress through the different interactions (Cheng et al 2021).

The relationship and integration between humans and machines are usually viewed as synergies where recognition of each other's demands is essential. However, in recent times the relationship can be viewed as human-machine symbiosis, where the two resources have emerged into one with a common objective and vision. Value is created from their interdependence (Stein & Scholz 2020), resulting in a higher value creation, tight collaboration, in-depth learning, knowledge exchange (Gaponenko & Glenn 2020; Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020), coordinate strategies, economies of scope, higher bargaining power, knowing each other's strengths and weaknesses. Resource sharing is necessary, especially regarding information systems which enables the integration between humans and machines (Stein & Scholz 2020). Furthermore, it enables humans and machines to share tasks (Badri et al 2018). Aspects that threaten the synergy relationships are dominant behaviour, mistrust and resilient to knowledge or resource sharing (Stein & Scholz 2020).

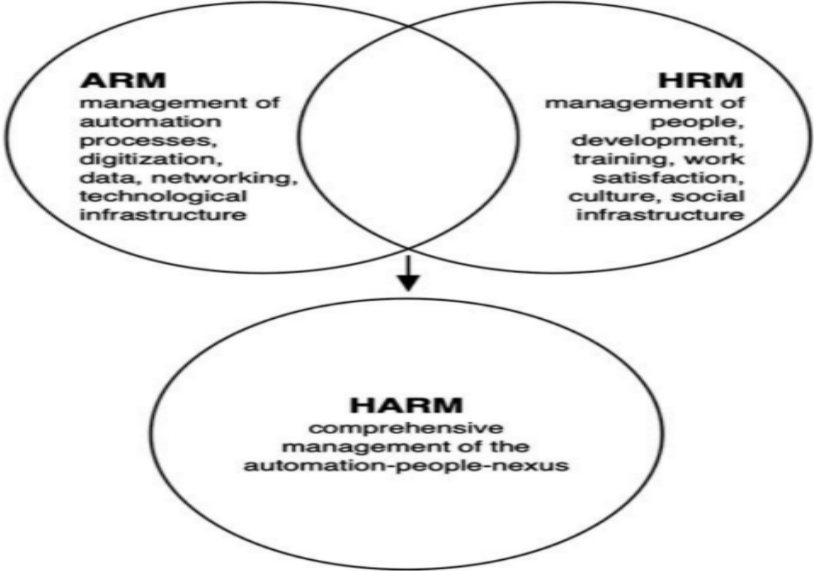


Figure 3: Synergistic logic of the merger of ARM and HRM to HARM (Stein & Scholz 2020).

Figure 3 illustrates the synergies from HARM, which is an integration of ARM and HRM (Stein & Scholz 2020). From a resource perspective, the HARM function assists the management team with future planning of resources. The HARM function is essential and must be fully functional to accomplish social sustainability and synergies for both parties (ibid).

2.4. Summary of the Theoretical Framework and Conceptual Model

Automation is a relevant trend that will be implemented in most industries (Acemoglu & Restrepo 2019; Dengler & Matthes 2018) and affect the business models (Sazás et al 2020; Pio et al 2021). Automation has resulted in a need for a new management concept, instead of a traditional one (Stein & Scholz 2020), where new HRM models need to be implemented to match the existing skills with the new demand (Pio et al 2021). Automation will impact the relationships between humans and machines, where it will cause a global shift regarding labour skills in the manufacturing industry (Stein & Scholz 2020). Therefore, the human capital's position within automation must be reshaped before it becomes obsolete (Stein & Scholz 2020). This creates a shift in HR practices regarding upskill and reskill (Pham et al 2018; Card & Nelson 2019; Hou et al 2020; Pio et al 2021), layoffs, outsourcing, offshoring (Boxall 2013), workers' attitude and knowledge towards automation (Stein & Scholz 2020). Additionally, automation creates a psychosocial hazard, due to the change in tasks (Cheng et al 2020). This will impact the working conditions, job satisfaction and motivation (Schwabe & Castellacci 2020). HARM is a process to combine humans and automation into one management concept. This integration will generate synergies, mutual learning, resource sharing, full capability utilisation, acceptance, equal participation with the same objectives and vision. Research suggests that a combination of humans and machines are optimal. The challenge is to balance this relationship (Stein & Scholz 2020).

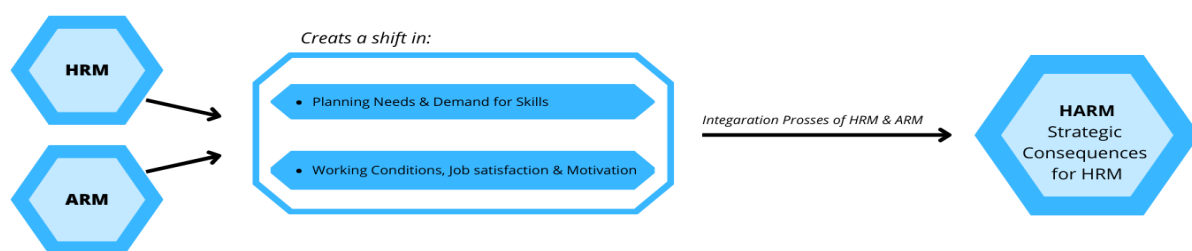


Figure 4: Conceptual model, based on Stein and Scholz (2020)

Figure 4 illustrates how automation in relation to HRM creates a shift in planning needs and demand for skills as well as working conditions, job satisfaction and motivation. This integration process results in HARM, which generates strategic consequences for HRM. The empirical findings are developed from the conceptual model with the research questions as a direction to cover the theoretical themes.

3. Methodology

3.1. Scientific Approach

3.1.1. Ontology and Critical Realism

Ontology is a research perspective that is a part of the social science philosophy, which consists of an objectivism position and a constructionism position. Ontology includes designing a theory about reality, where the objective is to understand the reality of the world. Constructionism refers to social actors influencing the phenomena through different actions and objectivism refers to the opposite, where the phenomena exist without the dependence of social actors (Bell, Bryman & Harley 2019). The social structure that is researched is the automation plant at SKF. The purpose of this research is to understand the reality of how automation changes the demand for skills, working conditions and strategies in relation to HRM. Therefore, the research leans towards an objective approach, where the authors have tried their best to observe and interpret the SKF's automation plant objectively and independently of the employees' subjective interpretations of the objective truth. However, according to Bell et al (2019), it is difficult to be completely objective. Therefore, the authors have been mindful of this aspect, where critical reflections have been applied when observing and interpreting the respondents' answers, which could involve different perceptions of the same phenomena.

Critical realism takes an ontological approach, where social structures are viewed as real and exist independently no matter of people's perceptions. The real part is identified through mechanisms that produce an outcome. However, this layer can at times not be observed. The empirical part consists of the thing that is being observed (Volkoff & Strong 2013). The empirical part is based on observations from the employees that are connected to the automation plant at SKF. This research is on a material process, where many objective changes have occurred due to this automation process and the research has a realistic standpoint. This automation process has continued regardless of perceptions. Critical realism helps to understand the complexity of a social process (Stevens 2020). Since the automation implementation process has been highlighted as complex by Adler (1987), Acemoglu and Restrepo (2019), Stein and Scholz (2020), critical realism is a suitable method to apply in this research.

The critical realism approach focuses on producing and generating knowledge. However, at the same time the critical realism approach focuses on implementing change, which could increase the risk of researcher bias. Therefore, critical realism can be argued to not be radical enough (Hammersley 2009). The authors acknowledge the risk of bias and have been systematically reviewing the data to minimise the possibility of bias. According to Volkoff and Strong (2013), a way to understand the mechanisms from a realistic perspective that is critical, is to understand how new structures affect the organisation's performance and how these structures are fostered. Critical realism temporarily separates agency and structure, where structures are viewed as preconditions for the actions. The agents are people that have abilities to think, reflect, show emotions and are conscious. The agents can plan, formulate goals and can uphold and change these structures (ibid). This research will observe the structures that have been implemented in SKF's automation plant, to drive this plant forward. The agents are the employees from different departments at SKF's connected to the automation plant, which fosters these structures.

3.1.2. Qualitative Research Strategy

The main characteristic of qualitative research is that it mainly consists of words regarding data gathering and analysis, while quantitative research focuses on numbers. The strategy of a qualitative method involves inductive, constructive and interpretive features. Meanwhile, a quantitative research strategy method is based on deductive, objective and natural science features (Bell et al 2019). A qualitative method is flexible, sensitive and explorative to gain a profound understanding of human's behaviours and attitudes (Hakim 2000). The qualitative method considers social actors that are not able to be quantified and therefore focuses on explaining and interpreting dynamic relationships (Queirós, Faria & Almeida 2017). Furthermore, qualitative research allows testing theories, creates new concepts and opens the ability of theory development (Doz 2011; Arghode 2012). Based on the research purpose and research questions, where the aim is to get a profound understanding of social phenomena, this research will be qualitative research. For the empirical data collection, semi-structured interviews and participant observation at SKF are the chosen methods. In order to gain a deep understanding of how the automation process will shift the demand for skills, a qualitative method can be considered as the best fit for this research compared to a quantitative method. The critique towards qualitative research is that it can be overly subjective, challenging to generalise, lack transparency and complicated to replicate (Bell et al 2019). To meet these critics, the authors have done the best to describe the research findings from an objective standpoint that can be applicable to similar processes. The authors have further described how

the results have been analysed, from what perspectives and from what basis, to achieve transparency.

3.1.3. Abductive Research Approach

Abductive research begins with observing interesting social events or trends and then explaining them using theory and collected data (Bell et al 2019). Since the purpose of the research is to observe the trend of implementing automation transformation through a case study, an abductive approach is considered the best fit.

An abductive approach is a mix of deductive and inductive approaches. The advantage with an abductive approach is that it eliminates the deductive and inductive weaknesses as well as difficulties. The abductive approach aims to construct theories based on reality, which is usually triggered by a curious event that seeks further understanding (Bell et al 2019). In this regard, automation can be considered as a curious trend that needs further explanation when it comes to its impact on the workforce.

In an abductive approach, the researchers are constantly moving back and forth between the theory and the empirical part, where the challenge is to construct the ultimate explanation based on competing theories and data interpretation (Bell et al 2019). This approach has been valuable in the research process, where data continuously has been adjusted in the theory and empirical parts to make it coherent as well as streamlined. It has also been valuable in developing the analytical part. The abductive approach allows one to be open to new interpretation and not solely based on predetermined understandings (Alvesson & Kärreman 2007; Mantere & Ketokivi 2013), which is relevant in a case study.

3.1.4. Research Design - Case Study

The research design presents the framework that will be applied to guide and conduct the research method, gather data and analyse it, which represents the quality of the research. The gathered data should be related to the research purpose and research question (Bell et al 2019). A case study with SKF has been conducted to gain an in-depth insight and understanding of a real-case automation transformation and its strategic consequences for HRM. According to Bell et al (2019), case study is a research design of one specific case in which one conducts a thorough and rich analysis to understand the complexity, uniqueness and nature of the specific case. Regarding the case study design, the approach will be to conduct a case study on a single organisation and their automation plant.

In a case study, there are different approaches that can be used together, such as idiographic, intricate and instrumental. An idiographic approach is when the researcher wants to emphasise the case's unique characteristics, the intricate case study wants to gain deep knowledge of the case and instrumental case study wants to use the case to understand bigger issues or challenge generalisations. However, general concerns regarding case studies are generalisability (Bell et al. 2019), which has been taken into consideration when analysing and formulating the analytical part. Through a case study with SKF, one has the opportunity to get a profound insight into the automation transformation process, identify unique characteristics, challenge generalised concepts and its strategic challenges in relation to HRM.

3.1.5. Developing the Theoretical Framework

Based on the abductive approach the theoretical framework has been developed dynamically, where one goes back and forth between the theory and the empirical data during the research process (Mantere & Ketokivi 2013). When developing the theoretical framework, some pre-research was conducted, where the authors investigated established theories, figures and previous case studies in the similar field. This pre-research built the foundation for the research purpose, research questions and the content of the theoretical framework. However, in the beginning of the research process, a field visit to the case company SKF's headquarter in Gothenburg took place, where the purpose and research questions were discussed to form the foundation for the research. This field visit inspired the focus area within HRM and gave an insight to automation, which inspired the theoretical framework.

To develop the theoretical framework, all the sources that are used are scientific articles. Peer-reviewed articles from academic journals give more credibility to the theoretical framework (Bell et al 2019), therefore all the scientific articles in the theoretical framework are peer-reviewed to capture a relevant and accurate trend within the technological field.

The scientific articles that are used are mainly from recent years. However, to build the foundation for HRM regarding the resource perspective some older sources were used, for instance Adler (1987), since many schools still refer to him in modern research. The scientific articles were searched for on Supersearch, which is provided by the Gothenburg University Library and Google Scholar. The keywords that were used in the searching process were Industry 4.0, automation, digitalisation, manufacturing, HRM, labour, working conditions, job satisfaction, skills, motivation, training and development. These keywords were used both separately and in combination with each other.

3.2. Empirical Data Collection

3.2.1. Data Collection

To collect qualitative data, interviews are a common method to gather primary data in qualitative research. The benefit of conducting interviews is the opportunity to reveal the respondent's own perception of the social world (Qu & Dumay 2011). Therefore, interviews are the primary data collection in this research. Another method for primary data collection is participant observation, where information from a social setting is gathered (Bell et al 2019). An observation of SKF's D-factory in Gothenburg was conducted during the research to complement the interviews in terms of process understanding. The secondary data collection includes SKF's annual reports from 2020 and 2021, as well as SKF's official webpage.

Regarding accessibility and feasibility, since this research is a case study in collaboration with the Swedish MNE SKF, the empirical data collection is both accessible and feasible. The collaboration with SKF has been enthusiastic, where there was a mutual interest in the research topic and the need for it. Therefore, SKF provided a coordinator that assisted in accessing the required data for the research.

3.2.2. Primary Data

Qualitative interviews allow the gathering of more detail-oriented information and the respondents behaviour, attitudes, and thoughts of the observing event (Bell et al 2019). In qualitative research, the most used interview method is semi-structured interviews. This method is more flexible in terms of gaining more profound answers. Since the semi-structured interviews are based on human conversation, the interviewer has the opportunity to adjust the questions to gain profound answers. Furthermore, this approach can identify potential management and organisational issues regarding motivation and working conditions (Qu & Dumay 2011). Therefore, the semi-structured interview method was applied for this research to provide elaborated answers that are based on the automation transformation's impact on the human capital. Through semi-structured interviews, one has the advantage of opening the possibility of new concepts and other perspectives that are not highlighted in the theoretical framework.

To collect qualitative data through interviews, it requires preparations in terms of both planning and organising (Qu & Dumay 2011). The interview preparation included creating an extensive interview guide, Appendix 1, based on the purpose, research questions and the theoretical framework. The interview guide was then adopted and adjusted depending on the respondent's knowledge and role within SKF. However, all conducted interviews covered the essential parts of the interview guide and the research purpose. This preparation resulted in gaining a rich data collection.

The interviews were conducted in 2022 between March 29th to May 9th and lasted between 30 minutes to 1 hour. The respondents were contacted through email, where a preview of the research purpose, interview questions, interview guidelines and information regarding data policy were presented. In the email, the respondent had the option to choose the interview day, time and how to conduct the interview. They had the option between having a physical interview at SKF's headquarter in Gothenburg or a digital interview through Zoom or Microsoft Teams. A physical interview was always the aim, but a digital option was provided due to the coronavirus disease 2019, COVID-19 pandemic and business trips. Based on the given responses, the interview setup was planned and organised accordingly. During the interview, the respondents could speak freely regarding the research topic, which provided an in depth understanding of the themes that were confirmed in the theoretical framework, things that were not covered in the theoretical framework and discovered new concepts.

The digital interviews were a flexible, timesaving and cost saving alternative to the physical interviews, especially for the employees in higher positions. It further opened the possibilities for effectively rescheduling and to interview employees that were working abroad. Bell et al. (2019) highlight that digital interviews are more convenient and tend to capture a larger number of responses. However, technical difficulties become a higher risk in digital meetings (ibid). During the digital interviews, no severe technical issues occurred. This since the authors secured a good internet connection with a backup server and scheduled a technical meeting room in advance. Permissions were given from the respondents to record the interviews, to be able to listen to the answers again and mitigate risk of misinterpretation. However, there was no recording during the observation and the interviews at SKF's D-factory that was conducted on the 6th of May 2022, due to SKF's regulations. Therefore, field notes were taken. The recordings and field notes were further used for transcription to review the answers and then deleted due to privacy reasons. During the interview process, follow-up questions were asked to gain a profound understanding of the respondents' specialisation and the coordinator from

SKF confirmed the empirical findings before submission to mitigate misinterpretations and mistakes. Furthermore, to avoid misconceptions of the responses and elevate the trustworthiness, quotes have been documented in the empirical part. Both English and Swedish interviews were conducted to make the participants more comfortable to answer the questions in their Swedish mother tongue. Translations of Swedish interviews to English transcriptions were made with great care and precision to preserve the original meaning of their words and prevent distortion of any kind.

Regarding the sampling approach, the sample consists of twenty employees at the Swedish MNE SKF. The initial respondents were provided by the coordinator at SKF with a profound contact network of SKF's employees. All the respondents have a strong connection to the automation transformation at SKF called World-Class Manufacturing Concept and HRM. The respondents had different roles and came from different departments within SKF to cover all aspects of the automation transformations impact on the human capital. The categories were HR, union, production and operators. The respondents have been briefed regarding the master thesis collaboration between the University of Gothenburg and SKF.

A common sampling method in qualitative research is purposive sampling (Bell et al 2019), where specific respondents that belong to the research field and can answer the research questions. Purposive sampling is a type of non-probability sampling (Patel & Davidson 2019). Furthermore, non-probability sampling does not allow generalising the results to a larger population (Bell et al 2019). A priori purposive sample means that the criteria is set based on the research purpose and questions, which do not evolve over time. A sequential approach is part of purposive sampling, where the sampling is evolving during the research process and the responses are selected based on the research purpose (Bell et al 2019). Therefore, this research has a priori purposive sample with a sequential approach, where the respondents has been identified that belong to the research field based on recommendations from SKF. The snowball sampling is a concept of purposive sampling, where the researchers has gained new contacts through the initial contacts that is relevant to the research field (Bell et al 2019). The snowball sampling was applied during the interviews, where the respondents recommended other candidates that fit the sample criteria and research purpose. This helped this research to expand the number of respondents, hence, a richer empirical finding.

For the sampling criteria, relevant criteria were established based on the research purpose and questions. The respondents needed to have a current employment within SKF, therefore external consultants were not included. They also need to either work at the automation plant D-factory at SKF in Gothenburg, have knowledge within the World-Class Manufacturing Concept at SKF and its impact on the human capital or work with HR strategies.

Regarding compilation of samples, with the given timeframe, resources and SKF's company size, one could argue that it is manageable to aim for twenty interviews. This sample size is abundant to gain a profound understanding of the complex integration process between humans and machines, to achieve reliable results. The employees were very accommodating and excited in participating in the research. However, due to the current COVID-19 pandemic, the employees at SKF have been very busy and scheduling an interview has been challenging. Despite these challenges, the aim of twenty interviews was reached. A thematic analysis includes examining the data in terms of interviews, where the researcher identifies common themes, ideas and patterns. A sample size between twenty to thirty respondents is common in a thematic analysis (King 2004) and a thematic analysis is applied in this research. Based on the thematic sample size and COVID-19 pandemic, the aim of twenty respondents can be arguable, which supports the conducted sample size. All the respondents were connected to the automation transformation within SKF.

The participant observation took place on the 6th of May 2022, which consisted of a field visit to SKF's D-factory with a tour of the automation factory and interviews were held with nine operators. The authors interviewed the operators during their shift, where they switched their station with each other to participate in a thirty-minute interview. The operators who participated as respondents had worked at SKF for more than two decades and been a part of the automation transformation at the D-factory. During this field visit, the authors got the opportunity to observe the workers, work environment, manual lines and automation lines, to fully understand the automation development at SKF. The tour included observing the production process of the bearings.

Table 1 below shows the details of the conducted interviews and observation:

Respondents	Titles	Date & Time	Interview Location
Respondent 1	Global Union Chairman, Board of Directors	29-03-2022, 10:00-11:00	Digital interview, Microsoft Teams
Respondent 2	Union Chairman, Board of Directors	30-03-2022, 13:00-14:00	SKF Headquarter
Respondent 3	Head of Communication & Branding, Previous Head of HR	07-04-2022, 15:30-16:30	Digital interview, Zoom
Respondent 4	Manufacturing Manager	11-04-2022, 15:00-16:00	Digital interview, Zoom
Respondent 5	HR, People Experience	13-04-2022, 15:00-16:00	Digital interview, Zoom
Respondent 6	Head of Manufacturing and Reliability Engineering	27-04-2022, 13:00-14:00	Digital interview, Microsoft Teams
Respondent 7	HR, People Experience	25-04-2022, 10:00-11:00	Digital interview, Zoom
Respondent 8	Production Manager	25-04-2022, 13:00-14:00	Digital interview, Zoom
Respondent 9	HR Manager	28-04-2022, 16:00-17:00	Digital interview, Microsoft Teams
Respondent 10	Production Manager	06-05-2022, 12:30-13:30	SKF D-factory
Respondent 11	Operator	06-05-2022, 13:30-14:00	SKF D-factory
Respondent 12	Operator	06-05-2022, 14:00-14:30	SKF D-factory
Respondent 13	Operator	06-05-2022, 14:30-15:00	SKF D-factory
Respondent 14	Operator	06-05-2022, 15:00-15:30	SKF D-factory
Respondent 15	Operator	06-05-2022, 15:30-16:00	SKF D-factory
Respondent 16	Operator	06-05-2022, 16:00-16:30	SKF D-factory
Respondent 17	Operator	06-05-2022, 16:30-17:00	SKF D-factory
Respondent 18	Operator	06-05-2022, 17:00-17:30	SKF D-factory
Respondent 19	Operator	06-05-2022, 17:30-18:00	SKF D-factory
Respondent 20	Production Manager	09-05-2022, 10:00-11:00	Digital interview Microsoft Teams

Table 1: Interview respondents.

3.2.3. Secondary Data

The secondary data sources that have been applied in the empirical context are SKF's annual report from 2020 (SKF 2021b), SKF's annual report from 2021 (SKF 2022) and SKF's official webpage (SKF 2021a). These have been applied to introduce SKF and its business operations. These have further been applied to confirm data, numbers and objectives that were addressed during the interviews.

The triangulation method includes using more than one source of information when conducting a social study, for the result to double check and even emerge. To combine different sources of evidence is useful for the research's validity (Bell et al 2019). This method was applied to compare findings from different data, to make the findings stronger and identify potential weaknesses. The triangulation process was applied to enhance the validity of the collected data from the primary data.

3.3. Data Analysis

3.3.1. Thematic Analysis

In abductive research, the analysis of the collected data was performed iteratively, where there is an integration between the theoretical framework and empirical data collection (Bell et al 2019). The abductive approach allows new interpretation and does not solely rely on predetermined understandings (Alvesson & Kärreman 2007; Mantere & Ketokivi 2013), which was useful during the data analysis. Since this is abductive research, the authors have gone back and forth between the theoretical framework and the empirical data collection during the research process and data analysis.

Thematic analysis is a method to systematise, describe, identify and analyse the observed themes that have been collected out of qualitative data (Nowell, Norris, White & Moules 2017). The method is effective in identifying different members' views from a given context, providing unexpected insights, highlighting different patterns and deviations (King 2004). The thematic analysis has been applied to identify similar statements, thoughts and perspectives regarding automation in relation to HRM. To interpret the collected empirical data, the thematic analysis was applied to identify similar behaviour patterns and themes. A thematic analysis has provided a flexibility to customise the process to fit the authors requirements.

To ensure reliability and validity in this research, Nowell et al (2017) step by step framework for conducting a thematic analysis has been used as a foundation. To organise and create a good structure from the beginning, separate documents have been created for each responded and a joint document was created to compare the interviews. This was done to get familiarised with the data and to create a summarisation. The identified teams were highlighted along with differences as recommended by Bell et al (2019). In this process, there were many perspectives and standpoint that were similar. However, some differences were also highlighted, but they were not significant. As Nowell et al (2017) and Bell et al (2019) suggest, the identified themes were analysed and compared with the theoretical framework which generated support of the theory, questioned the theory, new perspectives and ideas were highlighted. Bell et al (2019) discusses a critical aspect towards a thematic analysis, where the identified themes can often be unclear. This is due to the frequency of occurrence of words that conveys as a theme (ibid). Since this research has an abductive approach, the themes are generated from the empirical data and theoretical framework. Therefore, both strategies have been combined in the data analysis.

The identified themes in this research are the following:

- Shift in planning needs and the demand for skills.
- Working conditions, job satisfaction and motivation.
- Strategic consequences for HRM.

Nowell et al (2017) state that a thematic analysis assists the researchers to get an overview of the empirical data and identify a common thread. This for the empirical findings to be applicable to the research purpose and questions. The empirical findings include some valuable quotes from some of the respondents, to get a practical and credible understanding for the readers.

3.4. Methodology Summary

The scientific approach in this research is ontology and critical realism. A qualitative research approach was applied with an abductive approach with the purpose of gaining a deep understanding of how automation changes the demands for skills, working conditions and the strategies for HRM in the manufacturing industry. The research strategy is a case study with the Swedish MNE SKF to analyse the effects and consequences of how SKF's World-Class Manufacturing Concept has affected HRM, in terms of labour demand, skills, working conditions and strategies for HRM. The data collection consists of twenty semi-structured interviews and an observation of SKF's D-factory as the primary data. The secondary data consists of SKF's official website and annual reports. A thematic analysis was applied as the method for data analysis. This is illustrated in Figure 5.



Figure 5: Methodology summary.

3.5. Quality of Research

In qualitative research there are some criticisms regarding the subjectivity, where the result can be influenced by the researcher's own beliefs and values (Bell et al 2019). To avoid this criticism in the research, the aim is to be fully transparent, to clearly present the results and how they have been interpreted. In order to evaluate the research quality, reliability, validity and replicability are used (Bell et al 2019).

Reliability is that one should be able to repeat the research and get similar results. This is to ensure that the measures used are consistent throughout the research. This is linked to dependability; will the findings be the same in a different time frame (Bell et al 2019). To ensure reliability in the research findings, field notes and digital transcription methods such as recordings were used when gathering empirical data. Both the authors were present during the conducted interviews, to avoid misinterpretations. After the transcription process the responses were sent back to SKF for a review, to avoid mistakes, provide the opportunity to correct and add information.

Replicability means that the research must be able to replicate by thoroughly explaining the procedures. To evaluate the replicability, someone else must be able to replicate the research based on the explained procedures (Bell et al 2019). In the introduction chapter the scope of the research has been clarified and the aim has been clearly presented. The method chapter in the research has been written in detail in order to make it possible for other researchers to replicate this research.

Bell et al (2019) explained that validity is the most important quality criteria and concerns the integrity of the research. Validity has four different branches, these are internal, external, ecological and measurement validity. Internal validity is about the causality where the focus is on the causal relationship among different variables. This is linked to credibility, the trustworthiness of the results from the research (ibid). To ensure internal validity and prevent confusion in the research, a priori purposive sample with a sequential approach was used in the interview process. External validity addresses the question if the research is generalisable or not. This is linked to transferability; can the results be used in other scenarios (Bell et al 2019). The conducted interviews occurred with different departments and people, to enhance the

external validity. However, the aim of this research is more to particularise the findings instead of generalising them.

Ecological validity addresses if the research results can be applied in reality (Bell et al 2019). The empirical observation took place at SKF, which represents a natural environment within the manufacturing industry. Therefore, empowering ecological validity. Measurement validity is a quality criteria that focuses on if the research measurements captures the intended social phenomena or not. Additionally, confirmability is linked to objectives which focus on the researcher's level of objectives during the research process (Guba & Lincoln 1994; Bell et al 2019). The measurements used in this research to capture the social phenomenon regarding automation in relation to HRM are semi-structured interviews, where triangulation was used to ensure objectives. Triangulation can provide more accurate results through allowing different perspectives (Welch & Piekkari 2017). Since the aim of the research is to explore the shift in skills regarding the implementation of automation from experts by interviewing the employees at SKF, the authors' own perceptions and beliefs were avoided. Therefore, the authors' approaches during the research were to be neutral.

Transparency and documenting are essential to attain dependability (Bell et al 2019). To evaluate dependability, it should be possible for other researchers to investigate the process of the research (Lincoln & Guba 1986). If the research process is carefully documented and can be followed up clearly, dependability can easily be accomplished (Tobin & Begley 2004). An interview framework was developed and applied for all conducted interviews. Furthermore, the authors have tried to provide a clear and transparent methodology chapter.

3.6. Ethical Considerations

In business research it is crucial to consider ethical principles and how to manage them (Bell et al 2019). When research involves people, it is important to be aware of their treatment and protection. Furthermore, it is important to consider if there are any unethical activities in the research process that one should not take part in (Bell et al 2019; Swedish Research Council 2017). When research is conducted by students, it is common that the ethical principles will be discussed together with a supervisor, who has experience regarding its complexity (Bell et al 2019). In this research, the authors have gained assistance from the supervisor of Gothenburg University, school of business, economics and law, and coordination support from SKF to navigate the ethical principles.

There are four main ethical principles that are essential to cover in business research. These are harm avoidance, informed consent, privacy and deception (Bell et al 2019). Providing the necessary information to the participants is essential to get their participating consent. Before an interview, it is important that the respondent is well informed about the subject and the interview method, so they can be prepared. One should be considerate and respectful if the data collection occurs through recording (Swedish Research Council 2017). In this research, the interview questions have been formulated with great care, to avoid harm possibilities. During the interviews, permission regarding recording, confidentiality, and anonymity were addressed. These were honoured and respected. Since this research is a case study together with the MNE SKF, the organisation has given their permission to be named in publications by the researchers. However, the respondents' names will not be revealed, only their titles. Regarding informed consent, there has been a transparent dialog between the authors and SKF about the purpose of the research. The participants were well informed before the interview process started about the aim, content, and interview method of the research. Therefore, the participants were able to decide in advance if they wanted to participate in the research or not. Regarding privacy, it was respected due to the consent that was given by the participants. There were no questions that any participants felt uncomfortable answering. However, if there was, it would be respected. To prevent deception transparency was communicated through the whole case study process. During the interview, the authors explained the background to the research questions, which helped to avoid deceptions and change of narrative.

Other ethical principles that are important to consider in the research process are data legislation, reciprocity in the relationship between the researchers and the participants, sources, copyright and shared data (Bell et al 2019). Examples of laws that are crucial to consider in research are the Archives Act and Personal Data Act (Swedish Research Council 2017). Regarding data management, the collected data in this research was first evaluated if it was allowed to be used and in what regards.

Ethical principles are essential for openness and honesty towards the participants and the readers of the research (Bell et al 2019; Swedish Research Council 2017). It is important to be objective, trustworthy and fair. To obtain ethical considerations, the researchers must consider the qualities of diligence, loyalty and focus on the research (Swedish Research Council 2017). The purpose of a business research is that there should be a mutual interest for the researchers and the readers (Bell et al 2019). Since this research is a case study in collaboration with SKF, there is mutual interest in the topic for SKF, the researchers, other companies that operate in the same industry, and from an international business and trade perspective to Gothenburg University, school of business, economics and law.

There is no research that is completely independent (Bell et al 2019). The researcher must also consider the agreements with the involved parties, where transparency and openness are essential to generate credibility (Swedish Research Council 2017). Since this research is a collaboration with SKF, the authors are aware that bias issues can arise. To mitigate the bias and enhance credibility, the authors have been mindful of this potential bias through openness and transparency with the supporters of the research.

Regarding the political contexts, the authors have only taken credit for their own work. Credit has been given to the other parties involved that have contributed with this research, in this case SKF and Gothenburg University, school of business, economics and law.

4. Empirical Data

4.1. Empirical Context

The empirical context is based on secondary data, which consists of SKF's annual reports from 2020 and 2021 as well as SKF's official webpage.

SKF is a Swedish MNE that was founded in 1907 with a headquarter in Gothenburg and has a global presence in 130 countries (SKF 2022) and is a global leading supplier of solutions, services, and products (SKF 2021a) regarding rotating equipment. SKF's main product is bearings but is also producing lubrication and seals. SKF's products and services are used worldwide in different industries, such as renewable energy, automobile industry, manufacturing industry, paper industry, home supplies, heavy industry for example mining and metal industry. They have a strong focus on R&D to develop new technology that generates a more sustainable society and sustain competitive advantage (SKF 2022).

SKF introduced the World-Class Manufacturing Concept which includes cost reduction, technological advancement, manufacturing footprint and production system (SKF 2021b). The purpose with the concept is to provide excellent customer service, where the products will be customised. This World-Class Manufacturing Concept started over seven years ago and it is a journey that will continue with further improvements. The objective is to be efficient, flexible and close to the customer. SKF's aim by 2025 is to have fewer factories, but with higher automation and flexibility on a regional level (SKF 2022).

4.2. Empirical Findings

The empirical findings are based on the results from the interviews and the observation that was conducted at SKF's Gothenburg factory, D-factory. The empirical findings will be presented according to the research questions and conceptual model (Figure 4, p. 32), where the main themes and issues will be discussed. In the end, an empirical summary will be provided to demonstrate the main findings in relation to the purpose.

The section will be divided into four parts:

1. Introduction to SKF - World-Class Manufacturing Concept.
2. Shifting demands for skills and planning, which explains reskilling and upskilling.
3. Shift in working conditions, job satisfaction and motivation, which is a consequence of automation.
4. Strategic automation implications for HRM, which describes automations effect in relation to HRM.

4.2.1. SKF - World-Class Manufacturing Concept

All the respondents highlighted that SKF is one of the biggest manufacturing companies and that they follow the automation trend, otherwise SKF will become obsolete. The respondents further highlighted that SKF must keep an eye on technological advancement, where automation is a big part of it. According to many of the respondents, SKF invests highly in automation because it provides business benefits, a competitive advantage and creates meaningful work for the employees. The union respondents further highlighted that Europe is often ahead within this technical transformation compared to other markets. Regarding the automation trend, the HR respondents highlighted that a challenge for SKF is to make the transition from a labour intensive to a fully automated and simultaneously upgrade competences, so that the operators can continue to be employed.

“The World-Class Manufacturing Concept was a big starting point from a manufacturing perspective and made a big difference for the people connected to that area.” - Respondent 9

The respondents explained that the World-Class Manufacturing Concept was implemented in 2015 in SKF's D-factory and went live in 2017. The concept has a cost of approximately 200 million SEK in investment. The D-factory is not fully automated yet, but there are two automated channels called World-Class channels that replaced four manual channels, where

approximately 100 people required reskilling and relocation. A viewpoint was that SKF's World-Class Manufacturing Concept is an island of Industry 4.0, but around the island the old system is still operating. Many respondents stated that SKF's vision is to achieve Industry 4.0 fully.

Majority of the respondents highlighted that automation has resulted in lower costs, shorter lead time, quality, mitigation of errors, increased production volume and trustworthy results. There is also an opportunity to store and track the data, which generates a more proactive approach and value to the customers.

One of the respondents highlighted an important aspect where if one sets up a brand-new factory and immediately installs a fully automated line, one can recruit skilled people from the beginning. However, SKF dealt with the challenge of implementing automated channels in an established factory. From a HR perspective, this creates a challenge regarding the shift in planning needs and the demand for skills. All the respondents highlighted that in an automation transformation process it is important to include the human capital, where all the employees are involved in the process to find solutions.

“The human and machine integration at SKF is necessary, SKF tries to create a human atmosphere in their World-Class channels.” - Respondent 5

4.2.2. Shifting Demands for Skills and Planning

“In all professions today, one needs to have an element of digital skills.” - Respondent 3

Several respondents stated that the World-Class Manufacturing Concept has changed SKF's HR model, where strategic adjustments have been made. The HR respondents further highlighted three key dimensions within SKF's HR department. The first one is that HR should be the enabler for the business, where they should provide the tools, support, expertise and knowledge to SKF's stakeholders and managers. SKF has renamed their Human Resources to People Experience, PX. The idea is that SKF should be more business oriented and support managers from a people perspective through competence management. HR must keep up with Industry 4.0 and focus on future competence. Secondly, SKF tries to automatise the systems, which is a long journey. This since SKF has a lot of manual work and different systems. HR and managers automatise systems to gradually have less admin to perform. This to focus on the

third dimension, which is employee engagement. This includes how to inspire people, make them happy, add value to the company and develop peoples' careers.

“SKF changed the image of knowledge rather than expanding it.” - Respondent 4

The HR respondents elaborated that SKF incorporates local strategies and lean processes into their HR strategy. Since SKF started their automation process, they have worked on changing their competence structure. To shift the competencies, the future skills need to be considered. According to many of the respondents, SKF is at the forefront of automation transformation, where it can be challenging for managers to explain to HR what kind of skills are needed. What one will need in ten years is not the same as what one is hiring today. Therefore, there is a shift of planning needs for skills and future workforce. The HR respondents explained that the HR strategy regarding future workforce involves planning, digitalisation of the services, leadership training, career opportunities, competence strategies and people development. This is important from the organisation's perspective. However, one aspect that was highlighted was that the employer branding needs improvements, where the strategy must be in line with the business strategy. Many of the respondents highlighted that it is not only HR who is responsible for the competence development in the automation process, it is also up to the first line managers, middle managers and the operators. The first line manager has continuous development meetings with operators and schedules what kind of skills that are needed.

“It is important to have regular meetings with the operators to check in and see how everything is going.”- Respondent 20

Some of the respondents stated that automation can increase the gap between skilled and unskilled workers regarding work opportunities. The gap is small, but it exists between SKF's mechanics and operators. The mechanics have an overall picture of what needs to be done on most machines, while the operator often specialises in their department. Regarding planning needs, during the automation transformation, the production respondents highlighted that SKF still has some mechanical work in their operations, where mechanical expertise is still needed. Therefore, SKF can balance their workforce between those who are interested in the automated channels and those who would rather stay at the manual channels for now.

“In the old days, one worked with the component manually. Nowadays, due to automation, one is to look at the computer where one needs to read and understand the computer language” - Respondent 3

According to all the respondents, all the lines in the D-factory will be fully automated with time. Therefore, automation has resulted in a growing demand for new skills and job titles in terms of the overall process understanding. One must understand the process before and after the World-Class channel. This creates a need for reskilling and upskilling, where training and development is a tool to meet the demand for new skills. The respondents highlighted that there are some specific digital skills that SKF needs like cyber security, internet of things skills, programming, robotics, artificial intelligence, software architecture, automation engineering and software designer. There is more monitoring, software management and mechatronics now, but less assembly knowledge. SKF needs more digital knowledge and is moving towards implementing a lot of IT systems. The respondents further highlighted that in the automation process skills regarding human behaviour, problem solving, analytical thinking is of essence. The HR respondents stated that the operators need to be proactive, work with manufacturing excellence and change their mindsets, which is up to the managers to convey. SKF learned that when they changed the way of working, they had to provide the proper competence training, otherwise the operators could not perform their task. Nowadays, the operators’ main task at the World-Class channels is to prevent maintenance disruptions.

“The purpose from SKF’s point of view is the more competence an individual obtains; the less disruption occurs in the production.” - Respondent 2

The HR respondents stated that training and development is a part of SKF’s competence strategy. This process can be complex and SKF provides different types of training and development to manage the change. Most of the respondents explained that SKF has their own academy called SKF Academy, which is the driving force for training and development. SKF Academy is trying to customise the right education depending on SKF’s demand by offering internal education through identifying the change in skills. SKF Academy has different tracks like Purchasing Academy, Finance Academy, Manufacturing Academy, etc. The Manufacturing Academy is connected to the manufacturing processes. Another education platform is Competence Centre that offers courses for the employees like truck licence, leadership training and metalworking. Leadership training is to increase proactivity and ownership, because part of the work practices and methods will be developed by those who

work with it. The factories offer their own Learning Centres that are connected to skills. The provided training is different depending on what is needed and where. The workers can learn quality assurance, protection and health. This is more vocational training and practical activities with e-learning tools. In the Learning Centres, the employees can educate themselves. One development process is automation, where theoretical education is offered to enhance problem solving. Most of the respondents further highlights that there will be more investments in Learning Centres within the near future.

“It is important to develop the current competence that exists within the company” -

Respondent 2

The production respondents explained that SKF has a technical gymnasium called “SKF Tekniska Gymnasium” in Gothenburg where the students can study a three-year technical education and possibly get a job at SKF. Additionally, the production and HR respondents explained that SKF creates university training for operators, where fifteen to twenty people each year are selected to receive that training. The ambition has been to get closer to the white-collar work. Some of the respondents highlighted that another alternative is external education systems. However, approximately 90% of SKF training and development is internally. It is both easier and cheaper to have internal training. Additionally, the HR respondents emphasised that follow-up the education process to keep the value alive is important.

Most of the respondents highlighted that when SKF implemented the World-Class Manufacturing Concept, the employees who had an interest in automation could apply to the automated channels, where SKF provides the new skills. A couple of operators were chosen based on their expertise. As SKF is installing the new channels, the operators are already involved to get an understanding, design the workplace, familiarise themselves with the robots and test production cells. The operators and engineers were able to visit the machines’ suppliers externally and get more in-depth knowledge about the robots. From the operator's perspective this was appreciated. SKF is installing the new channels in a parallel process, where SKF still needs to deliver to the customers, but simultaneously free some resources for the operators to learn from each other in terms of new skills. Then the transition is much smoother, because when the old channel is taken down the operators are already into the new one. Some of the respondents highlighted that SKF encountered some obstacles during this process. However, over the years, SKF has learned from their mistakes and made improvements.

“Technology goes faster than the human part” - Respondent 7

All the respondents highlighted that the union and HR have a strong collaboration within SKF. The union plays an important part in helping SKF coordinate and develop joint training together. The union representatives further elaborated that the union and HR together created a validation tool called Industrial Technology Base, with three different levels of competences together and how to meet each group. The first level included employees who had no more than two years of technical experience. The intermediate group included those who work in constant salary development in semi-automated processes. It was only a matter of relocating them and then they started learning on the spot. The last group was conducted in project form where they learn by doing. The last group includes these new skills that would come with automation, software handling, Automated Guided Vehicle called AGV, and smart maintainers.

“I mean digitalization in itself does not create success, but it gives us the facts to take the right decisions and to do it with speed” - Respondent 9

The operators highlighted that learning by doing is a concept of SKF’s manufacturing plant. They learn new tasks from their more experienced colleagues and through experimenting by themselves. Some of the HR respondents explained that as a new employee at a SKF factory, one has the digital assistance of a tablet to help perform the specific tasks. However, this is under development and is not yet provided everywhere. On the other hand, the operators explained that the tablets can be difficult to navigate and lack updates. Many of the respondents stated that it is important to give operators time for competence development, which can be difficult and challenging when the production cannot stop.

4.2.3. Shift in Working Conditions, Job satisfaction and Motivation

Most of the respondents explained that when technological advancements like automation occur, there is always a concern and stress among the workers in the beginning. They are worried about how automation will impact them and if they are still needed. Many of the respondents highlighted that there were many different reactions in terms of automation. The respondents recognised that some of the operators who are close to retirement are not very interested in automation training. Then there were those who were really interested, curious and started the programme. Then there are the ones that if they are provided with the opportunity, they learn and then they will be fine in terms of capturing the new skills. The reaction when

SKF opened the two fully automated World-Class channels was on one spectrum workers who did not want to be a part of it, resisting due to fear and viewed it as a threat to employment. They often fear that they will lose their job that they have been doing for the last 25-30 years and the workers did not understand how this was going to change. This is a common reaction. On the other hand, from a generalised standpoint, there are younger workers but also seniors who think automation provides interesting opportunities to learn new skills and want to be a part of it. Some of the respondents further explained that the ones that are resisting are not comfortable with the new way of working.

“People may not be specifically afraid of automation but are often afraid of change.” -

Respondent 4

The HR and the production respondents explained that there is a difference between the older and younger generation in their attitude towards automation. The older generation are not as comfortable with the new digitalisation and automation as the younger generation, which is important to respect. The older generation tend to be more afraid of the new concept and are reluctant to receive the upskilling. Those who are more vulnerable to the automation process are often elderly and those who may lack English skills. SKF has learned that different types of workers require different approaches, where some might require more time to learn new skills. The younger generation comes with a completely different luggage, they are used to automation and new technologies. Sometimes they even think that SKF should be more digitised than it is today. It is easier for them to absorb this automation transformation, especially the software.

Even though there was a lot of fear of automation in the beginning according to most of the respondents, the operator respondents stated that their attitude today towards automation is mostly positive. They explained that they were tired of the old machinery and saw automation as something new and exciting. SKF is working on implementing a positive attitude towards the automation trend, since this development is a part of the industry. Therefore, a proactive approach is important.

“I am genuinely interested in automation and want to learn how the process works.”-

Respondent 18

According to the union and HR respondents, one tool to meet the fear of replacement is communication, to inform and to ensure the people experience security. The communication should be transparent from the beginning, where everyone is encouraged to take part in the change. One example that was highlighted to demonstrate that communication is an important tool was the fear of the validation tool. The HR manager and the union talked to the operators together and explained that the validation tool is not a sorting tool, but it is a way to develop workers' skills. They also proved it through actions, since no one had to leave due to automation. This created a sense of security. Additionally, the production respondents highlighted that involvement and training are also good tools to mitigate fear.

“Automation is the future of manufacturing, and it is very beneficial.” - Respondent 12

Most of the respondents explained that implementation of automation impacts the working conditions. Therefore, they highlighted that the union should be early involved in the process. This since the union is a place to hear the voice of the workers and their concerns for this transformation process. Where SKF then can respond to these concerns and come up with a solution. The union helps SKF in terms of communicating to their employees why they should learn new skills. Some of the respondents further highlighted that in Sweden the union is a very important partner to SKF. It is important to be able to collaborate globally on a union level when implementing automation transformation. Therefore, SKF has a global union and is the only manufacturing company in Sweden that has established that.

“If one is the first with something new, one needs to find the answers together with good employees and suppliers to come up with a good strategy.” - Respondent 4

Many of the respondents highlighted that the biggest effects of automation in relation to working conditions has been the improvement in health and safety, where there are less rehab cases. The operators stated that the machines helped the humans with heavy lifting and AGVs helped to move stools around the D-factory. Another aspect that was highlighted was that the light, air and sound in the factory has improved, which generates a better working environment. Some of the respondents highlighted that automation and production will become safer with the use of sensors and a smart collaboration between humans and robots. At SKF, most machines work in cells to protect humans from harm.

“When automation occurs, it moves more away from the physical aspect towards the mental aspect.” - Respondent 2

Some of the respondents explained that the automation process involves changes which generate stress and concerns. The union representatives elaborated that high levels of stress makes people frustrated, which can generate conflicts and potential burnouts. Stress is SKF’s work environment issue today. SKF must learn how to handle this, and the safety representatives are not used to the psychosocial issues. SKF has occupational healthcare and a feelgood concept in place. One of the union respondents highlighted an interesting aspect by expressing an interest in implementing mandatory meditations, which is an upcoming trend for organisations.

“A part of proactive work is to manage stress and find peace, where one can become more productive not only at work, but also in daily life.” - Respondent 2

“Automation has led to less wear and tear on people.” - Respondent 15

Some of the respondents stated that the psychosocial work environment is changing. When the software is not user-friendly enough, it creates frustration. There are no loopholes as before with paperwork. In a business system, everything must be done in a specific order which creates a huge frustration.

According to most of the respondents, automation includes reduction of standardised tasks, mitigates the risk of accidents and results in a better working environment. This improves job satisfaction and ergonomics when working at the World-Class channels. However, one of the production respondents highlighted an interesting aspect regarding personal chemistry that has been affected by automation. Before the automation transformation, there were more people at each task and were able to socialise more. Nowadays, there are fewer people, and they work further apart.

“[...] there will be less personal chemistry. Before, you could sit and talk and have coffee together. Now, you work more with the computer.” - Respondent 8

Since automation causes changes in leadership, some of the respondents explained that SKF hosted a self-leadership class where human behaviour was the focus, learning about different types of personalities and getting to know your co-workers. Which generated better teamwork, increased job satisfaction and it was appreciated by the employees to understand each other.

“We are a part of the SKF family, where we support each other's daily work.” - Respondent

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Some of the respondents explained that it is more motivating to work with new equipment which involves more monitoring, thinking, improvement and proactivity. SKF has experienced that people do not enjoy monotonous tasks and these tasks have therefore been decreased. The respondents further highlighted that robots and automation are significantly better at monotonous tasks than humans. SKF wants to use humans for what they are best at, which is to think and come up with solutions.

“One part of the motivation is that automation removes the boring and monotonous tasks” -

Respondent 1

Regarding motivation tools in relation to automation, many of the respondents mostly referred to SKF's platform called Group Based Organisation, GBO. The GBO is a tool to motivate the employees to educate themselves. Through this platform, SKF can control the salary and connect a part of it to how much skills one obtains. It offers a competence ladder for the employees to climb on, to get more responsibilities and a higher salary. If one feels unpaid, they are not motivated. Some of the respondents further stated that the older generation tends to have more GBO steps, due to more years of experience. Motivation among the workers is self-propelled, where the workers in this process are usually very ambitious and passionate about solving problems in the process.

“It is about the willingness to learn new things” - Respondent 14

4.2.4. Strategic Automation Implications for HRM

According to a few production respondents, a strategic consequence for HRM due to the implementation of automation in an established factory is the change in management routines. Leadership competence is required. The production respondent further highlighted that the leaders do not need to have detailed knowledge, but they need to know how to lead an automated operation versus a manual operation. Automation requires a different operational management. The management routines now consist of more computers and surveillance, which is another way of management. Most respondents highlighted that it is important to involve the current workforce early in an automation transformation together with the supplier to learn the foundation, have an influence and to share knowledge.

“For SKF it is very important to take care of the employees.” - Respondent 3

Another strategic consequence that some respondents stated was that an automation process often results in the demand of workers in one area will decrease compared to before. Therefore, a shift of workers within SKF can occur. As a global company, SKF is fortunate to be able to provide their employees different opportunities. These opportunities can for example be another production unit or through training and development one could switch departments to other functions like sales. SKF is trying to make this department shift as smooth as possible and maintain the existing knowledge within the company. In those situations where a shift of workers might be difficult, they have the solution with voluntary redundancies with early retirement and turnover. One interesting aspect that some of the respondents further highlighted is collaboration with other actors on the market, where they both can share workers with each other. This collaboration of job rotation fosters knowledge exchange, new ideas for the workers and flexibility. One product respondent highlighted an interesting strategic consequence of automation which was undesirable competency drainage. As the manual tasks disappear, so does the knowledge about it. Without this manual competence, there is no data to feed the machine learning models with.

“Because you do not actually poke, fiddle, feel and squeeze, you lose a lot of skills. It will be an undesirable competence drain linked to automation [...]. But without that competence, we have nothing to feed our smart machine learning models.” - Respondent 6

One other strategic consequence of implementing automation in an established factory that some of the respondents expressed is that today the reset goes quicker. Before the automation transformation, it was more time consuming and hard to reset the machines manually. The automated production flows are also more stable and smoother. Some of the respondents highlighted that one strategic consequence of automation is the benefit of cost saving. Another benefit is to optimise the processes, which results in a higher production volume. Before automation, one could have day and night shifts, but now the robots can technically run 24/7.

All the respondents highlighted one essential strategic consequence of implementing automation in an established factory from a human capital perspective, which is that new investments means that the manufacturing in Gothenburg stays, it gives a positive feeling that the jobs stay here. Additionally, some of the HR respondents highlighted that one strategic consequence of automation is that SKF talks about instead of the blue-collar or white-collar, there is now a grey-collar. However, there is not a clear definition of them yet.

“The things that are difficult to implement today, will become easier within two to three years.” - Respondent 1

The biggest strategic consequence of the automation implementation according to most of the respondents is the human and machine relationship. This since it is the humans that take care of the machines and maintain them. Humans need information from technology all the time and this is the best way to integrate them. The relationship depends on the context in terms of the maturity and the readiness when it comes to automation. Nowadays, one can scale it up in terms of understanding the relationship. That means that the next phase for the operators' tasks is to identify how one can improve the work regarding production and productivity. According to the production and operators' respondents, in the beginning of the automation implementation some operators were bothered when the AGVs went around. This since the AGVs is a fleet that supplies the whole factory and as a human, you want to be responsible for your limited area. It is important to work in a way where there is sense, responsibility and ownership, which is connected to leadership. One integration tool is cloud solutions. It helps the workers to instantly update their information about AGVs, robots and IT systems.

According to the production respondents, in some environments the integration between humans and machines works great and in other environments not so much. At SKF, there are automation cells where the human is not allowed in a certain area, which makes it difficult for the human to observe the situation, to see the cause of things and the connection. They further explained that the humans are there to work proactively, to make sure there is enough of components and maintenance.

“It is more about how humans and the machines can actually work together and smarter.” -

Respondent 3

A couple of respondents stated that people nowadays tend to view machines replacing manual work, heavily work and tedious work. In the future, opportunities between humans and machines are almost like working, collaborating and connecting with another human. According to the production and operator respondents, the AGVs have been given personal names to give the AGVs a more personal and human touch. Some of the AGVs names were R2D2, Madonna and Bumblebee. This helped the integration process.

According to the production respondents, there is no specific human and machine relationship strategy at SKF yet. Since technological advancement has a rapid speed, it is difficult to have one valid strategy. The union respondents further elaborated that SKF’s approach is to identify systems and then adapt them over time to suit SKF’s employees. One needs to be aware of the changes and trends in society when developing a strategy.

“One needs to be open minded, identify opportunities and adapt for future demand.” -

Respondent 1

The production and union respondents explained that in the production system, there is a communication process between the operator and the machines. SKF is not yet where there is a communication between machines, only humans to machines. However, it is on the horizon for the future factory plans. The last step in the smart factory process is from machine to machine. There is a knowledge exchange between humans and machines, where the machines can improve through adding data and the humans can learn from the machines. The production respondents further highlighted that the communication between humans and machines can sometimes be difficult for the operators. This is because many robots are programmed by different programmers and come from different suppliers. One needs to understand every robot and how they react to different situations.

Some of the respondents highlighted that one strategic consequence of the human and machine relationship is the challenge when the machine is speaking a different language. In the beginning of the automation implementation, it was almost like two languages, a human language and a machine language. This makes it difficult to understand each other and work together. One aspect that was highlighted was to consider the local language when installing a new system. This is because not every country is speaking or understanding English, especially within manufacturing. Some of the respondents further highlighted that the operators have developed a language understanding with the machine when working with it for many years.

“The great advantage of automation is that there is a certain continuity in it.” - Respondent 6

Some of the respondents explained that a strategic consequence of implementing automation from a human resource perspective, is that human and machine integration can help the individual to make the right decisions and mitigate the risk of errors, where the machine analyses and evaluates the process. It also enables resource sharing between machines and humans. There needs to be a flexible approach for adjustments. Therefore, one cannot leave everything to the machines and the human capital will always be needed. The respondents further highlight that if one implements an automation process without involving the human capital, there is a high risk of reluctance and bad reputation, which hinders the automation process for the company. One of the synergies with this integration process is that it allows more flexible work. One of the production respondents highlighted an interesting aspect that one must consider how much to automate. It is a balance, and one needs to have experience to be able to take this on. One should not do it for the sake of it, but to become more competitive.

“Many people believe that digitalisation and automation will easily solve all problems.

However, this is not the case in reality.” - Respondent 6

4.3. Empirical Summary

The implementation of automation has created a shift in planning needs and the demand for skills where SKF's HR model has changed, and strategies have been adjusted. To meet these changes, SKF has renamed their HR to PX to be more business oriented and focused on the people's perspective. The HR needs to be the enabler for the business, elevate their employee engagement and focus on the future workforce. When planning for future needs and demand for skills, the HR, the union and the production manager are responsible for the competence development. The future demand for skills will mostly consist of digital skills, process understanding, analytical thinking and problem solving. Therefore, training and development is an important tool in SKF's competence strategy, where 90% of the training is internal.

In the beginning of the implementation of automation, there was a fear of how automation will impact the operators. However, today there are mostly positive attitudes towards automation. This is due to the influence of automation on working conditions, job satisfaction and motivation. Regarding the working conditions, there has been significant improvements in terms of health and safety, where for example the machines assist in the heavy lifting. The working environment in terms of light, air and sound has improved and therefore increased the job satisfaction. The motivation has increased due to new machines and working with less standardised tasks. One motivation tool is GBO, which motivates the workers to learn and receive a higher salary. However, automation has resulted in a stressful environment and the representatives are not used to handling psychosocial issues.

There are some strategic consequences of implementing an automation plant in an established factory from a human resource perspective. One strategic consequence is change of management routines to an operational management. Other strategic consequences are a shift of workers to other departments and risk of undesirable competence drainage. Investments in automation means that jobs remain in Gothenburg. It also fosters a new type of workers called the grey-collar. The biggest strategic consequence of the automation implementation is the human and machine relationship. In the production system, there is a communication process between operator and machines. However, the communication and language barriers can be challenging. There is no specific human and machine relationship strategy at SKF yet. However, one method for integration has been to give personal names to the AGVs. So far, there is no machine-to-machine communication, but it is on the horizon for SKF.

5. Analysis

According to the theory, Industry 4.0 is the current transformation of automation within the manufacturing industry (Horváth & Szabó 2019; Xu et al 2018; Szász et al 2020). The empirical findings show that SKF calls this industrial revolution the World-Class Manufacturing Concept. If one does not focus or aim the strategy towards automation, then they will become obsolete. This project made a big difference for the workers within the area. The empirical findings are therefore in line with the theory, where organisations should follow the current automation transformation within the manufacturing sector to stay relevant.

The empirical findings suggest that automation creates business benefits in the form of competitive advantage, lower costs, shorter lead time, higher quality, improved production volume, reliable results and meaningful work. From a business perspective, the empirical findings are very much in line with the theoretical framework which argues for the same business benefits. The empirical findings also support the theoretical argument from Marengo (2019), that automation is a gateway to access new jobs, knowledge and economic growth.

The theoretical framework highlights that the new procedures in the manufacturing industries transform the need for human capital (Horváth & Szabó 2019), which results in a shift in labour demands regarding skills and tasks (Acemoglu & Restrepo 2019). The empirical findings agree with the theory and highlight that from a human resource perspective, automation creates shifts in planning needs and the demand for skills.

5.1. Changing Planning Needs and Demand for Skills

The theory explains that HRM is used as a resource to achieve organisational and human objectives, where their responsibility is to manage the rising challenges within the organisation's workforce (Stein & Scholz 2020) and to match the existing skills with the new demand (Pio et al 2021). Furthermore, it is the HRM responsibility to obtain harmony between the organisation and workers (Stein & Scholz 2020). The empirical findings highlight that the HR department should be the enabler for the business and provide the tools, support and expertise. The empirical findings further highlight that the implementation of automation encourages more automated systems for HR, where they will have less admin to perform to focus on employee engagement. To be more business oriented, SKF renamed the HR to PX to keep up with Industry 4.0 and support managers from a people perspective through competence

management. Regarding the HR function, both the theory and empirical findings highlight that HR's task is to help planning the future need for skills and competences for an organisation in an automation transformation process. The theory states that it is important for managers and departments to collaborate with HR to identify the future needed skills (Liboni et al 2019). This is in line with the empirical findings where HR is not the only department responsible for the competence development in the automation process, it is also up to the managers and workers.

The theory highlights one aspect of the implementation of automation that can occur within the manufacturing industry, which is that the HR department may be seen as less important or even outsourced (Stein & Scholz 2020). However, the empirical findings show the opposite, where the HR department is an essential function and has an influential role in the automation transformation process. The theoretical framework has identified HRM practices regarding labour changes. Which are reskill and upskill (Pham et al 2018; Card & Nelson 2019; Hou et al 2020; Pio et al 2021), outsourcing, offshoring and layoff (Boxall 2013). The empirical findings show that reskill and upskill is the most common HRM practices when implementation of automation occurs. Voluntary redundancies are also a practice that is highlighted. However, outsourcing and offshoring was not mentioned in the empirical findings. Therefore, the empirical findings show that organisations tend to lean more towards reskill and upskill compared to what the theory suggests.

Regarding the future planning of needs due to the implementation of automation, the theory argues that HR needs to adjust (Ada et al 2021; Pio et al 2021), consider updating employment models, maintain and train employees (Pio et al 2021). The empirical findings enhance this theory by stating that this creates a need for upskilling and reskilling, where training and development is a tool to meet the demand for new skills. The empirical findings further express that future workforce planning is essential in this automation transformation and includes career opportunities, competence strategies and people development. The empirical findings suggest one method to identify the need is to have development meetings with the workers, which is a method that the theory does not focus on.

The theory expresses that the new skill requirements need adjustments, where training programs must be implemented for the current workforce (Pham et al 2018; Card & Nelson 2019; Doherty & Stephens 2021). Therefore, there is a critical need to reshape the human capital's position within automation before it becomes outdated (Stein & Scholz 2020). The empirical findings highlight that to shift the competence structure, the future skills need to be considered. The

empirical findings further show that SKF conducts around 90% of their training and development internally, where it is both easier and cheaper. At the same time, it is important to have a follow-up process to keep the added value alive. The empirical findings agree with the theory, where the new demand for skills requires training adjustments. However, the emphasis of internal training and the importance of follow-up from the empirical findings is not addressed by the theory. The empirical findings highlight one learning method, which is learning by doing. The workers learn new tasks from each other and through experimenting by themselves. This learning method was not mentioned by the theory.

The theory suggests that vocational training is a common educational form within the manufacturing industry (Vereycken et al 2021). To train and develop the workforce, there should be a mutual collaboration between industries, governments and universities (Marengo 2019; Fareri et al 2020). The empirical findings support the suggested educational form from the theory, where the majority of SKF's training is vocational and SKF shows a strong collaboration with the union, where they develop joint training plans.

The empirical findings argue that leadership training is important during the implementation of automation, both for workers and managers. However, the theory does not address this training form, which the empirical findings feel is very beneficial because part of the work practices and methods will be developed by those who work with it.

The theory highlights that through technology, humans and tasks can integrate in a way that was not possible before the technological advancements, with the help of training and development (Card & Nelson 2019). The organisation's strategies should include training and development of the workforce (Pio et al 2021). This theory is acknowledged in the empirical findings, where training and development is a part of SKF's competence strategy and different types of training and development is provided to manage the change.

According to the theory, technological advancement enhances the gap between skilled and unskilled workers regarding work opportunities (Schwabe & Castellacci 2020; Dengler & Matthes 2018). The empirical findings identify this gap from the theory where there is a small gap between mechanics and operators. The empirical findings further suggest a method to minimise this gap is upskilling and reskilling through internal training.

The empirical findings demonstrate the importance of including the workers in a transformation process to jointly find solutions and to familiarise themselves with automation. This suggested strategy of including the workforce in the automation process has not been highlighted by the theory. Instead, the theory puts an emphasis on helping the workforce to adapt to automation, not influence it like the empirical findings highlight.

The empirical findings show that an organisation in the beginning of the automation process can balance the workforce, where some can still be in the manual channels and some in the automated one. This strategy to balance the workforce has not been identified by the theory. The empirical findings show that this strategy creates a smoother transformation process from a business perspective. At the same time, the empirical findings explain that the implementation of the automation process occurs in a parallel process, where there still needs to be a delivery to the customers, but simultaneously free some resources for the workers to learn new skills. The empirical findings further argue that it is important to give workers time for competence development, which can be difficult and challenging when the production cannot stop. These aspects have not been discussed by the theory. Therefore, the empirical findings identify a challenge that exists in the implementation of the automation process in regard to planning needs.

The theory highlights that in this automation era, soft skills are more important than hard skills (Fareri et al 2020). The empirical findings agree with the theory and show that flexibility, attitude and open mindedness towards automation are soft skills that are important to consider in the demand for skills. The theory further states that some of the growing job titles are software engineer (Pio et al 2021), coding, and programmer (Ada et al 2021). According to the empirical findings, the implementation of automation has shifted towards more digital skills where there is a demand for cyber security, programming, robotics, automation engineering and software design. Therefore, both the theory and empirical findings demonstrate that the future demand for skills is in terms of process understanding and digital skills.

The theory describes strategic HRM by Abdul-Halim et al (2016), which consists of six strategies to improve the workforce. These six strategies have been applied to the empirical findings in Table 2 below:

Strategic HRM	Empirical Findings
Innovative	The empirical findings show that one method to be innovative in the automation implementation process is to involve the workers, to listen to their valuable inputs early in the process.
Quality	The empirical findings highlight an interesting method to attract a qualified workforce to the World-Class channels. Suitable candidates were selected based on a validation tool where competencies and interests within automation were identified. Through this strategy, one can attract a qualified workforce based on a personal fit.
Cost Efficiency	The empirical findings show that automated processes result in a more stable and cost-efficient production, where the workers will be able to focus more on meaningful tasks.
Commitment	The empirical findings highlight that one HR strategy is employee engagement, to foster a committed workforce through inspiration, encouragement and development. This will make the people feel more driven and developed in their career.
Employee Development	One tool to upskill and reskill the workforce that was shown in the empirical findings is training and development, where internal training is the main part to meet the changing demand for new skills.
Conventional	The empirical findings state that HR’s administrative tasks are becoming more automated to free more time to focus on people development.

Table 2: Strategic HRM, adopted and elaborated by the authors from Abdul-Halim et al (2016)

5.2. Working Conditions - Job satisfaction and Motivation

One common view according to the theory is that humans see machines as a work threat. To meet this challenge, one method is to demonstrate that human skills are still relevant (Stein & Scholz 2020). The empirical findings acknowledge this fear by stating that when automation transformation occurs, there is a rise in stress and concern regarding work tasks. The empirical findings showed that there are different reactions among the workers when automation occurs, where some are more comfortable with change than others. The empirical findings further show that the workers have more of a positive attitude towards automation today, due to its benefits. Therefore, the empirical findings demonstrate an interesting practical example on how the theory of including humans in the implementation of the automation process can gradually mitigate the fear among the workers and accept the automation transformation.

The theory by Stein and Scholz (2020) together with Schwabe and Castellacci (2020) argue that the younger unskilled workers are more substitutable to machines. Meanwhile, machines are complementary to workers who are skilled and older. However, the empirical findings show another angle of this concept, where the younger generation is more used to automation and new technologies. It is easier for the younger generation to absorb automation transformation compared to the older generation. The ones who apply to the new World-Class channels is usually the younger generation and digital skills can be challenging for the older generation. This means that the machines are complementary to skilled workers regardless of age, due to semi-automated tasks. Therefore, the empirical findings show that machines are complementary to both younger and older skilled workers, compared to the theory.

According to the theory, the younger unskilled workers tend to view automation as a threat, since they have a long working life ahead and new employment can be difficult to find. Meanwhile, the older skilled workers view automation as a positive impact on workers well-being and development in society (Schwabe & Castellacci 2020). The empirical findings show that the younger generations tend to view automation as new opportunities and excitement. However, the older generation tend to be more afraid of the automation transformation and reluctant to receive training. The empirical findings are not in line with the theory by Schwabe and Castellacci (2020), since the empirical findings highlight that the older generation is the group that is mostly afraid of automation.

One method to meet the fear of replacement when automation occurs is education, which is suggested by Schwabe and Castellacci (2020) in the theory. The empirical findings emphasise education being one valid method. However, the empirical findings further highlight another important method, which the theory has not mentioned in this context. This is internal communication, where the communication should be transparent and inclusive.

The theory highlights that policies can assist with job insecurities, which contributes to a safer and more stable employment (Cheng et al 2021). The union provides a certain protection regarding working conditions and employment (Schwabe & Castellacci 2020). The empirical findings argue that the union should be early involved in the implementation automation process to deal with concerns, help communicate why employees should learn new skills and provide education. The empirical findings agree with the theory that the union is an important actor for the employees to be involved in the implementation of automation to help with the communication process and make workers feel safer.

According to the theory, health and safety are two important factors to consider in an automation transformation (Cheng et al 2021). Automation can enhance the job quality, working conditions and mitigating injuries (Cheng et al 2020; Schwabe & Castellacci 2020; Stein & Scholz 2020; Pham et al 2018). At the same time, Pham et al (2018) in the theory argue that workers who are integrated with machines in their work tasks may not see the improvements. The empirical findings are in line with the theory regarding the improved health and safety aspects, especially regarding heavy lifting and reduced work injuries. The empirical finding further argue that it also generates a better work environment for the employees and that ergonomics have significantly improved due to automation. Therefore, one can argue that the empirical findings demonstrate that the workers see these improvements, which contradicts the theory by Pham et al (2018).

The theory explains that the shift of skills will result in increased mental and physical pressure (Pham et al 2018), which is a field that is not fully explored by the literature (Cheng et al 2020). The psychosocial health aspect is highlighted in the empirical findings, where stress is emphasised as a rising issue within working conditions and the safety representatives are not used to handle the psychosocial issues. The empirical findings are in line with the theory that there is a shift from physical pressures to more mental pressures in regard to automation. One method to manage the stress factor from the empirical findings is to implement meditation, which was highlighted as a future trend for organisations.

The theory states that automation affects workers' health in terms of job satisfaction (Schwabe & Castellacci 2020), which consists of the level of satisfaction that a worker feels toward its task (Memon et al 2020) and is a significant part of the well-being (Schwabe & Castellacci 2020; Memon et al 2020). The empirical findings show that factors that have improved job satisfaction due to the implementation of automation are mitigation of standardised tasks and fewer accidents. Another aspect the empirical findings highlight is self-leadership training due to automations change in leadership with a focus on human behaviour, personalities and knowing your co-workers. This has increased both the satisfaction and teamwork. However, in the automated channels the workers work further apart from each other compared to manual channels. Therefore, the workers can experience less personal chemistry. The empirical findings agree with the theory that job satisfaction is essential for workers well-being and the empirical findings further highlight the benefits of self-leadership training to enhance employees' job satisfaction.

The theory states that human capital is one of the most important resources within a company (Boxall 2013). To encourage workers' motivation is a key factor to gain workers' support. The theory suggests that some motivation factors are promotion opportunities and mobility activities (Ybema et al 2020). The empirical findings highlight that the human capital is essential in the implementation of the automation process, where opportunity to work with new equipment was identified as motivating and monotonous work was highlighted as unmotivating. The empirical findings further highlight that the humans should focus on their strength, which is creativity. Therefore, the empirical findings contribute with more practical examples of motivational tools to the theory.

The theory identifies one common motivation tool which is a higher salary (Tan & Rajah 2019). However, this motivation tool might not motivate knowledge sharing, since there is a focus on individual task efficiency (Tan & Rajah 2019). The empirical findings highlight an interesting type of motivation tool called GBO, which is based on acquiring more learning steps to get a higher salary. The GBO is a tool to motivate the employees to educate themselves. Therefore, both the theory and empirical findings suggest the same motivation tool to encourage the workforce engagement in automation. However, since the GBO is an individual motivation tool, the authors suggest that group-based motivation could generate higher knowledge exchange.

Ybema et al (2020) in the theory highlight that some HRM methods to achieve sustainable employability for the older generation is to focus on motivation, health and employability. The empirical findings show that SKF has many older employees who have been a part of the SKF family for decades. The empirical findings highlight motivation tools like GBO, the health improvements of automation and involvement of the worker in the implementation of automation. Therefore, the empirical findings can complement the theory by showing a way to foster sustainable employability.

5.3. Strategic Consequences for HRM

To identify the strategic consequences of implementing an automation plant in an established factory from a HRM perspective, eleven factors for a successful HARM integration provided by Stein and Scholz (2020) have been applied to the empirical findings. These eleven factors are elaborated down below.

- **Management effectiveness** describes that information driven machines need a different operation management and not a traditional one to integrate the new workforce (Stein & Scholz 2020). According to the empirical findings, managing an automated channel is very different from a manual channel, with more computers and surveillance. Therefore, there is a need for a change in management routines towards an operational management with leadership training. This is in line with the theory, which explains that there needs to be different operational management, due to automation.
- **Organisational transformation** requires workers to be open to change regarding work tasks and skills. The changes should be handled both on a group and individual level (Stein & Scholz 2020). Except for generating shifts in tasks and job positions, the empirical findings demonstrate this organisational transformation also results in a shift of workers to other departments. The empirical findings further show that a global company such as SKF is fortunate to be able to provide their employees different opportunities. Therefore, both theory and the empirical findings demonstrate the importance of being open towards organisational transformation, where the empirical findings further show how a global company can manage this.
- **Long-term relationship** describes that the implementation of automation is a long-term project, where the relationship between the workers and management is important to consider (Stein & Scholz 2020). The empirical findings highlight that in an implementation of an automation process there will be hiccups along the way. Therefore, it is important for the management to support the workers in this transformation process. This fosters a long-term working relationship.

- **Strategy synchronisation** includes that the technological strategies must be aligned and integrated with the organisation's main strategy and objectives (Stein & Scholz 2020). The empirical findings explain that since technological advancement has a rapid speed, it is difficult to have one valid strategy. Therefore, there is no specific human and machine relationship strategy implemented at SKF yet. The theory argues for an implementation of a technological strategy, meanwhile the empirical findings state that this is difficult due to the technologies' rapid transformation speed.
- **Training and development** is a tool that is used for a new capacity building and knowledge due to the implementation of automation (Stein & Scholz 2020). The empirical findings highlight another method of training and development, where collaboration with other actors on the market to share workers with each other can be a great method to implement. This collaboration generates job rotation, knowledge exchange, new ideas and flexibility. The empirical findings agree with the theory. Even if internal training has been mostly highlighted in the empirical findings, working with other actors can further generate new knowledge and elevate the capacity building.
- **Equal participation** describes that the future of automation will depend on the integration process between humans and machines to innovate new ideas (Stein & Scholz 2020). The empirical findings show that the human and machine relationship is an important aspect in the automation process. This since machines and humans will both be equally needed in this process and should share resources with each other. One integration tool that the empirical findings exemplify is cloud solutions, which helps the workers to update information about AGVs, robots and IT systems. Therefore, the empirical findings acknowledge the HARM concept in the theory through working on an integration tool that can be complementary to the theory.
- **Teamwork** within the HARM's process includes the integrated workforce, where it requires humans to trust the robots as their colleagues, even though the robots might not trust the humans (Stein & Scholz 2020). The empirical findings highlight that teamwork is important, since the humans take care of the machines. The machine analyses and evaluates to assist the human in the decision-making process. It is important for employees to take responsibility and ownership in this relationship. However, the empirical findings show that some humans can be bothered by the machines. This since as a human, you want

to be responsible for your limited area. Therefore, the HARM teamwork by Stein & Scholz (2020) in the theory at SKF can be seen as a challenge that requires more effort.

- **Organisational culture** transformation includes a cultural change that is required by the HARM process to create acceptance and beneficial exchange (Stein & Scholz 2020). The empirical findings highlight that in the future working with a machine can be similar to collaborating with a human. The empirical findings further demonstrate that one way to accept the machines as a part of the workforce and provide them with a human touch, is to give the machines personal names. The empirical findings support the theory that acceptance is important to have a successful integration process, by demonstrating an integration activity to achieve acceptance.
- **Communication** includes improving and establishing joint communication. The HARM interaction requires a different kind of language to avoid communication barriers and foster knowledge exchange between humans and machines (Stein & Scholz 2020). The empirical findings show that there are communication barriers between humans and machines, where the humans do not always understand the machine language and the local language should be considered together with training. One reason for these communication barriers is that machines can come from different suppliers and programmers. Shift of communicative interaction between humans and machines (Figure 2, p. 30) by Stein and Scholz (2020) describe the different communication interactions. The empirical findings explain that not all the steps in the communication interactions are fulfilled yet, where the communication between machines to machines is still absent. Therefore, the empirical findings confirm the theory regarding the importance of establishing a joint communication and are striving for a full implementation of Industry 4.0.
- **HARM network and projects** includes innovation networks, collaborations and projects to create technology within information systems, which integrates the workers in a new automated network structure (Stein & Scholz 2020). The empirical findings describe a collaboration project to create a network structure, where workers were able to visit the suppliers for machine learning. Therefore, the empirical findings show a method to create a network structure which is a practical complement to the theory of Stein and Scholz (2020).

- **Value creation** in global production, national culture and regional diversity describes that outsourcing to low-cost countries will decrease due to automation, where organisations will keep the manufacturing in their home country and create new jobs (Stein & Scholz 2020). The empirical findings acknowledge this theory by stating that the implementation of automation results in that the manufacturing remains in Gothenburg. Therefore, the empirical and the theory share similar views on value creation.

The empirical findings identify two other strategic consequences of implementing an automation plant in an established factory from a human resource management perspective, which were not covered by the theory.

- **Undesirable competency drainage** is when manual tasks and knowledge disappear due to automation. This is an essential strategic consequence since without this manual competence, there is no data to feed the machine learning models with.
- **Grey-collar workers** are a mix of blue-collar workers and white-collar workers due to the implementation of automation and the competence shift that it brings.

Therefore, the empirical findings add to the theory by identifying two other factors that are important to achieve a successful HARM integration.

The theory highlights that the relationship and integration between humans and machines are viewed as synergies. Value is created from their interdependence (Stein & Scholz 2020), which results in a higher value creation, tight collaboration, in-depth learning and knowledge exchange (Gaponenko & Glenn 2020; Pham et al 2018; Ozkan-Ozena et al 2020; Stein & Scholz 2020). The HARM integration enables humans and machines to share tasks (Badri et al 2018), but the challenge is to balance this relationship (Nazareno & Schiff 2021; Stein & Scholz 2020; Badri et al 2018; Tan & Rajah 2019). Figure 6 is elaborated by the authors and Stein and Scholz (2020). Figure 6 demonstrates thirteen strategic consequences for HRM to reach a successful HARM integration process, which has been applied to the empirical findings to create an integration framework.

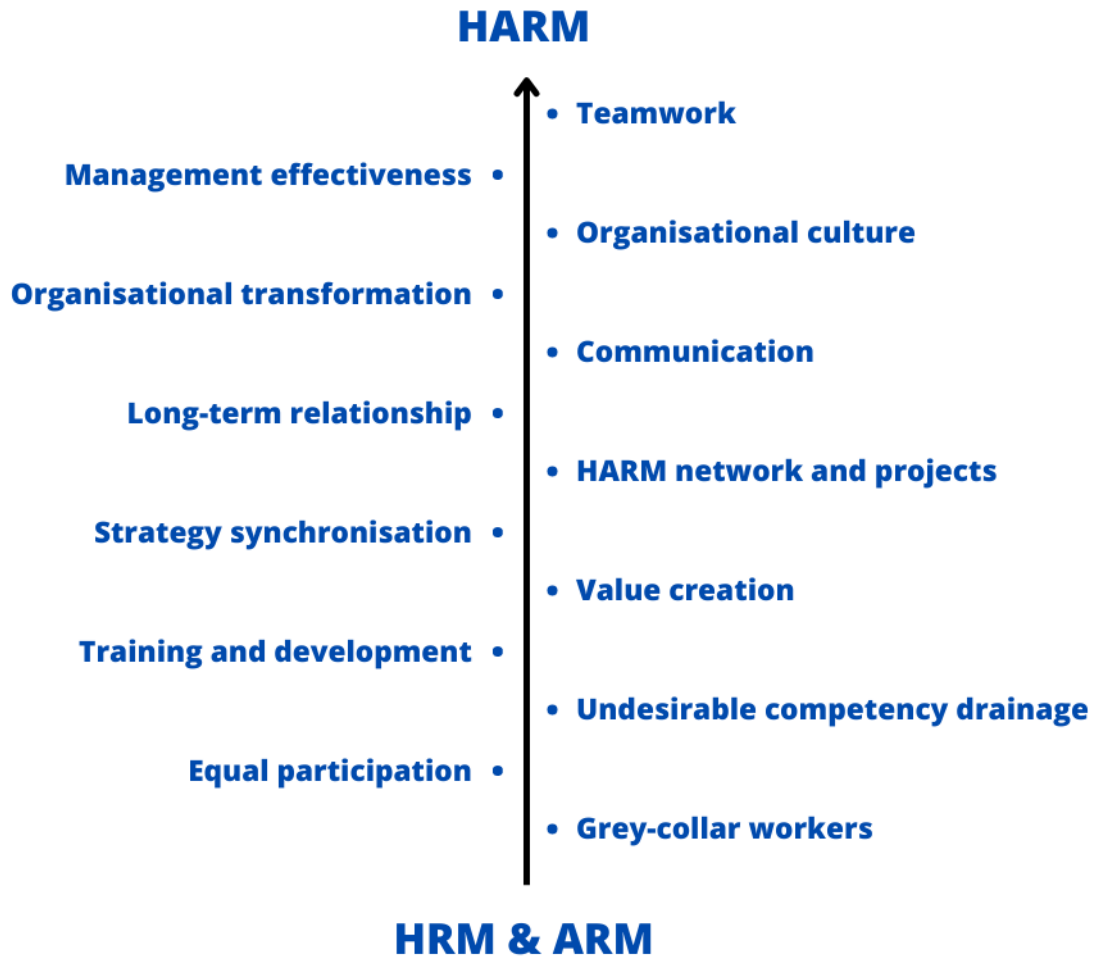


Figure 6: Strategies for HRM to reach a HARM integration, adopted and elaborated by the authors from Stein and Scholz (2020)

6. Conclusion

To conclude, the purpose of the research is to get a profound understanding of how automation changes the demand for skills, the working conditions, and the strategies for HRM in the manufacturing industry. This through answering the three research questions.

The first research question regards how the implementation of automation shifts in planning needs and the demand for skills. The results show that Industry 4.0 is the current transformation of automation within the manufacturing industry. If one does not focus on the automation transformation process, one risks becoming obsolete. Therefore, it creates a shift in planning needs and demand for skills. To handle this shift, the results show a change within the HR function towards a people perspective with competence management, where internal training and development is the most common HR practice within future workforce planning. This planning includes leadership training, union collaboration, vocational training and collaboration with other departments to manage the shift of skills. However, HR is not solely responsible for the competence development, it is also up to the managers, union and workers. The demand for skills has shifted towards more process understanding and digital skills. The results show the importance of including the workers in an automation transformation to jointly find solutions and to influence the process, where it is important to consider that some workers might require more time or different approaches than others to learn new things.

The second research question concerns how the implementation of automation plants affect working conditions, job satisfaction and motivation. When automation transformation occurs, it creates fear and concern among the workers, especially the older generation. To mitigate this fear; education, including the workers in the implementation process and collaboration with the union can improve the internal communication as well as making the workers feel safer. The research shows that the implementation of automation improves the working conditions in terms of health aspects, safety conditions and the work environment. The research further shows that the implementation of automation has shifted from physical to mental pressures, where stress is the main factor. Regarding the automation's effect on job satisfaction, mitigation of standardised tasks and fewer accidents has improved this area, where self-leadership training is a method that increases satisfaction, well-being and teamwork. Automation has improved motivation, where results show that new equipment is motivating for the workers and that monotonous tasks are unmotivating. Therefore, it is motivating to provide the workers with new

learning opportunities that focus on their strengths and creativity to feel motivated. The research identified a salary-based motivation tool that was built on competence development to receive a higher salary. Furthermore, group-based motivation can increase knowledge sharing within the organisation.

The third research question addresses the strategic consequences of implementing an automation plant in an established factory for HRM. The identified strategic framework in the research is based on Stein and Scholz (2020) and the empirical findings which has identified thirteen factors for a successful HARM integration. These strategic consequences are important for HR to consider when planning for future workforce. These are presented in Figure 7 below:



Figure 7: Strategic framework, adopted and elaborated by the authors from Stein and Scholz (2020) and empirical findings.

6.1. Contributions and Implications

6.1.1. Theoretical Contributions

According to previous research, theoretical insights about HRM in relation to automation is lacking and requires specific skills to be managed. This regarding the future of automation activities and the human capital (Stein & Scholz 2020). This research has provided an insight into how the Swedish MNE SKF works with the human capital in relation to their implementation of automation process through a case study. Previous research consists of examples of automation processes from different organisations with an organisational perspective. However, an in-depth case study of the automation transformation process from a workers perspective is lacking. This perspective is addressed in this research.

Previous research highlights that automation results in a shift of skills and tasks for the workers where training and development is a valuable tool to manage this shift. Liboni et al (2019) stated that reskilling of workers in the most optimal way or attracting, retaining and replacing skills efficiently are still unclear for many organisations. Therefore, there is a gap within the labour market regarding knowledge and skills between the demand and the available workforce (Pio et al 2021). However, the theory does not elaborate on how and what kind of training and development is needed in this transformation process. It lacks the complexity of how to manage a workforce in an automation transformation through concrete examples or suggestions.

The theory addresses HR's responsibility to manage the organisation's workforce and their issues (Stein & Scholz 2020). However, in an automation transformation, there are more actors within an organisation that are responsible for the workers relationship with automation that the theory does not bring up. These actors consist of managers, workers and the union, who also need to help in this automation transformation process.

Workers' well-being is essential in organisations. However, this topic tends to be ignored in relation to automation (Nazareno & Schiff 2021; Cheng et al 2020), especially the psychosocial health risks (Cheng et al 2020). This research highlights both physical and mental challenges and improvement that affects the working conditions due to the implementation of automation. To handle these changes, the safety representative must get familiar with these issues. Therefore, this research complements this theory through providing practical examples.

Previous theory focuses on how to adapt the current workforce to the automation process but does not focus on how to include the workers perspective, experience and knowledge to influence the implementation of the automation process. This research considers this aspect and can add value to the literature. The HARM integration concept in relation to Industry 4.0 explains what factors are needed in the integration process but does not focus on how to apply it to a specific industry or company. This research provides an example of that.

6.1.2. Practical Implications

The practical learning outcome of this research is to involve the human capital early in the automation transformation process. If one includes the human capital in the decision-making process from the beginning, one can mitigate the hiccups, errors and workers' reluctance towards automation along the way. One other practical implication is conveying the message of the automation process to the workers about the individual and organisational changes it brings. Additionally, an important factor to consider is the union's involvement in this automation transformation to make the process run smoother.

Another practical implication is the internal communication, both hierarchy and between different departments. The communication needs to be clear and transparent to the workers. Therefore, it is important to listen to the workers when automation occurs, since they can contribute with practical inputs of what is needed and what will occur when a task gets automated. Therefore, a communication strategy would be valuable in automation projects.

Another dimension that the research highlights is that it is important to have one standard regarding programming of machines. Otherwise, it can be difficult for the workers to understand the machines, resulting in errors and disruptions in the production.

For the HARM integration to be successful, one should invest in training and development in the form of upskilling and reskilling. There should be a diverse set of internal training and development platforms. It is important to adapt the competence development and processing time to the workers. A HARM integration strategy can be an important management style for organisations to implement when atomising their production.

6.2. Limitations and Suggestions of Future Research

This research provides a profound understanding of how automation changes the demand for skills, the working conditions, and the strategies for HRM in the manufacturing industry. However, there are always potential limitations in research that might influence the findings. Therefore, it is important to acknowledge these and provide suggestions for future research. One limitation to acknowledge is that this research was conducted on a MNE that has not fully implemented Industry 4.0 yet, since the case company still has manual channels operating and the machine-machine communication has not yet been achieved. Therefore, a suggestion for future research is to analyse the HARM integration process when Industry 4.0 is fully accomplished or to analyse the HARM integration process in relation to the next industrial revolution called Industry 5.0, which is on the horizon. Such research would build on this research and add further value to the HARM integration process. Since automation is a trend in the manufacturing industry (Horváth & Szabó 2019; Xu et al 2018; Szász et al 2020), further research within this field would be of interest to many organisations.

Another limitation is that this research is limited to twenty samples that consist of respondents from HR, production, union and workers. It would be interesting to see the outcome of a larger sample size that is spread over more functions. This could further strengthen or weaken the results in this research and add more value to the research field. One other limitation is that this research is based on a MNE and may therefore not be applicable to a SME. This since MNEs operate in different global locations which gives them access and control over a bundle of different resources (Buckley & Ghauri 2004). Therefore, a suggested future research field would be to apply the same research purpose and questions to an SME or do a comparison between a SME and an MNE. This research perspective would further broaden the research field and identify if the HARM integration process is equally applicable to SMEs and MNEs.

Another identified limitation is that this research is conducted on one case study on a MNE's automation plant in Gothenburg. Although the research consists of respondents from other countries, it is still limited to SKF's Gothenburg D-factory. Therefore, the final suggestion to add value to this research area is comparison research of companies in different countries, a comparison of companies in the same industry or a comparison of companies within different industries. This would identify if the HARM integration were a set strategy or if it needs adaptations depending on the company, industry or country.

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8. Appendix 1

Interview Guide

1. Could you please present yourself?
2. How long have you been working at SKF?
3. What department do you work at and what is your role at SKF?
4. Could you describe your tasks at SKF?

Human Resource Management

1. What is SKF's HRM strategy and does it match SKF's overall strategy?
2. Has the automaton plant "World-Class Manufacturing Concept" changed SKF's HRM models/strategies? If so, how?
3. Automation can require a different operation management instead of a traditional one. Have the management routines changed at SKF?
4. How is SKF's HR department working on matching the existing skills with the new demand? How has it impacted the current workforce?

Upskill and Reskill

1. Automation can increase the gap between skilled and unskilled workers regarding work opportunities. Is this something that SKF has experienced? If so, how?
2. What role does training and development have within SKF? What kind of training is performed?
3. Automation results in a growing demand for new skills and job titles. What positions and qualifications are there a need for at SKF?

Working conditions, Job satisfaction and Motivation

1. The workers skills, attitude and knowledge towards automation is a current discussion. How has SKF's HR department managed this?
2. The automation process tends to create a fear of replacement and affects job satisfaction. What are SKF's thoughts regarding this?
3. Automation can affect job satisfaction, motivation and working conditions. How do SKF work with these areas?
4. Has the automation resulted in a shift of workers to another department within SKF?

Automation

1. In what way has automation affected the manufacturing within SKF and are there implications regarding the demand for skills?
2. What are SKF's biggest challenges and opportunities in connection to automation from a human capital perspective?
3. What are automation's advantages and disadvantages regarding human capital?

Human and Automation Resource Management

1. A way to manage both humans and automation is to combine them into one management concept called Human & Automation Resource Management, HARM. According to the literature, this integration will generate synergies for both parties and HARM could be a solution where humans and machines work with each other instead of against each other. What do SKF think of this integration? What does SKF think about the integration between humans and machines at SKF?
2. How is the relationship between humans and machines at SKF? What are the synergies from the integration?
3. How do humans and machines work together at SKF? How do SKF balance the relationship between humans and machines?
4. Is there a specific strategy that is implemented to manage humans and machines? What have SKF learned during this process?
5. Is there anything that has not been asked that you would like to add to the research?