

Challenges of Industry Revolution 4.0 Towards Human Resource Practices Among Manufacturing Companies in Johor

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Abstract: The manufacturing sector needs highly skilled workers to prepare workers to transition to workspaces with more complex processes and ensure job retention in ever-changing working environments, especially following the implementation of Industry Revolution 4.0 (IR 4.0). As IR 4.0 affects human resource practices, it must be well planned and managed. Nevertheless, this issue was not yet fully explored in Malaysia. Thus, this study intends to explore the challenges posed by Industry Revolution 4.0 for human resources (HR) practises in manufacturing companies in Johor. This study conducted qualitative interviews involving 15 human resource managers from manufacturing companies in Johor to meet its objective. The data analysis has been analysed using thematic analysis. This study discovered four main challenges that manufacturing companies would face and need to be addressed before adopting IR 4.0: necessary skills, future employment issues, human labour dilemma, and superficial conflict. Hence, despite the benefits of IR 4.0, the adoption of IR 4.0 among manufacturing companies in Malaysia needs further analysis.

Keywords: IR 4.0, Manufacturing companies, Human resource practices

1. Introduction

The term "industrial revolution" describes how an industry's technological, economic, and social systems have evolved. (Dombrowski & Wagner, 2014). The German government's expansion of digitization and computerization led to the development of "Industry Revolution 4.0" (IR 4.0). (Shamim, Cang, Yu, & Li, 2017). The three elements of Industry 4.0 are vertical integration and networked manufacturing systems, end-to-end engineering over the full product life cycle, and horizontal integration across the entire value creation network (Stock & Seliger, 2016). The vision of the impending industrial revolution includes technological concepts and solutions to combine the economy of scale with the economy of scope (Dombrowski & Wagner, 2014). The vast majority of

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company operations must become more digitalized if the Industry 4.0 goal is to be realized. To date, the companies that have gained the benefits of IR 4.0 are able to produce new products and services that increase efficiency and pleasure (Egbetokun, Yun, Zhao & Kim, 2018). Nevertheless, the appropriate mix of products and services, an effective and efficient supply chain, timely information on customer needs and wants, a smart work environment, and mass customization are the main problems facing businesses in the IR 4.0 world (Morrar & Arman, 2017). Therefore, the organization's human resource is greatly impacted by IR 4.0 (Benešová & Tupa, 2017). Future tasks will increasingly necessitate independent work organisation and a thorough thought process (Dombrowski & Wagner, 2014). If an organization aspires to be smart, it requires smart workforce and a conducive environment for learning and creativity, which calls for proper processes. This issue not only affects the organisation's competitiveness but can also cause the organisation to step down from the market if it ignores it. Hence, not much study has been done on management for IR 4.0, particularly in Malaysia (Shamim, Cang, Yu, & Li, 2016).

Although Malaysian industry mostly still in Industry 2.0, the Fourth Industrial Wave (Industry 4.0) is expected to create 1.5 million jobs in the country (Hussin, 2017). It will create a whole range of businesses that require more skilled workers although there is going to be a lot of automation. Therefore, HR practices play a crucial role in organisation performance by focusing on effectively utilising its human workforce within the organisation. This paper presents results from qualitative study on the challenges of IR 4.0 on human resource management practices among manufacturing companies in Johor.

2. Literature Review

2.1 What is Industrial Revolution 4.0?

The term industrial revolution refers to the change of the industry's technological economic and social system (Dombrowski & Wagner, 2014). The creation of the steam engine marked the beginning of the First Industrial Revolution, which originated in England in the middle of the 13th century. Apart from that, The Second Industrial Revolution emerged in Europe and the United States in the latter half of the 19th century. It is strengthened by mass production and the replacement of chemical and electrical energy for steam (Lavanya, 2017). The creation of the integrated circuit was the technology that the Third Industrial Revolution generated. The key feature of this revolution is the use of electronic and information technology, and this revolution appeared in the last of the 20th century in many industrialised countries around the sphere (Pereira & Romero, 2017).

The Fourth Industrial Revolution 4.0 (IR 4.0) comes from the German government project for digitalisation and computing purposes (Shamim, Cang, Yu, & Li, 2017). The product idea is the first step in this cycle, which also includes the order placing, product development and manufacturing, product delivery to the customer, and recycling, which includes all subsequent services. Through real-time data exchange, IR 4.0 will cause interconnection of people, objects, and systems in the whole value chain (Hecklau, Galeitzke, Flachs, & Kohl, 2016). Internet of Things and cyber-physical systems, it is expected that there will be 60 billion smart objects online by 2020 where the CPS system and technology are the main support (Crnjac, Veža, & Banduka, 2017). The concepts in Industry 4.0 are very theoretical because the implementation of Industry 4.0 at the factory is very difficult. The ability to obtain all relevant information in real-time by involving all value chain participants is the basis of the fourth industrial revolution. The capacity to create the best value-added movement from the data at any time is very important. By connecting people, things, and systems, companies can establish connections that are dynamic, self-organizing, real-time optimised, and have value added. These can be optimised based on different criteria such as costs, availability, and consumption of resources (Müller *et al.*, 2015).

Many experts are talking about Industry 4.0, which focuses on a multidisciplinary, intelligent society in which smart manufacturing links physical and digital networks. Companies are now faced

with several difficulties due to this growth, including the demand to drastically boost digitalisation levels to define the role of humans in new processes (Pessl, Romina Sorko, & Mayer, 2017). According to empirical studies, the growing digital revolution in industries opens up new opportunities for innovative business plans. Therefore, the majority of companies in the manufacturing industry (79.9%) and the logistics industry (85.5%) see positive effects resulting from digital transformation (World Economic Forum, 2017). However, the studies from (Qin *et al.*, 2016) indicate that although many researchers and companies are working on this issue, present production has not yet attained Industry 4.0. Every manufacturing system has certain interoperability-focused elements that can be applied to it.

2.2 IR 4.0 on Human Resource Practices

One of the primary methods used by organizations to determine the abilities, attitudes, and behaviours of their workforce to achieve organizational goals is through HR practices. Additionally, it refers to a collection of prepared plans of action carried out by a company's human resources. Chan (2017) identified that prevalent factors, contextual and contending changes, and emerging factors are the three categories of factors that influence the changes in HRM practices. Moreover, HR practices are executed at strategic and human resource levels. Individual and bundles of human resource practices are the streams on human resource practices. Furthermore, managers can foster employee creativity, knowledge management skills, and learning by creating HR practices.

The Malaysian job market will be tougher as firms struggle to keep up with rising business management expenditures (PwC, 2023). Therefore, it is important for all parties to acknowledge that automation risks the eradication of more than half of Malaysia's jobs (Vaghefi, 2022). According to Malaysia's Minister of Human Resources, V. Sivakumar, if they do not attend reskilling and upskilling programmes or enhance their abilities, approximately 4.5 million Malaysians could lose their jobs by 2030 (Bernama, 2023). The problem in the future for Malaysia is not the lack of employment but the shortage of skills that the new jobs will demand (Ranstad, 2021). Therefore, HR practices play a crucial role in organisation performance by focusing on effectively utilising its human workforce within the organisation. (Chan, Lian, & Tourism, 2017). As a result, intentional transformation processes—often digital transformation—are necessary for the organisational adoption of Industry 4.0. For the challenges of the digital transition, new mindsets are necessary, as well as a shared approach to personnel acceptance and certification (Müller *et al.*, 2018). The key source of competitive advantages and a good relationship between employee and employer in the organisation depends on how effective the implementation of HR practices is. Thus, for Industrial Revolution 4.0, the concept of developing countries has included all the elements of HR practices and has become a topic of modern management today.

3. Methodology

The study adopted a qualitative approach as the information required for this study is the exploration of challenges in Industry 4.0 towards HR practices through the experiences of respondents (Mason, 2002). Moreover, the qualitative approach enables the researcher to read and engage with information critically, and also enhance the crux from the large body of information towards specific and required information. Thus, open-ended interviews are conducted to gather the HR managers' opinions. Afterward, interview data is analysed to explore the level of understanding of Industry 4.0 towards HR practices and the challenges of Industry 4.0 in HR practices among manufacturing companies in Malaysia.

As the issue of this study is very focused in IR 4.0 the purposive sampling has been done involving 15 HR managers of manufacturing companies in Johor. Johor is chosen as the manufacturing companies are among the top three states in Malaysia, contributing 12.6 % of market shares the other two states are Selangor (28.9%) and Pulau Pinang (12.9%) (Department of Statistic Malaysia, 2017). This study also chooses manufacturing companies as they are the most affected industry with IR 4.0. Based on Janice Morse (1994) 15 respondents are already sufficient for phenomenological studies.

Data were collected using open-ended interviews to achieve the study's objective. The interviews focused on Industry 4.0, human resources practices, and human resource challenges. Before undertaking

the interviews, the questions of instruments are verified and endorsed by the four relevant experts. In which one professional from each category of respondents is approached. Concurrently, the interview questions are updated, finalised, and preceded according to the expert’s opinion. The interviews were done through face-to-face contact and followed up by an email with the questions to be answered. By doing this, it was made sure that the interviewees had enough time and space to ponder and describe their experiences. The data collected through the qualitative method after conducting the interview is analysed by making relevant themes congruent with the research objectives. The data analysis process started with research questions that were asked through interviews (Edwards & Holland, 2013). Then, the raw interview data was gathered from respondents’ comments and feedback. The raw data was then examined using the code and themes.

4. Findings

The 15 respondents pointed out various challenges faced by the Human Resources Practices among manufacturing companies in Johor. The challenges have been grouped into four categories as summarised in Table 1.

Table 1: Challenges of industry revolution 4.0 towards HR practices among manufacturing companies in Johor

Challenges	Necessary Skills	Future employment issues	Human labour dilemma	Superficial conflict
R1	✓	✓		✓
R2	✓	✓		✓
R3	✓		✓	✓
R4	✓		✓	
R5	✓	✓	✓	
R6	✓	✓	✓	✓
R7	✓	✓	✓	✓
R8		✓		✓
R9		✓		✓
R10	✓	✓	✓	✓
R11	✓		✓	✓
R12	✓	✓	✓	✓
R13	✓	✓		
R14	✓	✓		
R15	✓	✓		
Total	13	12	8	10

(a) Necessary Skills

There are some necessary skills required of the workers that need to be done within the industry. From the interviews, 13 of 15 respondents pointed out various skills are needed among the

manufacturing companies in Malaysia to face the challenge of IR 4.0. The most important skill needed is the technical competencies to handle the new machine.

“the person who takes care of the machines has been working at the companies for so long, and for the past two years, he got the assignment for him to be able to handle these machines. Thus, this person had to acquire the necessary knowledge and skills”. (R1)

“in production management, if the company wants to acquire a new worker, we have different requirements than we had before. The company is not only looking for a knowledgeable employee based on the theory but also has special technical competence because these machines need more understanding”. (R3)

“the company wants to have technically enabled people and be able to harvest the potential of new technology when we provide it. So, we are clear on when the company decides competence requirements”. (R4)

(b) Future Employment Issues

This issue, according to 12 of the 15 respondents, is crucial for manufacturing companies. There are two potential challenges that Industry 4.0 poses to human resources in terms of future employment debate. Firstly, for now, the industry needs no skill requirement when it comes to job opportunities. Secondly, if employees and the organisation themselves do not meet the requirements, Industry 4.0 will create an employment problem in the future.

“I think that I just need to improve myself. I just need to find what I need and try to learn it” (R2).

“Previously we had almost 2000 people but today it is less than thousand. Currently we are using machines because we want to place humans in areas that are dangerous to work” (R13)

(c) Workforce Dilemma

Based on the interview, it was found that Industry 4.0 practices require many companies to reduce their workforce. The statements from respondents stated as below:-

“the machines that we used now can replace three workers. Thus, it can help to cut the cost of training” (R1)

“When we open one position, we have so many candidates who apply for that position. But we only can choose one” (R8).

“We have not reduced the workers, but we doubled the production. Thus, the output per worker has doubled” (R6)

“We will identify the workers who are ready to take on various aspects of jobs such as problem-solving and troubleshooting”. (R5)

The workforce profile is changing rapidly and looks different than a few generations ago. As technological advancement triggers an increased level of automation, the workers must upgrade themselves to cope with Industry 4.0 technologies. While some companies oppose this advancement, several have seen the industry's major impact on human labour. Thus, it can be observed that Malaysia's manufacturing sector is still growing and that labour productivity needs to be improved.

(d) Superficial conflict

During the investigation, it was found that:-

“It is sad to say that new technologies that we bought from Italy will replace human jobs. All of the workers here have family to take care. I can’t imagine how they have survived in their life if they lose their jobs” (R3).

“We have spent a lot of money on the maintenance fees of machines. Thus, it will cost us if we still have a lot of workers” (R5)

, “Currently, we have not reduced the workers but they need to do double work of production. Thus, output per worker has doubled” (R4)

Consequently, results demonstrate that Industry 4.0 will operate using cutting-edge technology like sophisticated machinery and save costs rather than using human labour. Utilising technology will increase worker productivity and has serious risks. Based on the findings, we believe that Industry 4.0 is superficially contradicting and that the manufacturing sector is still evolving and immersed in conflict.

5. Discussion and Conclusion

Most respondents gave the opinion that HR practices can be considered as one of the primary sources by which the companies can shape the skills, capabilities, and behaviours of their workers by designing the selection, recruitment, training, and staffing (Aluwi and Saihani, 2013). Moreover, managers can enhance their workers' innovativeness, knowledge management capacity, and learning by designing HR practices accordingly. This finding aligns with that of (Ekowoabo et al., 2015), who conducted studies on the effect of recruiting and selection criteria on performance in Lagos, Nigeria. They asserted that the effectiveness of every organisation depended on the quality of employees it recruits through hiring and selection processes. Thus, the studies suggested that quality should not be compromised in designing the recruitment and selection criteria.

It was discovered that when the obstacles brought on by Industry Revolution 4.0 in Human Resources Practises were examined, essential abilities, the issue of future employment, the human labour dilemma, and superficial conflict issues emerged as the most significant issues. The results are consistent with the findings published by the World Economic Forum (2016), which discovered that employees in lower-skilled roles, especially those in office and administrative, manufacturing, and production families, might get stuck in a variety of cycles where their lack of skill stability puts them at risk of being laid off without significant re- and upskilling. Thus, the expectation about future skills requirements will indicate which retraining effort will be concentrated most effectively and efficiently.

In conclusion, this research is carried out through a qualitative research method in which 15 interviews were conducted. Companies that want to thrive have to focus on acquiring the expertise they need, and some do this by continually upgrading their workforce. We could also inquire as to what we can do for the workforce that robots will replace. Though it is still the subject of political controversy, the government has begun determining the minimum wage for all Malaysian nationals in Malaysia. Government policies must also focus on providing youth with new options and secure employment. Although the study only involved manufacturing companies in Johor, similar challenges could be faced by manufacturing companies in other locations in Malaysia. This is mainly because the industry operates within the same environment and regulations.

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