

Industrial Revolution 4.0: the Human Resource Practices

Jen Ling Gan, Halimah Mohd Yusof

Abstract: *The trend of Industrial Revolution 4.0 (IR 4.0) has been emerged since the year of 2011 by German government. In this IR 4.0 era, automatization is emphasized in the particular industry. With the invention of high technologies on machines in organizations, the practices and business models of organizations would be impacted. The human resource practitioners might be facing several challenges in organizations, such as lacking of skilled workforce in managing the high-technology machines, as well as the employees' retention in this fast changing working environment. The human resource officers need to ensure that the employees are equipped with the updated knowledge and skills in order to operate the machines. Besides, human resource development is also playing a vital role in IR 4.0. Effective human resource practices could improve the working environment in the era of IR 4.0 by promoting the creativity of employees. Therefore, it could be seen that, in human resource aspects, human resource practices are concerned in organizations in order to match with the trend of IR 4.0. However, there is a lacking of discussion on the aspect of human resource practices, where most of the studies discussed on the technologies aspect of IR 4.0. Hence, this paper intends to discuss the human resource practices that could assist organizations in achieving the goal of IR 4.0.*

Keywords: *Human Resource Practices, Industry 4.0, IR 4.0*

I. INTRODUCTION

The trend of Industry 4.0 has been started since the year 2011 at Hannover Fair in German, where it has been gaining much attention from scholars [1]. Although Industry 4.0 was emerged from German government, it has internationally become a motivation and guidance for other countries' manufacturing industry [2]. Instead of the term "Industry 4.0", the term of "Industrial Revolution 4.0" is more familiar in literature because the term has been commonly used among the countries and industries [3]. In order to implement the concept of IR 4.0, there are six philosophies to be followed, namely Decentralization, Modularity, Service Orientation, Interoperability, Real-time Capability, and Virtualization [4]. The key objective of IR 4.0 is to enhance the efficiency and effectiveness of operation by instilling the technology of automation [5]. It is also known as the era where the technology of automation and strong data encryption are used

in manufacturing sector [6]. With the help of high technology in automation and machinery, it was believed that the productivity and efficiency of industry will be boosted to a higher level [7]. The high technology that was invented in IR 4.0 allows the machines and human to collaborate and cooperate in manufacturing products in particular industry [8]. The implementation of these new technologies is essential in IR 4.0 in order to produce an intelligent environment in industrial area, where the industry could exchange their information and regulate their operations through a smarter as well as quicker way [9]. By interacting the artificial intelligence (AI) of machines and human, German government believed that future manufacturing industry would become excellent by making use of Internet of Things (IoT) in IR 4.0 [10]. The implementation of the new technologies affects several parties, such as the employees who operate the daily operation in the industry, as well as affecting the organization [11].

Many scholars have been discussing the emergence of IR 4.0 on technologies aspects, however, there is a lacking of the discussion on Human Resource (HR) practices in IR 4.0 [12]. HR practices are known as one of the vital aspects in IR 4.0 [13]. It was stated that the issues of HR practices have become one of the hindrances that impede the digitalization of IR 4.0, which in turn affecting the performance and effectiveness of industries [14]. The qualification of employees has become complicated, hence it is essential for HR to know how to appraise the competencies of employees [15]. To reach the goal of IR 4.0, Asian countries have been taking initiatives to improve HR. For example, the government of Korea planned to nurture HR as well as to enhance HR's creativity through education [3]. Besides Korea, China has also taken initiative in enhancing their workers' competencies in order to overcome the insufficiency of skilled employees in the aspect of information technology [16]. Although IR 4.0 involves most of the automation of technologies, the process of operation is still relying on human, especially human's judgement and valued experiences in decision making process [17]. This is agreed by the experts of industries, where 60.2% respondents of an empirical study mentioned that human is still playing vital role in IR 4.0 [18]. The competencies of workers are one of the foundations in order to be successful in this era [19]. Below is the illustration of the integration between human, technology and organization in IR 4.0.

Revised Manuscript Received on October 15, 2019.

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Financial support is from Zamalah Universiti Teknologi Malaysia.

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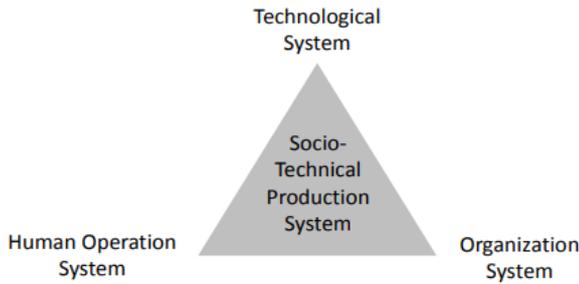


Fig. 1. The illustration of the integration between human, technology and organization in IR 4.0 [20]

Due to the emergence of IR 4.0, it was expected that HR management should adapt to the changes [21]. HR scholars had been proposing that the companies should have planned together with HR department to overcome the shortage of skilled employees in achieving IR 4.0 [22]. Due to the uncertainties of IR 4.0, the HR practitioners have been worried and put attention on how to recruit, to develop, and to retain the skilled employees [23]. The digitalization of HR practices is believed that it could boost the overall efficiency of HR team, as well as reducing the size of the team [24]. The HR in IR 4.0 should focus on automation, as well as the interoperability and flexibility in new practices [25]. Smart HR (SHR) 4.0 is one of the efforts to achieve IR 4.0 where the functions of HR are digitalized, such as the process of recruitment, training and development, reward system, and knowledge management [26]. SHR 4.0 involves high technologies, such as AI, IoT, and Big Data Analytics in HR practices [27]. As the complexity of tasks is increasing, companies might face challenges in obtaining qualified and skilled workers to operate high technology machines [28]. Scholars had been categorized the competencies of employees, such as literacies (languages), problem-solving, creativity, critical thinking, as well as the quality of characters [29]. To conclude, a well-planned HR practices should be instilled in IR 4.0 to enhance the competitiveness of employees by emphasizing on employees' development as well as the knowledge management that can improve organizations' sustainability [30]. Therefore, this paper intends to discuss the HR practices that could provide a positive workplace's climate which can achieve IR 4.0 effectively.

II. HUMAN RESOURCE (HR) PRACTICES IN IR 4.0

In this competitive IR 4.0 era, HR practices play essential roles in organizations because a suitable approach of HR practices could assist organizations to reach the objectives of IR 4.0 effectively [31]. This section discussed the role of HR practices in IR 4.0. The first practice is **knowledge management** (KM). An effective KM is crucial in HR practices because KM can boost up employees' innovation and the convenience of learning [32]. KM is about obtaining, organizing, processing, re-utilizing, and transferring knowledge among employees, as well as making knowledge available to all organizations' members [22]. Besides, KM also assists in employees' development of competency [33]. Although there is machinery assistance in IR 4.0, the KM practices 4.0 is still immature [34]. To increase the innovativeness and long term competitiveness of employees,

it is important for organizations to improve the process of KM [35]. HR practitioners could adopt KM 4.0, where KM 4.0 focuses on information accuracy, relevancy, value of content, as well as retrieving knowledge in real time without any delay [36]. By doing this, the higher the sustainability of KM in HR practices, the stronger the ability of organizations in adapting the changes of IR 4.0 [37].

The second practice is **HR policy making**. In order to have good quality of policy in HR development, HR should have matured HRM practices with the assistance of external sources [22]. It is encouraged that HR should be open to external sources of knowledge in policy making because the source of knowledge could be suitable for new procedures that are essential for IR 4.0 [38]. It was believed that the digitalization of HR 4.0 could be successfully launched if HR collaborates with professional academic training by combining the knowledge [25]. The exchanged information between industries and universities could be a vital element in IR 4.0, as well as HR 4.0 [39]. When the policy of HR 4.0 is matched with the syllabuses of universities or vice versa, it could help to develop competitive human capabilities for IR 4.0 through training and universities' programs [40]. By having collaboration between industry and institutes of education, the HR policy maker could tailor a set of new competencies with the institutes in order to have skilled human capital in future to handle IR 4.0 [41]. Besides, HR practitioners are also encouraged to work with Education 4.0, where Education 4.0 integrates the real working information into curriculum [42]. Through this effort, the knowledge of new HR 4.0 practices will be included in universities teaching, which in turn, preparing a pool of talented future workers [43].

The third practice is **training**. Training is known as the key HR practice that could overcome the uncertainties of IR 4.0 [44]. In uncertain working environment, trained employees will be able to adapt the frequent changes of working characteristics in IR 4.0 [22]. The innovativeness of employees are important to be trained because innovative employees tend to be able to work smart, overcome uncertainties, and more competitive in IR 4.0 [12]. Besides, the training of problem solving competency is also highly needed in IR 4.0 [45]. Training is important in HR practices 4.0 because several outdated positions will be replaced by machines and automation that involves high technology, where retraining programs are needed [46]. Hence, HR 4.0 is suggested to develop the employees because competencies and qualities are known as one of the keys to achieve IR 4.0 [47].

The fourth practice is **recruiting**. Blockchain based HRM System (BcHRMS) was proposed to encourage speedy and high transparency of recruitment process, where effective decision could be made in recruitment [48]. The scholar believed that, instilling high technology to recruitment process could help HR to avoid overspending on unproductive maintenance [49]. For example, the new technology provides double layered of encryption security to protect HR recruitment information, as compared to single layered security in

traditional HR system [48]. HR 4.0 is suggested to practice automated process of screening applicants' resume through AI and Big Data, where the technology helps to filter out disqualified applicants and to reduce time consuming process [26]. Besides AI and Big Data, IoT is another technology that could assist recruitment by connecting human, system, and machine [50]. IoT assembles and distributes recruitment related information through particular system, hence speeding up the process of decision making and efficiency of recruitment [51].

The fifth practice is **reward system**. Due to the lacking of skilled workforce in IR 4.0, it is important for HR to develop an effective reward system to retain and to develop existing workers, as well as to attract talented new workers [52]. It is believed that innovativeness and willingness of learning could be boosted through a good reward system in organizations [45]. Besides, reward should be adjusted when employees have intention to leave companies. The HR officers are suggested to adopt SHR 4.0 approach to analyze an individual employee's task performance, tenures, joined events, superiors' ratings, as well as peers' ratings to predict the rate of intention to leave [53]. This technology successfully reduced the rate of turnover, as well as helped organizations in avoiding high turnover costs [53]. Under the uncertain environment in IR 4.0, it is suggested that HR could motivate employees by communicating expectations effectively to reduce employees' stress and intention to leave [30]. Therefore, either tangible or intangible rewards, skilled employees must be rewarded to motivate them and to promote creativity among the human capital in IR 4.0.

The sixth practice is **job design**. In IR 4.0, the emergence of high technologies and machinery could bring impacts and challenges to all HR practices, which includes job design [52]. The existence of IR 4.0 principles affected job design among employees as well as the procedures in organizations [54]. It is suggested by scholar that, job design in HR 4.0 should focus on flexibility and openness due to the continuous changes in IR 4.0 [18]. Scholar has raised attention that, job design was overlooked in HR 4.0, however, job design is one of the most essential elements when IR 4.0 was introduced [55]. Effective job design in HR 4.0 practices could be seen when organizations successfully transformed their operations to automation with new procedures and systems [56]. However, job design issue in HR is known as one of the factors that could hinder the development of IR 4.0, where empowerment is not provided to employees [31]. Therefore, it is suggested that job design approaches, such as job enrichment should be taken into consideration because a good job design in HR 4.0 could help to meet the principles of IR 4.0 [56].

III. CONCLUSION

To conclude, HR 4.0 practices play significant roles in meeting the principles of IR 4.0 at particular industries. Effective HR 4.0 practices could enhance the performance of organizations by equipping the workforce updated competencies. Although past studies have been discussing the topic of IR 4.0, there is a dearth of studies that discuss the roles of HR 4.0 practices in achieving the goals of IR 4.0. The

discussion of this paper might be beneficial for HR practitioners of industries, where it might serve as a basic foundation in comprehending the roles of HR 4.0. Future researchers are encouraged to conduct empirical studies to examine the effect of HR 4.0 practices on organizational performance in IR 4.0.

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