

## **Chapter I**

### **INTRODUCTION**

#### **1.1 Background**

Industry 4.0 has started to transform the manufacturing environment completely and is expected to spread all around the world during the next decades. Industrial revolutions were always triggered by technological developments in history (Xu, David, & Kim, 2018). At the end of the 18th century, introducing mechanical production by using steam and water power has led the First Industrial Revolution (Xu et al., 2018). Mass production by using electricity was the key concept of the Second Industrial Revolution at the end of the 19th century. In the 1990s, with the use of IT systems and automation, the Third Industrial Revolution occurred. Today with the centralization of CPS (Cyber-Physical Systems), IoT (Internet of Things), and big data, the Fourth Industrial Revolution which has named Industry 4.0 in Hannover Fair event in 2011, has started to change the economy (Kazancoglu and Ozkan-Ozen, 2018). The Industry 4.0 transformation process does not only affect the manufacturing systems but also there is a significant effect on the nature of work (Kazancoglu and Ozkan-Ozen, 2018).

The increase in the use of internet technology in the industry has increased the complexity of these companies face (Majeed & Rupasinghe, 2017). Besides, industry 4.0 brings to a situation where business networks become very heterogeneous, involving various parties with various modes of communication and information. Companies in the future are faced with challenges in the management of these complexities and heterogeneity (Wollschlaeger, Sauter, and Jasperneite, 2017).

Indonesia itself has already vision several programs to answer industry 4.0 challenges. Elected President-Vice President's vision mentioned that they will develop new entrepreneurs,

especially from millennials generations, to face demographic bonus and industry 4.0 (Widodo and Amin, 2018). They also will revitalize supporting industry and infrastructure, science-techno parks development, and accelerating e-government systems (Widodo and Amin, 2018). They also state that the government already prepared with human resources, incubated in the last three years in their programs (Bahasa Kita, 2019). While in the masterplan of Islamic Economics 2019-2024, ministry of development plan states that, among others, the government will strengthening halal food value chain ecosystem with 4.0 industry technology especially for SME, using social media for halal tourism branding, using the digital platform to connect designer and fashion industry, creating media center, recreation center, production process, and distribution/marketing channel using industry 4.0 technology, adapting Islamic capital market to the industry 4.0 revolution, using digital technology (mobile, crowdfunding, or internet banking) to collect zakat and wakaf, and even creating digital Islamic economics curriculum for higher education (Kementerian PPN/Bappenas, 2018).

On the other hand, various economic parameters of Indonesia showed a slowdown (Dutu, 2016). This is indicated by the stagnation in the level of household consumption, weakening export capacity, slowing investment, declining state revenues, and the ongoing current account deficit (Praditya, 2019). This indicates at the micro-level that there is a decrease in performance in companies in Indonesia. This has an impact on the decline in Indonesia's competitiveness in the global environment (Kompas, 2019). Meanwhile, on the other hand, the level of work inconvenience in the Indonesian work environment is still high, the digital divide is still large, and concerns arise that most professions today will no longer be able to survive in the future. It is estimated that 57% of current professions will be eroded by the industrial revolution 4.0 (Pitoko, 2018). Meanwhile, only 71% of urban residents and 49% of rural residents in Indonesia have access to the internet (Jakarta Globe, 2018). The level of innovation in Indonesia is still very low, at 78 levels lower than Vietnam, and comparable

to Cambodia (Dutta, Lanvin, and Wunsch-Vincent, 2019). The country is faced with a lack of science & technology and R&D experts, weak R&D governance, complex bureaucracy, and missing infrastructure for innovation (CIPG and Nesta, 2019). In line with this, millennials are also in a state of uncertainty about their future (Pyöriä, Ojala, Saari, & Järvinen, 2017). However, anecdotal evidence said that they are quite more ignorant in the workplace (Full Stop Indonesia, 2018).

This phenomenal gap raises concerns about whether the government might bring Indonesian businesses into the industrial revolution 4.0. Besides, the business world itself cannot be sure whether they can implement revolution 4.0 with their internal situation because of the inconvenience and lack of confidence of employees in the face of change. As a result, the role of leaders, innovation, and openness for young people is an indispensable element in this kind of organizational environment.

Under industrial revolution 4.0, organizational performance should be linked to the contribution of human resources (Shamim, Cang, Yu, and Li, 2016), besides the information technology itself. This reflects the disruptive trend of reducing people in manufacture realm yet is able to improve both quantity and quality of outputs. Even though technologies and smart factories concepts are latest trend, it is impossible to deny the fact that humans are still important (Autor, 2015). Human factor contributes to organizational performance, even when the production system is highly automatic. The contribution could come from social communication to create new technology (Suebsin and Gerd Sri, 2009) or from an assessment of the level of usefulness involved in implementing a new concept or technology (Husain, Razali, and Eni, 2018). The technology itself was determined by the level of investment in innovation activities and the size of the organizations (Aboal & Garda, 2016).

Human resources could be used to increase organizational performance with speeding-up the process of innovation and effective leadership (Marvel & Patel, 2017). Two ways for

the company to use human resources to be able to increase complexity and heterogeneity are fast innovation speed and effective leadership. The speed of innovation represents a product aspect of competitive advantage, as a distinctive element of industry 4.0, surpassing traditional aspects such as product quality, product efficiency, and market strategy (Lauzikas, Miliute, Bilota, and Bielousovaite, 2017). Meanwhile, leadership effectiveness is a managerial aspect of organizational effectiveness which is also increasingly important in the development of business policies, plans, and product differentiation in industry 4.0 (Chung, Hsu, Tsai, Huang, and Tsai, 2012).

The questions then what are the determinants of 4.0 leadership effectiveness and 4.0 organizational performance? Researchers have been increasingly interested in the role of leader-member interaction as a source of employees, teams, and organizational outcomes. Leader-member exchange interaction (LMX) known to have effects on task performance (Wang, Law, and Hackett, 2005), organizational commitment (Truckenbrodt, 2000), organizational citizenship behavior (Illies, R., Nahrgang, J.D. and Morgeson, F.P., 2007), justice perception (Elicker, Levy, and Hall, 2006), turnover intention (Saeed, Waseem, Sikander and Rizwan, 2014), and job satisfaction (Pellegrini and Scandura, 2006). It is also known that individual job performance is the predictor of organizational performance. Hence, LMX could also be a predictor of 4.0 organizational performance. However, since LMX just a quality of interaction, we need a more direct variable to predict organizational performance. This variable, LMX, could have informed by empowerment theory (Emery, Booth, Michaelides, & Swaab, 2019).

Empowerment theory suggests that empowered employees could contribute to job satisfaction (Ugboro and Obeng, 2000) since it increasing some expected exchanges in the side of employees. Employees want to get involved more in the organization, not just as a resource exploited by the organization. Empowerment serves this purpose. Consequently,

empowered employees more involved in his or her work, leading to organizational outcomes. While research saw these two constructs unrelated (Chen, Lam and Zhong, 2007), LMX a form of empowerment. When a good leader harnesses good relations with his employees, employees could voice more and influencing a leader's decision (Lam, Loi, Chan, & Liu, 2016). Hence, LMX should merge with empowerment, results in Leader-Member Empowerment Interaction (LMEI<sup>®</sup>). This new construct could relate more to 4.0 organizational performance than LMX alone. The next step then to relate this individual-level construct to an organizational level construct. The mediating mechanism, of course, a team level construct (Li, Kim, & Zhao, 2017).

In a small but growing literature on team innovation speed, team innovation speed has been related to organizational performance (Knockaert, Ucbasaran, Wright and Clarysse, 2009). Team innovation speed is a team-level construct (Cheng, Cao, Zhong, He, & Qian, 2019). Here, innovation as the keyword since innovation is a major source of competitiveness in the industry 4.0 environment (Lin, Shyu, & Ding, 2017). It is a team dynamics measure and influenced by leadership (Peterson, Smith, Martorana and Owens, 2003). Hence, conceptually, it could relate leadership at an individual level to team dynamics at the team level and then an organizational performance at the organizational level.

This research developed the concept of 4.0 organizational performance relates not only to innovation as a characteristic of the 4.0 industry but also to the human resource aspect of the 4.0 industry. Millennials, those who born in 1981-1999 (Vessell, 2006), are the main human resource for the 4.0 industry. By 2020, about 50% of workers are millennials (Eberhard, Podio, Alonso, Radovica, Ayotina, Pieseniece and Sole-Pla, 2017). They are more multitasking and more involved in social media (Deloitte, 2016). Millennials have a knowledge resource, needed to adapt to the 4.0 industry environment (Črešnar & Jevsenak, 2019). According to Knockaert *et al.*, 2009 research, knowledge is one of the most important

determinants of team innovation speed. However, the organization usually saw the older generation as its backbone for innovation team. More team oriented generation, millennials, are ignored (Brant & Castro, 2019). Moreover, millennials as a human resource could inform much of the tacit knowledge needed to create innovation effectiveness (Hernández & Torres, 2018). Without sure knowledge, innovation speed could halt. Again, this would relate to leadership level construct such as leadership effectiveness.

Research on leadership effectiveness has shown significant associations with knowledge resources (Le & Lei, 2019). Indeed, knowledge is a part of the leadership competencies needed to create leadership effectiveness (Emiliani and Stec, 2004). Millennials could inform the leader how to behave, and is the external source of knowledge for the leader, creating leadership effectiveness. Another explanation comes from Lewis et al. paradoxical leadership theory that points to the importance of human resources strategic agility as part of leadership effectiveness (Lewis, Andriopoulos and Smith, 2014). Based on the study in five companies, three of which are web-based technologies and new media solutions, the model also oriented to problem-solving, using socio-technological instruments, which of course, heavily based on knowledge resources. In line with this, Jablokow, Jablokow, and Seasock (2010) noted that information technology leadership should be oriented to problem-solving to be effective. Hence, paradoxical leadership theory potentially used as the grand theory for leadership effectiveness and its relationship to employees in Industry 4.0.

In management research, Industry 4.0, its implementation and its economic, environmental and social implications represent a comparably young research field (Müller, Kiel and Voigt, 2018). Because 4.0 leadership effectiveness is somewhat a new concept, no previous research could inform the determinants and consequences of this kind of leadership effectiveness. From the paradoxical leadership point of view, however, the effectiveness could be predicted by the ability to accommodate the employee's characteristics which fit the

business environment, that is, millennial's style, and tap their knowledge to solving problems in business (Kornelsen, 2019). This leadership effectiveness then translates to team-level outcomes, such as team innovation speed (Cheng et al., 2019).

Hence, paradoxical leadership theory provides the theoretical basis for the relationship between openness to millennial style and leadership effectiveness and then moves to team innovation speed and finally, to organizational performance. Meanwhile, LMX and empowerment theory provides the theoretical basis for the relationship to team innovation speed, and then organizational performance.

Over the last decade, an increasing trend has been observed in the research interest in leadership and organizational performance. However, to date, the research on both variables, leadership and organizational performance, in the 4.0 industry environment has been unavailable (Nazarov & Klarin, 2020). Previous research only covers things not specific to 4.0 industry environment such as the effect of leader-member interaction to job performance (Wang et al., 2005; Saeed et al., 2014; Chen et al., 2007), empowerment by the leader and organizational performance (Ugboro, 2006), or leadership effectiveness and organizational performance (Svensson and Wood, 2006). No research has been done in the 4.0 industry environment, or empowerment and LMX concerning team innovation speed. Therefore, this research will address this gap.

Given that 4.0 leadership effectiveness and 4.0 organizational performance could highly relate to the 4.0 industry environment such as the millennial's style and innovation, we should research to test this assumption. The research could reduce the empirical and theoretical gaps that currently exist in this field. This research also could contribute to development problems in organizations that increasingly pushed to the 4.0 industry border. While the new methods of work are reinforcing our understandings toward future, the postulate that human factor and involvement at work still remain its priority in determining

organizations' successes. New empirical findings on leadership and motivation models, thereby, are equally important as other studies on Industry 4.0. (Tan and Rajah, 2019).

The purpose of this study is to test and to know the relationship between the variables and also the positive effect from one variable to another variable. The variables that will consist of an independent variable and dependent variable are leader-member empowering interaction, openness to millennial employee style, 4.0 leadership effectiveness, team innovation speed, and 4.0 organizational performance.

## **1.2 Research Problems**

There is still a gap in the literature that explores the interplay of team innovation speed and leadership effectiveness in the change process from the traditional environment to the fourth industrial revolution environment. Provided the fact that, relate to Industry 4.0, frequently in the areas of manufacturing and engineering, need more research in non-technical side like in human-machines interaction (Ekren, Erkollar, and Oberer, 2017).

The effect of team innovation speed and leadership effectiveness on firm performance within the 4.0 industry is not well researched especially. Besides, leader-member empowering interaction and openness to millennial employee style are transforming the ways of operating in the fourth industrial revolution era but the phenomenon is somewhat unexplored with firms.

The problems of this research are:

1. Does team innovation speed have a positive effect on 4.0 organizational performance?
2. Does 4.0 leadership effectiveness have a positive effect on 4.0 organizational performance?
3. Does 4.0 leadership effectiveness have a positive effect on team innovation speed?
4. Does leader-member empower interaction to have a positive effect on team innovation speed?

5. Does openness to the millennial employee style have a positive effect on 4.0 leadership effectiveness?

### **1.3 Research Objectives**

The objectives of this research are:

1. To examine the positive effect of team innovation speed to 4.0 organizational performance.
2. To examine the positive effect of 4.0 leadership effectiveness to 4.0 organizational performance.
3. To examine the positive effect of 4.0 leadership effectiveness on team innovation speed.
4. To examine the positive effect of leader-member empowering interaction to team innovation speed.
5. To examine the positive effect of openness to millennial employee style to 4.0 leadership effectiveness.

### **1.4 Research Contribution**

This research has two types of contributions: theoretical contribution and practical contribution. Theoretical contribution explains the contribution of the research to the growing or development of the science while practical contributions talking about the contribution of the research to the management practice in the real daily work field.

#### **1.4.1 Theoretical Contribution**

This research will fill the gaps in the theory of 4.0 leadership effectiveness by advancing openness to millennial employee styles as determinants for this construct. This is important since no known leadership theory advanced to explained leadership

behavior in the 4.0 industry environment. This research might expect that paradoxical leadership could fit well with 4.0 leadership phenomena, hence giving support to this heavily debated leadership theory.

#### **1.4.2 Practical Contribution**

Since Industry 4.0 is a practice-driven topic, however, this research will briefly discuss opportunities for practice-enhancing research. This research will highlight the 4.0 industry organizational leadership and performance dimension of conceptual relationships they help to enact. Through this research, the findings should alert managers that some change should be done to increase their organizational performance based on recent development in lifestyles and technology and also in their leadership development program. Managers then can work to transform their organization into a functional 4.0 industry ready and compatible organization. This research also can inform the key strategic decision-makers to change and formulating new policies to help industries and other trade players to transition smoothly to the 4.0 industry through recruitments and ethics policy systems (e.g the role of leader for millennial employees) and other HR Management policies.

#### **1.5 Systematics**

This research proposal begins with an examination of recent literature on openness to millennial employee style, 4.0 leadership effectiveness, 4.0 organizational performance, leader-member empowering interaction, and team innovation speed. Research problems and objectives presented related to these constructs. Then, the research contribution emphasized in the theoretical and practical realm.

Chapter 2 considers some of the construct concepts theoretically. Hypotheses will be developed based on this theoretical consideration and empirical evidence. After that, the

research model for this research will be presented. Then, Chapter 3 present the plan for collecting and analyzing data to test the hypotheses and research model. Chapter 4 present the results of data collection and analysis. Then it proceeds to the discussion of the research findings in light of previous theory and research. Chapter 5 conclude the research and considers the implications of the findings on the theoretical advances and practical aspects. Finally, some limitations will be exposed and the consequences for future research are drawn.

