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Managing creativity and innovation in the 4th industrial revolution: Learning from giants

Saddam Rassanjani¹, Herizal², Mukhrijal³, Wais Alqarni⁴, Bustami Usman⁵

Management Department, Universitas Syiah Kuala, Banda Aceh, Indonesia^{1,2,3,4,5}

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Abstract

This article highlights an idea of the importance of creativity and innovation in the face of a change that will inevitably occur in global competition, where technological sophistication is the main prerequisite to lead. The research relies on secondary data primarily from books, journals, published reports, online news, and others. This study observes business giants like Google as the best example of maximizing creativity and innovation in global competition and kitabisa.com as Indonesia's local social entrepreneurship pioneer. Then Nokia and Yahoo are examples of failure to implement creativity and innovation. From many theories, there are four theories to draw the relationship among creativity, innovation, and technology, namely: technology S-curve, punctuated equilibrium, dominant design, and absorptive capacity. However, many theories of creativity and innovation developed by scientists have their advantages and disadvantages. This study is expected to provide new insight for individuals, groups, practitioners, or stakeholders to overcome industrial revolution challenges.

Keywords: Creativity; innovation; technology; industrial revolution

Introduction

The industrial revolution greeted again, and now it has entered the fourth phase. Due to the 4th industrial revolution, which is caused by the advances of technology, each company is obliged to familiarize themselves with the innovations that they are not afflicted by global competition. For any company, innovation is the cutting edge that will determine the company's sustainability in the future, as expressed by Lee (2018) that the innovation can provide added value and increased quality for the organization. In the perspective of science, innovation becomes an exciting research area for scientists and industries, both of them are used a different approach to determine the meaning of innovation. In The Practice of Management book, Drucker (2012) said that innovation is the fundamental function of an organization.

Moreover, Witkowski (2017) argued that innovation concerns new things, especially new ideas such as new products and services. It could be a new use of an existing product, a new market for it, or a new marketing method. Meanwhile, the Organisation for Economic Cooperation and Development, an intergovernmental economic organization with 35 member countries, identified innovation as all scientific activities related to technological, organizational, financial, and commercialization to increase revenue by marketing a new product (OECD, 2005). Thus, innovation is valuable for companies, and it could change the company's fate to be better (if managed well) or will be a backfire for the company (if not managed correctly).

The term of innovation is often paired with creativity. In a simple notion, creativity is the fundamental source of innovation (Abbate et al., 2019). In the more complex discussion of these theories, Argabright et al. (2012) argued that creativity is the main foundation for innovation implementation. Furthermore, innovative management is directly involved with the processes of innovation (new ideas, new methods, new operating modes, and a new direction) that implement creative ideas that will drive the company to success. Therefore, creativity is the first step that the company needs to bring out into innovation. In other words, creativity comes first and innovation later. It can be said that creativity is an

¹E-mail: saddam.rassanjani@unsyiah.ac.id

²E-mail: herizal.ismail@unsyiah.ac.id

³E-mail: mukhrijal@unsyiah.ac.id

⁴E-mail: waisalqarni@unsyiah.ac.id

⁵E-mail: bustami.usman@unsyiah.ac.id

essential element that becomes the key to the birth of innovation. Moreover, creativity and innovation are likely fundamental to face the 4th industrial revolution.

This study explores the theories of creativity and innovation as two critical points in business competition in the era of technology enhancement, especially industrial revolution 4.0. The research objective to be achieved is to obtain an overview of the importance of creativity and innovation to the sustainability of a business. Furthermore, the research is expected to contribute to the development of management theory, primarily on developing conceptual and strengthened theories about creativity and innovation and competence in the business world. In turn, it is expected to provide a stimulus and reference comparison to similar research. The results of this study are expected to be helpful information for small businesses to increase their potential to manage their business better, even to expand their business. Similarly, a variety of related agencies are expected to be used as material for policymakers to determine the right strategy in support of the successful entrepreneurs who are creative and innovative in the business environment that is increasingly growing and competitive. Finally, this article analyses the critical theories and processes of creativity and innovation, and the examples of organizations will be discussed.

Literature Review

Traditionally, the terms creativity and innovation refer to separate areas of social life: creativity is mainly linked to artistic activities, while innovation is associated with scientific discovery or technological progress (Chan & Mann, 2011). Hulpke (2019) argued that although these two are different, creativity and innovation are intertwined. Creativity can be seen as an activity to connect and assemble the knowledge in a man's mind, which allows him to think more freely in generating new things or generate ideas that shock the other party to produce something worthwhile. From that point of view, it is known that creativity is pooling knowledge from various fields of different experiences to generate new, better ideas. Creativity is also the skill to determine the new linkage, look at the subject from a new perspective, and form new combinations of two or more concepts printed in mind to generate new ideas.

It is believed that creativity is not directly associated with a person's higher intelligence; in other words, the creative person can run different ideas and is sensitive to changes or environmental demands. The characteristics of creative thinking and creative thinker as Winardi (2017) says it, among others; (i) trying to put forward original ideas by making a new connection between things that are already known (ii) pay attention to things that are not expected, (iii) taking personally like the flexibility and spontaneity in thought, (iv) work hard to form ideas so that others can see the value in him. From this, it can be said that creativity is a process that can be developed and improved as long as individuals or groups have the desire to adapt to change.

On the other hand, innovation can apply creative solutions to problems and opportunities, but presenting an idea is insufficient. Creative thinking (innovation) has developed into a skill for entrepreneurs in developing and implementing (Drucker, 2014). Furthermore, Hubeis (2012) suggested that innovation consists of four types, namely; discovery, development, duplication and synthesis. In this regard, innovation can be defined as a change of ideas towards a set of information related to inputs and outputs. Moreover, it is also found that innovation is a change related to increasing or improving existing resources or modifying something to be more valuable. Several innovations lead to a significant change; however, the most successful innovation can utilize the ongoing changes. Thus, success is not determined by the size of innovation but rather suitability in adapting to change.

In terms of artistry, innovation does involve more physical work than thinking. However, innovation does not have to be technical and does not need to produce a physical object. As a result, creativity is the way to generate new ideas and innovations as an interpreter of new ideas become; new companies, new products, new services, new processes or new methods in the production chain (Stoner et al., 2016). Nowadays, the situation has changed dramatically from the past, and creativity now can be twinned with innovation; both are mentioned concerning the economy (Mann, 2011a). Thus, creativity and innovation are juxtaposed as related aspects of economic activity, which become central when linked again to technological developments (industrial revolution).

The term of the industrial revolution, which has entered phase 4.0, is used to frame and analyze the impact of technological developments on almost all human activities, especially information technology that has developed since the beginning of the 21st century. World Economic Forum (2016) in The Future of Jobs Report claimed that technology is the driver of change, which mean that all related to employment, skills and workforce depends on technology. So, as a generation that is currently feeling the tide of the industrial revolution 4.0 through technological innovation, it is must be believed that technology has changed the way we interact in social and economic environments; such as the way we live, the way we work, the way we relate to others, and many things. Thus, it means that the speed of innovation development

is much faster than in previous periods (Schwab, 2017). Meanwhile, Verganti (2008) believed that companies must produce business model innovations through three sources of innovation strategies, namely drive technology innovations, attracting markets innovations and design-driven innovations. Drive technology innovation comes from the exploration of new technology by companies.

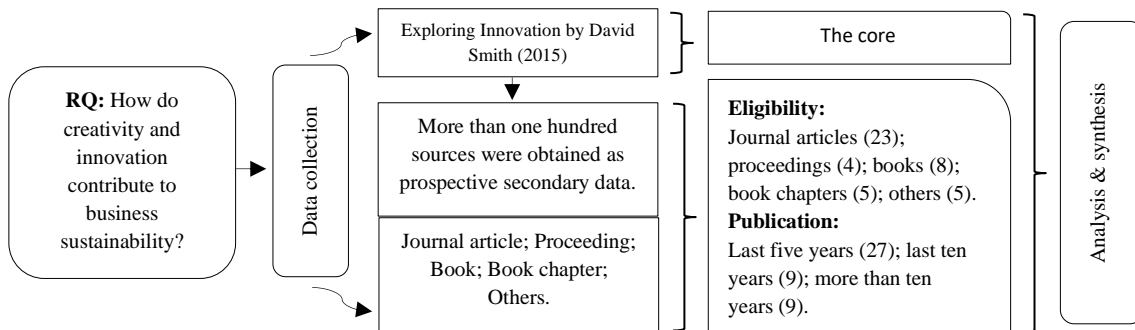
Meanwhile, attracting markets innovation comes from understanding customer needs or demand from the market. Whereas design-driven innovation differs from the two previous innovations, it is more about innovation meaning. This type of innovation arises from exploring and understanding current and future trends in the socio-cultural model (Verganti, 2008). Creativity and innovation could be fascinating topics to study in the setting of the industrial revolution 4.0. However, according to the study of Piccarozzi et al. (2018), the relationship of the industrial revolution 4.0 with management studies is still very new and has not received much attention. Therefore, this study should be given the broadest possible space for further development.

The World Economic Forum, in its report, predicts creativity and innovation as critical skills for a competitive workforce of the future (Whiting, 2019) as previously supported by Suarta et al. (2017) and Sarfaz et al. (2018), and some other studies. Furthermore, creativity and innovation are also considered the central part of the industrial revolution, closely related to technological advancement (Azmi et al., 2018; Lee et al., 2018; Oke & Fernandes, 2020). However, few studies fully describe how creativity and innovation play a pivotal role in the industrial revolution era marked by technological advances. Furthermore, in particular, provide examples of how business giants back down and let the stage taken by newcomers because they are not more responsive in dealing with the era of disruption. Therefore, this study will describe the success and failure stories of business leaders worldwide and even Indonesia in facing technological disruption by maximizing their creativity and innovation potential.

Research Method

This research is Systematic Literature Review (SLR), a series of studies related to library data collection methods. Research objects are explored through various sources, such as books, scientific journals, newspapers, magazines, and other documents. Research literature or literature review is research that studies or critically reviews knowledge, ideas, or findings contained in an academic-oriented body of literature and formulates theoretical and methodological contributions to the topic. The focus of SLR is to find various theories, principles, or ideas that are used to analyze and solve research questions that are formulated. The nature of this research is descriptive analysis, which is the regular breakdown of data that has been obtained, then given an understanding and explanation so that the reader can understand it well.

The data collection method used in this study is the documentation method; data that has been obtained from various literature and other resources are used to answer the problems that have been formulated. David Smith's book "Exploring Innovation" is the core of this paper. He has selected four theories that precisely describe the relationship between creativity and innovation: technology S-curve, punctuated equilibrium, dominant design, and absorptive capacity. In order to test David Smith's ideas, several secondary data were taken from the internet, especially Google Scholar, with an emphasis on some keywords, namely: creativity, innovation, technology, industrial revolution. The data selected must be in English, published in the last five years; if there is no up to date source is found, the search will be widened to the next five years, and so on. More details can be seen in the following Figure 1.



Sources: Adapted from Malik et al. (2021)

Figure 1. The flow of Systematic Literature Review (SLR)

Result and Discussion

Facing open competition in the current global era requires entrepreneurs to be more modern, have broad insights, think far ahead, always follow developments, and be open to new concepts and ideas. In addition, to interact and compete in a competitive business world, businesses must have adequate business management skills and technical skills such as mastery of information technology. Therefore, having a creative and innovative entrepreneurial spirit is the main prerequisite in facing an era of change and demands, especially the industrial revolution 4.0. Creativity emphasizes new ideas, while innovation is related to applying ideas to valuable products; therefore, creativity is a condition for innovation (Stoner et al., 2016). Moreover, Mann (2011b) argued that the linear model of the direct path from creativity to innovation places creativity (new ideas) as antecedents to innovation (implementation). Thus, creativity and innovation are inseparable packages, both of which are interdependent.

In modern research, creativity and innovation go hand in hand; their relationship can be seen when a creative idea is implemented and adopted as an innovative product in the form of technology (Mann, 2011a). Moreover, it is believed that the number of innovations that occurred lately influenced by technological advances, as it is supported by Smith (2015) that argued technological developments can push the pace of innovation so that the customer will get a product and a service that is more sophisticated than ever before.

Industrial Revolution 4.0 provides a new source of creativity and innovation that utilizes all characteristics, providing new challenges to change the company's business model. Indeed, the 4.0 industrial revolution is leading to digital transformation, requiring interconnected systems that can interact and collect and analyze data to adapt to change. World Economic Forum (2016) assessed the industrial revolution as a hurricane for changes in business models that have resulted in a significant disruption to the labour market. Despite the disruption of the value chain, companies must not limit themselves to the analysis of technological transformation but are forced to rethink the way they work to create value for their customers (Bagnoli et al., 2018). Moreover, it is noticed that the technological revolution standing in an uncertain position between great social good or widespread social harm (Maynard, 2015). It means that the use of technology in the fourth industrial revolution will positively or negatively impact individuals and groups; therefore, caution must be applied to benefit rather than harm.

The industrial revolution plays an essential role in accelerating the realization of a paradigm shift. However, there is a need to overcome the unexpected consequences of the rapid pace of technological development. The challenges caused by technological innovation need to be addressed with complementary and innovative approaches to provide innovative solutions that can anticipate emerging technologies and their impacts - from a holistic perspective (Morrar et al., 2017). Moreover, there are many theories that experts developed to describe the phenomenon of innovation. Of the many theories, there are four theories to draw the relationship between innovation and technology, namely: technology S-curve, punctuated equilibrium, dominant design, and absorptive capacity (Smith, 2015).

The life cycle of technology is one of the main ideas behind the birth of the theory of technology S-curve (Smith, 2015). It shows that innovation and technology continue to evolve from time to time and will look different in each era. Hasegawa et al. (2015) argued that the technology S-curve is very useful for managers to know the progress of technology. Based on this notion, the manager should know every curve transition; thus, they can predict when to abandon the old technology and then switch on the new one to keep the company from the threat of a failure to innovate. Unfortunately, some companies seen failed in applying this theory. For example, about ten years ago, Nokia was known as the holder of the number one market in the telecommunication sector; they must be willing to fall due to the inaccurate anticipated presence of the Android platform. Nokia answered the challenge by issuing Lumia products; unfortunately, these products were not accepted in the market. Finally, Lumia is the last innovation that Nokia can present. In such competition, a new product is not enough; technology should collaborate with the market and organization (Lee et al., 2018). Still, the critical aspect is the technology, but environmental factors such as the market influence the success of an innovation.

Status as a market leader does not guarantee the company's sustainability if a good managing of innovation does not accompany it. Like Nokia, the Internet icon in the early millennium that is Yahoo must be willing to be sold cheaply to Verizon, the U.S broadband telecommunications company, for 4.8 billion USD (DiChristopher, 2016). For the information, The Wall Street Journal (2016), in their report, recorded the value of Yahoo in early 2000 reached 125 billion USD. Moreover, in its heyday, Yahoo nearly acquired Google and Facebook, but the intention was cancelled because of the bid price problems that were too low. Ironically, now the two companies that nearly fell into the arms of Yahoo became more successful company than Yahoo.

What happened to Nokia and Yahoo have been foreseen more than a decade ago by Christensen (1997) in *The Innovator's Dilemma* that is "one thing that can be fatal for managers is when they blindly follow their customers". A significant dilemma faced to decision-makers when it should decide to follow the market or stay with the results that are already satisfactory. For sure, Nokia and Yahoo have made one big mistake in their history: they had missed catching the wave of the mobile smartphone revolution and the explosion of social media.

These business giants were ignoring "the disruptive innovation" of smaller players or new entrants who could emerge anytime from unexpected directions. The board managers are aware of innovation's importance, but they are awkward to take radical steps. Christensen et al. (2018) argued that errors in anticipating or relying on disruptive innovation theories lead to errors in applying the wrong ideas, reducing individual and group opportunities for success. Some companies feel already mastered the market, and they feel risky to play in the new area that will not guarantee to provide the profitable as good as they have acquired. The two well-known consortia were trapped in this "innovator's dilemma" debate. They were slow to deal with the paradigm change and eventually even lagging far by the new player who entered the arena without any load. However, some companies can implement the theory of technology S-curve with good performance; Samsung is one of the best examples. When Google marketed the Android platform to manufacturers of mobile devices by open to anyone who wanted to participate, Samsung accepted Google's offer with open arms. Since marketed Android products, Samsung can be the prominent leader of this platform in the global market with its flagship products Galaxy. Furthermore, ironically, Google's Android Motorola Mobility product did not even get significant sales results.

One example of the creativity born from innovators with technological advances is the emergence of social entrepreneurs by incorporating the concept of business to social movements, a crowdfunding platform. Hsieh et al. (2019) argued that social movements significantly influence the chances of successful crowdfunding. The crowdfunding platform is very welcome in the community because able to solve various social problems such as infrastructure development, disaster, medical assistance, scholarship, nature conservation, and other social movements, especially in developing countries like Indonesia. Moreover, one of the platforms on the rise in Indonesia is kitabisa.com, founded by Muhammad Al-Fatih Timur (better known as Timmy).

The online fundraising system grew and became very popular several years ago, initiated by the two bearers of the United States of America, such as kickstarter.com and indiegogo.com (Wenzlaff, 2020). However, no exact date stated when this kind of social business was transmitted to Indonesia, which was evident before kitabisa.com in 2013, there have been patungan.net and ayopeduli.com. By looking at the success inscribed by kickstarter.com and indiegogo.com, Timmy can utilize his knowledge by establishing kitabisa.com. Furthermore, this step relates to the theory of absorptive capacity that is the attempt to acquire knowledge of the outside network, then assimilating it with the value that has been formed to gain a commercial advantage (Jansen et al., 2005). Absorptive capacity is the key to the company's innovation capabilities (Murovec & Prodan, 2009). Absorptive capacity can increase the speed, frequency, and magnitude of innovations, and innovation itself can also generate knowledge as part of the organization's absorptive capacity.

Timmy saw the social phenomena in society, such as the uneven development in Indonesia, making many people mired in poverty, and what he feels is one of the social capital capable of helping to innovate. Like Gölgeci & Kuivalainen (2020) who stated that social capital is one of the essential things for the establishment of absorptive capacity. In a comprehensive understanding, Burt (2001) defined social capital as the ability of people to associate (related) to one another and then become a significant force for economic life and every other aspect of social existence. Thus, the nature of human beings that helps each other and give to those in need can be managed well by Timmy through crowdfunding facilities, namely kitabisa.com.

The ability of the company's innovation is an accumulation of innovation capability of the individuals in the company (Tortoriello & Krackhardt, 2010). The ability to acquire and use external knowledge of the individuals is crucial in an innovative process (Flor et al., 2018). Therefore, the ability to exploit external knowledge is an essential component of innovating; it is not only at the corporate level but also the individual for the company's innovation capability that is an accumulation ability of individuals. In addition, it is essential to note that different individuals will produce different types of information as well.

According to Verčič & Vokić (2017), internal communication has a relationship with innovation. Internal communications involve communication in new product development, the use of e-commerce, and sustainable development strategy, which is essential for the company's performance. Peng et al. (2018) suggested that the innovation capability can be improved by increasing the frequency of communication both horizontally (between departments) and vertical (between managerial levels) within the company. It

is also associated with one of the dimensions of social capital, i.e. the structural dimension. The company cannot create knowledge without the action and interaction of its employees; thus, this indicates the importance of social capital linked to absorptive capacity.

The influence of absorptive capacity of the innovation has been investigated empirically by some researchers as practised by Thornton (2008), who found that the absorptive capacity has a positive effect on the performance of the company's innovation. Another study conducted by Escribano et al. (2009) argued that the absorptive capacity could regulate the flow of external knowledge and improve the innovative outcome. Both these studies expressed that the absorptive capacity can assist companies in capturing knowledge from the outside to be developed into an innovation, and it seems that the companies with a high absorptive capacity tend to be best practice in innovation activities.

If we are talking about the relationship between new entrants and the incumbents, it can be seen that the incumbents' success overshadows the new entrants during a period of equilibrium. However, everything changed when the axis of technology evolved toward more advanced (Smith, 2015). Still, in the kitabisa.com case, Timmy was not the first to introduce this concept in Indonesia. Some predecessors first engaged in this business, but that did not discourage him from plunging and finally appeared to be the number one. Well, this step is related to the theory of dominant design. Starting with the presence of patungan.net and ayopeduli.com (period of the ferment), then kitabisa.com comes to bringing the more brilliant concept and innovation (dominant design), finally the presence of kitabisa.com can change the market segmentation (incremental innovation).

New technologies create new ways to meet current needs. In the end, it will completely change market demand for how customers are served, so those customer expectations are now redefined into the experience. Apple's experience, for example, is not just about how we use its products but also about its packaging, brand, purchasing, and customer service. Apple thus redefined expectations by incorporating aspects of the customer experience using the product. Many companies claim to be customer-centred, but their claims will be tested as real-time data and analysis are applied to how they target and serve customers. The digital age is about accessing and using data, perfecting products and experiences, and walking towards a world of continuous adjustments and improvements while ensuring that the human dimension remains at the heart of the process (Schwab, 2017). The success of innovation for any company is coupled with the courage of the innovators to be able to implement their creativity. Moreover, to implement the ideas properly, it takes innovation processes to support the execution of the project successfully. It is understood that creativity and innovation lead to two things that are success and failure. Smith (2015) sees two possible causes for the failure of innovation: a weakness in the technology and the failure to meet market demands. Henri Fayol (in Smith, 2015) identified four essential management elements: planning, organizing, leading, and controlling. Those parameters are likely good techniques to manage creativity and innovation; however, the complexity of management also depends on what kind of innovation changes happened to the company, whether incremental or radical.

Conclusions, suggestions and limitations

In conclusion, creativity and innovation are two things that entrepreneurs need to have to manage business performance. Increasing creativity can be done through self-development as well as stimulation. Likewise, in the case of innovation, it needs an understanding that innovation can be incremental, which is more improvement in nature and does not have to be a radical innovation. It needs to bear in mind; an invention can be an innovation if it is the result of creating a product, service or process that has never been done before. Moreover, a practical innovation starts from the small things; it is intended that innovation is not grandiose to prioritize something unique. In general, too grandiose ideas may not work and are challenging to realize. Thus, innovation does not need to lead directly to the ultimate goal, such as becoming a big business. In reality, no one can be sure whether specific innovations will end up as a big business or as an ordinary achievement.

Moreover, several theories and processes of innovations developed by scientists have their advantages and disadvantages. It cannot be decided which is the best and which is the worst. Therefore, it all depends on what kind of innovation and how the manager can manage creativity and innovation. Furthermore, in this era of technological advancement, it is suggested that companies open themselves to adapt to all kinds of changes and accepts a wide range of valuable input from the outside. Therefore, it is likely to be concluded that creativity and innovation determine changes to competence in entrepreneurship. It means that if creativity and innovation can be actualized, it will increase entrepreneurial competence, contributing to business development and business sustainability.

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