A Systematic Literature Review on the Definition and Classification of Innovation

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ABSTRACT

The keyword of innovation becomes widespread in Thai society since Thailand 4.0 principle was launched in April 2016. This principle ignites the country to change from heavy industry-driven country to innovation-driven country. Therefore, innovation becomes one of key drivers which aims to bring the country a high-value economy and step over the middle-income trap. When talking about innovation, people usually think of new products in the market, especially technology-related ones. This paper aims to provide clearer understanding on innovation. To do so, a systematic review is conducted to extract definition and classification of innovation found in multiple fields of research. The review shows that beside something new, innovation also include an improvement of existing things or system that create value to the firm. Innovation is classified into several types. Different fields of study consider innovation in different perspectives. Especially researches in the period from 2012 to 2017 which show larger diversity on how researchers classify innovation.

KEYWORDS: Innovation, Definition, Classification

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ทบทวนวรรณกรรมเรื่องความหมายและการจำแนกประเภทของนวัตกรรม

*บงกช เจนจรัสสกุล**

บทคัดย่อ

จากการประกาศนโยบาย ประเทศไทย 4.0 ในเดือนเมษายน พ.ศ. 2559 คำว่า นวัตกรรม ได้กลายเป็นหนึ่งในคำสำคัญที่ถูกกล่าวถึงอย่างแพร่หลายในสังคมไทย นโยบายนี้ถือเป็นนโยบายที่จุดประกายการเปลี่ยนแปลงของประเทศ จากประเทศที่ถูกขับเคลื่อนโดยอุตสากรรมหนัก ให้กลายมาเป็นประเทศที่ถูกขับเคลื่อนด้วย นวัตกรรม ดังนั้น คำว่า นวัตกรรม จึงถือว่าเป็นหนึ่งในตัวขับเคลื่อนหลักที่จะนำพาประเทศไปสู่การเป็น ประเทศที่มีเศรษฐกิจที่มีมูลค่าสูงและก้าวข้ามดักรายได้ปานกลางไปได้ เมื่อพูดถึงคำว่า นวัตกรรม ผู้คนทั่วไปมักจะนึกถึงผลิตภัณฑ์ใหม่ๆที่ออกสู่ตลาด โดยเฉพาะอย่างยิ่ง ผลิตภัณฑ์ที่เกี่ยวข้องกับเทคโนโลยี บทความนี้มีจุดประสงค์ที่จะให้ความชัดเจนของคำว่านวัตกรรมมากขึ้น ผ่านการทบทวนวรรณกรรมอย่างเป็นระบบเพื่อดึงความหมายและการจำแนกประเภทของนวัตกรรมจากบทความวิจัยในหลากหลายสาขาวิชา จากการทบทวนวรรณกรรมพบว่า นวัตกรรมนั้นยังหมายรวมถึงการปรับปรุงของสิ่งที่มีอยู่แล้วเพื่อเพิ่มมูลค่าให้แก่องค์กร นอกจากความหมายในเรื่องของการนำเสนอสิ่งใหม่ๆอีกด้วย ในส่วนของการจำแนกประเภทนั้น นวัตกรรมสามารถแยกได้หลากหลายประเภทภายใต้มุมมองที่แตกต่างกันไปตามแต่ละสาขาวิชา โดยเฉพาะอย่างยิ่งบทความวิจัยในช่วง พ.ศ. 2555 ถึง พ.ศ. 2560 ที่แสดงให้เห็นถึงความหลากหลายของการจำแนกประเภทของนวัตกรรมที่มากขึ้น

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INTRODUCTION

In the era where advanced technology becomes an essential part of our lives, people strive for supportive advanced technologies which help enhancing balance in their lives. Such demand becomes one of key drivers which leads to the Fourth Industrial Revolution framework (Schwab, 2016; Buckup, 2017). This framework blends physical, digital, and biological spheres together. The blended sphere brings several changes to the customer's expectation from product enhancement by data to new forms of collaboration and new operating models. These changes also bring a huge impact to current business models (Schwab, 2017). As a result, new economy models are introduced. From 2014, government leaders from several countries come up with new economic campaign. For example, the *Nation of Makers* in the US. (The White House - President Barak Obama, n.d.; Office of the Press Secretary, 2016), the *Make in India* initiative in India (Invest India, n.d.), the *Made in China 2025* in China (Kennedy, 2015), and *Creative Economy* in Korea (Kwon , 2016).

For Thailand, from April 2016, the term *Thailand 4.0* is spreading in our society. This term was publicly introduced by the Prime Minister General Prayut Chan-o-cha on April 22, 2016 as the national address in the program "Return Happiness to the People" (The Government Public Relations Department, 2016). On that day, the Prime Minister mentioned that the country's economy is needed to be restructured by a new economy model which is conducted based on His Majesty the King Rama IX's Philosophy of Sufficiency Economy. To do so, he mentioned that "the country's development must also be carried out under the "Thailand 4.0" principle, in line with the 20-year national strategy". "Thailand 4.0" was referred as a principle with 2 objectives which are 1) to bring the country a high-value economy and 2) to make Thailand becomes a regional hub. The agenda behind the Thailand 4.0 principle is also "to pull the country out of the middle-income trap, economic disparities and imbalance between the environment and society" (Thai PBS Reporters, 2017). Under

this principle, the government introduces change in economic strategy from production-based economy to value-based economy (Thairath, 2016). In other word, from heavy industry-driven country to innovation-driven country. Since then, the keyword "innovation" and prefix "smart" become very popular. But what is innovation? How do we classify its types? These are things the author would like to introduce in this paper.

This paper is organized as follows: in the next section, related literatures and recent trend of innovation are shown to give general ideas on this topic. Research questions are also listed in this section. After that, methodology which the author uses in this systematic review is explained. Definition of innovation and its typology are explained in Section FINDINGS. After that, discussion and recommendation are given in their respective section. Finally, limitation and future direction are introduced in the last section.

LITERATURE REVIEW

Year after years, definition of innovation is continuously developed (Khayyat & Lee, 2015). An initial concept of innovation was introduced by Schumpeter in 1934. Innovation can be considered as a key for economic growth which gives investment opportunity as well as reducing cost to the firm (Merton, 1995; Bottazzi & Peri, 2002). To deal with uncertainty and introduce innovation, trials and errors approach takes place (Bougrain & Haudeville, 2002).

Recently, people usually think of new products, especially technology-related ones in the market when talking about innovation. To confirm such idea, the author looks up recent trend from Google Trends (Google Trends, n.d.). At this website, information regarding trends of specific topics based on users' keywords at Google Search are provided upon query. Provided information includes 1) Related topics or topics that the users who search for a given term also reached for, and 2) Related queries or phrases that the users who search for a given term also reached for. The

search results can be viewed by 2 metrics; Top and Rising. The top metric shows the most popular topic and the rising metric shows related topics with the biggest increase among a specific period. The author setup a query with the term "innovation" and look for its trend, top 5 related topics, and top 5 related queries. The period of this observation is set to be a period from July 16, 2016 to July 15, 2017 (12 months). The results for both global trends and Thai trends are shown in Table 1.

The results in Table 1 help emphasizing the connection between innovation, product, and technology. Especially the trends from Thailand. With above motivation and evidence, the author comes up with 2 exploratory research questions:

RQ1: What are definitions of innovation?

RQ2: What are classifications or types of innovation?

Table 1: Global and Thai trends regarding "innovation" on Google Trends from July 16, 2016 to July 15, 2017 (12 months).

	Global Trends	Thai Trends
Related Topics (Top 5)	1) Innovation – Field of study 2) Technology – Topic 3) Business – Organization type 4) Management – Academic discipline 5) Research – Field of study	1) Innovation – Field of study 2) Technology – Topic 3) Management – Academic discipline 4) Business – Organization type 5) Design – Field of study
Related Queries (Top 5)	1) technology innovation 2) business innovation 3) innovation center 4) definition innovation 5) innovation management	1) innovation คือ 2) innovation technology 3) innovation product 4) innovation แปล ว่า 5) food innovation

Note: The search was conducted on July 29,

RESEARCH METHODOLOGY

To answer research questions, the author conducts a systematic review by using snowball technique. Although the technique is usually employed by a qualitative study, several systematic literature reviews consider this technique as a practical way to gather new knowledge (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Budgen, Burn, Brereton, Kitchenham, & Pretorius, 2011; Jalali & Wohlin, 2012). Greenhalgh and Peacock (2005) identify the source of papers in a systematic review of complex evidence in papers related to "the diffusion of service-level innovations in healthcare organisations". They found that source of papers in a systematic review papers come from the use of snowballing. They also mention that citation tracking is an important method to identify the source of information.

1.1 Snowball Technique

In this study, the author adapts the technique mentioned in the work by Wohlin (2014). To conduct the snowball technique in this systematic literature review, the author goes through following steps:

Step 1: Selecting a set of papers as start set.

To select a set of papers as start set, the author conducts a primary search with assigned search terms at Google Scholar (Google Inc., n.d.). Once the set of papers is identified, the papers in this set will be used for snowballing.

Step 2: Searching for additional papers by Snowballing

According to Wohlin, there are 2 types of snowballing which are backward snowballing and forward snowballing. The backward snowballing refers to the identification of new papers by using the reference list in the start set. On the other hand, forward snowballing refers to the identification of new papers by looking at papers citing the paper being examined. In this

paper, the author focuses on forward snowballing approach to emphasize recent trends of definition and typology of the innovation.

Step 3: Data extraction

After searching for additional papers until there is no interesting paper, related-data from all selected paper are extracted according to research questions.

1.2 Selecting start set and additional articles

To identify the start set, the author uses Google scholar to avoid bias and to increase diversity of the research field. The search terms used in this paper are “innovation”, “innovation definition”, and “innovation classification”. The author sets searching time frame to be 1995–2005. Although, the search was conducted in July 2017, this selected time frame covers a period when 2 famous books on innovation were launched for the first time; The Innovator’s Dilemma (Christensen, 1997) and Open Innovation (Chesbrough, 2003). Furthermore, this time frame also covers the transition from 20th to 21st century.

By using the search terms mentioned above, the author downloaded 164 papers; innovation 22 papers, innovation definition 50 papers, and innovation classification 92 papers. The replicated papers are removed from the downloaded set so that 152 papers left. After that, the author goes through all papers by considering title, abstract, keywords and content of each paper to identify suitable papers as start set. Finally, 34 papers are selected as start set. For the forward snowballing approach, the author focuses on papers published between 2012 and 2017 to raise aspects of current definition and distinguish viewpoint on how researchers classify innovation. Figure 1 illustrates the process mentioned in this step.

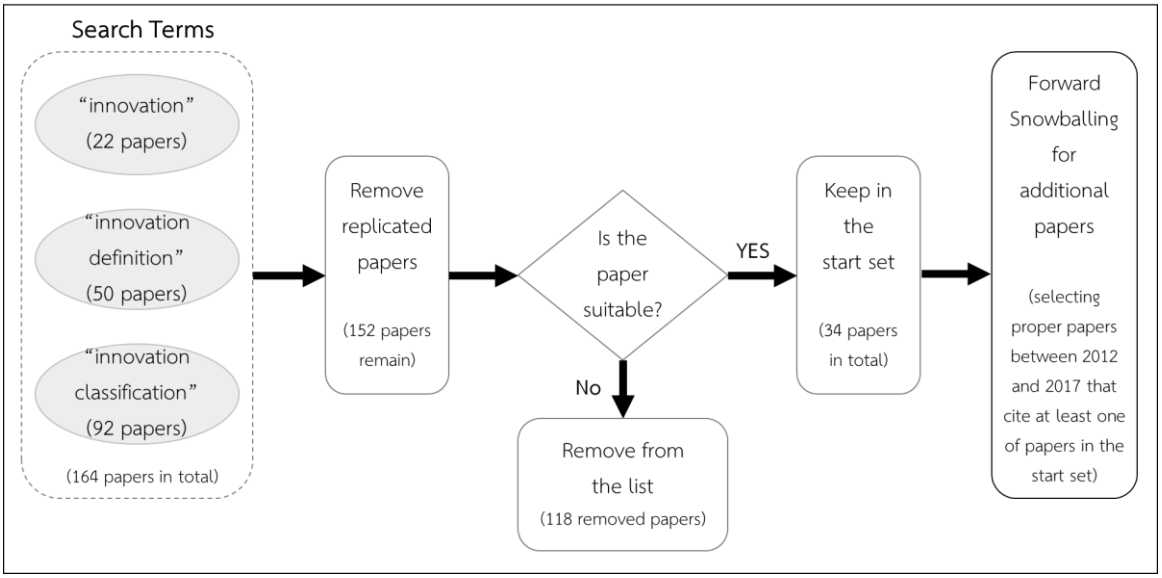

Figure 1: Papers selection process for the start set and additional papers

1.3 Data extraction

In this step, interesting points related to definition and classification (i.e. type of innovation) in papers from start set and forward snowballing are extracted. Since selected papers come from several research fields from Agriculture to Management. The author manages to extract definition and classification according to following groups.

Group	Research Field(s)
1)	Organization- and Human Resource-related: Organizational behavior, Human resource development
2)	Management
3)	Business
4)	Economics and Finance
5)	Technology-related: Information technology (IT), Technology, and Industry
6)	Others: Agriculture, health, policy, service

FINDINGS

Definition of innovation

Generally, the definition of innovation is considered in 3 different aspects as follows:

1) An activity regarding technological changes (Archibugi & Pianta, 1996; Cooke, 2001).

2) An iterative process of new ideas. In this aspect, commercialization of the process is also required (Garcia & Calantone, 2002; Fagerberg, 2003).

3) A creation of something new (Drucker, 1998; Veryzer, Jr., 1998; Johannessen & Lumpkin, 2001). In addition to a creation, papers from Drucker and Johannessen and Lumpkin also raise the viewpoint of economic benefit to the firm in their definitions.

Apart from general perspective, researchers from different fields consider innovation in different aspects. Here are what the author found from the survey.

Group 1: Organization- and Human Resource-related: Organizational behavior, Human resource development

The definition of innovation in this field is considered as a process that leads to new ideas and improvement (Baer & Frese, 2003; Anderson, De Dreu, & Nijstad, 2004; Zhang, Lim, & Cao, 2004; McLean, 2005; Obstfeld, 2005). The process, mentioned here, is focused in the ways of development, generation, implementation, and introduction. Furthermore, McLean (2005) provides additional viewpoint in his definition that “innovation must receive funding” and be able to “overcome potential obstacles”. It is interesting that researchers in this field emphasize the scope of consideration to be in organization context. Especially in works by Zhang, Lim, and Cao (2004), and McLean (2005).

Researches from 2012 to 2017 also emphasize on the process that leads to new things such as product, service, method, and process (Salge & Vera, 2012; Gill,

Horgan, Hunter, & Cushenbery, 2013; Goh, Goodman, & Weingart, 2013; Abdi & Senin, 2014). In addition, some papers also consider innovation in the way that it would help organization strengthen its ability to stay competitive and to add value to the firm (Salge & Vera, 2012; Uzkurt, Kumar, Kimzan, & Eminoğlu, 2013; Abdi & Senin, 2014).

Group 2: Management

For this group, innovation is considered in term of *tool* which introduces changes to product and process (Cooper, 1998; Cumming, 1998; Tidd, 2001; Omta, 2002). Authors in this group also raise a mutual target of innovation as it let firm stays competitive. Unlike the works from the start set, papers in the latter period show 2 main streams of the definition. The first group of researchers consider innovation as a process which enhances existing resources inside the firm (Yang, Wang, Zhu, & Wu, 2012; Hecker & Ganter, 2013; Savino, Petruzzelli, & Albino, 2017). Another group of researchers consider innovation in the way of new approach which helps firm stays competitive (Fartash & Davoudi, 2012; Tsai & Yang, 2013; Hilman & Kaliappen, 2015; Tavassoli & Karlsson, 2015).

Group 3: Business

The field of business defines innovation in 2 different aspects which are

1) Aspect of “a function of management” (Han, Kin, & Srivastava, 1998), and

2) Aspect of “process” in the same way as defined in Group 1 (Organization- and human resources- related) (West & Anderson, 1996; McMahon, 2001; Sexton & Barrett, 2005).

Papers from 2012 to 2017 refer to innovation as something that brings improvement and changes to the firm (Damanpour & Aravind, 2011; Bucherer, Eisert, & Gassmann, 2012; Marques, 2014). Zhao (2014) also gives additional idea that innovation is the “specific tool of entrepreneurship”.

Group 4: Economics and Finance

In this area, innovation is considered as something “new to the organization” (Gopalakrishnan & Damanpour, 1997) as well as the definition in the sense of an “improvement of existing system that help improving efficiency” to the firm (Merton, 1995; Bonannoa & Haworth, 1998). An efficiency which is considered here focuses on lower risk and cost. Such consideration clearly reflects characteristics of the research field. These 2 aspects of innovation in its definition have not changed over time. That is, innovation is still being considered as something “new” to an organization and “changes” occur based on existing system (Engelen, et al., 2012; Laeven, Levine , & Michalopoulos, 2015).

Group 5: Technology-related: Information technology (IT), Technology, and Industry

Researchers in the technology-related field consider innovation as “knowledge-based tool” (Prescott & van Slyke, 1996). In addition, they also emphasize the scale of change from the implementation of innovation. The consideration on the scale of change is also found in explanations on type of innovation by Tushman (1997) and Dismukes (2005).

In the latter period, Bocconi, Kampylis, and Punie (2013) call innovation as something that creates new characteristics to product and service. In addition to this definition, there are 2 more interesting aspects which papers in this area include in the definition. These aspects are an objective to reduce negative impact from the use of technology (Buddea, Alkemadeb, & Hekkertb, 2015) and an objective to increase effectiveness from the use of new technology (Bocconi, Kampylis, & Punie, 2013).

Group 6: Others: Agriculture, health, policy, service

Although papers in this group come from different fields, they provide mutual definition of innovation in term of *newness* and *value* from an introduction of innovation (Sunding & Zilberman, 2001; Darroch & McNaughton, 2002; Herting, 2002; Hindle, 2002; West, 2002; DiMasi, Hansen, & Grabowski, 2003; Ottenbacher & Gnoth,

2005) The same sense of newness in the definition of innovation still appears in works from 2012 to 2017 (Nijhoff-Savvaki, Trienekens, & Omta, 2012; Panuwatwanich & Stewart, 2012; Tsai Y. , 2013). Although the sense of value from an introduction of innovation is not directly mentioned, Panuwatwachich and Stewart (2012) and Bocconi et al. (2013) raise an importance of impact and improvement in the definition of innovation.

Classification of innovation

Classification of innovation or its typology is diverse due to different viewpoints on innovation in each research field. Firstly, classification of innovation in general is considered. Johannessen and Lumpkin (2001) classify innovation in term of newness and introduce 6 types of innovation which are a.) new product, b.) new services, c.) new methods or production, d.) opening new market, e.) new sources of supply, and f.) new way of organizing. Fagerberg (2003) also classifies innovation in the same way as Johannessen and Lumpkin. However, the type of "new services" is not included in Fagerberg's consideration. Veryzer, Jr. (1998) provides list of sub-types under product innovation. He classifies product innovation into 4 sub-types based on technology utilization and user benefit. These 4 sub-types are a.) product innovation which is "continuous in both technology utilization and user benefit", b.) product innovation which is "continuous in technology utilization but new user benefit", c.) product innovation which is "discontinuous in both technology utilization and user benefit", and d.) product innovation which is "discontinuous in technology utilization but new user benefit". Although Archibugi and Pianta (1996) do not directly mention about the type of innovation, they provide criteria based on utility to classify innovation which are a.) technology, b.) "product in which the innovation is likely to be embedded", c.) "sector of production or type of the firm", and d.) "sector of use which refers to users of the innovation".

Like the definition, classification of innovation is considered according to research areas.

Group 1: Organization- and Human Resource-related: Organizational behavior, Human resource development

There are 2 different perspectives on classification found in researches belong to this group. The first perspective on types of innovation considers innovation in term of process innovation. This type of innovation is found in all papers between 1995-2005. Zhang, Lim, and Cao (2004) also provide another perspective on innovation based on prior work by Van der Ven (1986). Additional perspectives in their work are administrative innovation and technological innovation.

Researches from 2012 to 2017 consider more types of innovation comparing to those found in the earlier period. Nijstad, Berger-Selman, and De Dreu (2014) and Goh, Goodman, and Weingart (2013) mention the term “team innovation” in their studies. This type of innovation is introduced in consideration of the role of leadership belongs to top management team and increasing complexity in the organization. “Business model innovation” is another type of innovation which is introduced in the area (Denicolai, Ramirez, & Tidd, 2014). It explains the combination of external resources and internal capabilities. The aim of this combination is to “create and capture value in new way”.

Group 2: Management

Researches in the field of management emphasize on 2 types of innovation which are product innovation and process innovation (Cooper, 1998; Cumming, 1998; Tidd, 2001; Omta, 2002). Cooper (1998) considers these 2 types of innovation as the first pairs of innovation’s typology. Other 2 pairs of innovation which Cooper also mentions are a.) incremental innovation and radical innovation, and b.) administrative innovation and technological innovation.

During the period 2012 to 2017, researchers usually refer to Oslo Manual version 3 (launched in 2005) when explain about typology of innovation. Four types of innovation which are usually referred in this period are a.) product innovation, b.) process innovation, c.) marketing innovation, and d.) organizational innovation (Boli´var-Ramos, Garci´a-Morales, & Garci´a-Sa´nchez, 2012; Fartash & Davoudi, 2012; Güngör & Gözlü, 2012; Atalaya & Sarvanc, 2013; Hecker & Ganter, 2013; Hilman & Kaliappen, 2015; Tavassoli & Karlsson, 2015). Damanpour (2014) explains that "management innovation" is similar to "organizational innovation", "administrative innovation" and "managerial innovation". He also explains that these innovations are non-technological innovations.

Group 3: Business

From the selected papers in the start set, only work by Han, Kin, and Srivastava (1998) mentions about types of innovation. Based on prior work by Damanpour (1991), Han, Kin, and Srivastava classify innovation into administrative innovation and technological innovation.

In the latter period, type of business shows its influence on how researchers classify innovation in different ways. Beside business model innovation found in the work by Bucherer, Eisert, and Gassmann (2012), product and process innovation (Marques, 2014; Ndubisi & Agarwal, 2014), technological innovation (Fernandes, 2014), and managerial innovation (Damanpour & Aravind, 2011), additional typologies such as cultural innovation (Fernandes, 2014), and green innovation (Kucukoglu & R.Ibrahim Pinar, 2015) are also found in this area.

Group 4: Economics and Finance

In Gopalakrishnan and Damanpour's review of researches in innovation (1997), innovation in this research area is classified into 3 types which are a.) product and process innovations, b.) only technical innovation, and c.) only radical innovation. On the other hand, Bonannoa and Haworth (1998) classify innovation in 2 types which

are product innovation and process innovation. These 2 types of innovation are classify based on their objective which is to raise quality of product and to reduce cost of the firm, respectively.

The same types of innovation are still used to explain innovation in papers from 2012 to 2017. Most of the selected papers in this period classify innovation into 2 types which are product and process innovation (Dube, et al., 2014; Chang, Bai, & Li, 2015; Prajogo, 2016). However, additional sense of technology-related is added into the area (Dube, et al., 2014; Liu, Kauffman, & Ma, 2015).

Group 5: Technology-related: Information technology (IT), Technology, and Industry

From the review, the author found that there are 3 different perspectives on typology of innovation for this group. The first perspective classifies innovation as incremental innovation and radical innovation. This perspective found in (Prescott & van Slyke, 1996) and (Dismukes, 2005). The second perspective considers innovation in terms of product innovation and process innovation. These 2 types of innovation are found in (Prescott & van Slyke, 1996) and (Tushman, 1997). Finally, the third perspective of innovation which describes innovation as marketplace innovation and marketspace innovation is found only in the work by Prescott and van Slyke (1996).

The change in technology makes researchers in this area focus more on technological innovation (Ratten, 2014). However, this is not the only type of innovation which is found from the survey in the latter period. Another type of innovation is an ICT-based innovation (Bocconi, Kampylis, & Punie, 2013). These are 2 additional types of innovation which is found in the papers belong to this field from 2012 to 2017.

Group 6: Others: Agriculture, health, policy, service

The type of innovation in this group is diverse due to the differences in the field of research. Starting from the field of Agriculture, Sunding and Zilberman (2001) consider types of innovation in 3 different ways. The first aspect of innovation in their

work comes from the “forces behind the generation and adoption of innovations”. Different forces mentioned in their work lead to Mechanical innovation, Biological innovation, Chemical innovation, Agronomic innovation, Biotechnology innovation, and Informational innovation. The second aspect of innovation is classified according to the “form distinguishing”. This aspect of innovation leads 2 types of innovation which are process innovation and production innovation. Finally, the last aspect classifies innovation based on its “impact on economic agents and markets”. This aspect introduces 5 types of innovation which are yield-increasing innovation, quality-enhancing innovation, risk-reducing innovation, environmental-protection increasing innovation, and shelf-life enhancing innovation.

Darroch and McNaughton (2002) consider innovation based on its impact or “innovation scale”. Three types of innovation are given under this consideration. They are “New product/service or Revision/repositioning to existing product ranges”, “Innovation that changes customers’ behaviors and new-to-the-world or new-to-the-firm innovation”, and “New-to-the-world or new-to-the-firm with potential to destroy existing competencies”.

In the work by Herting (2002), 4 types of innovation found in hospital is explained. These 4 types of innovation are technological innovation, administrative innovation, human resource innovation, and product/service innovation. Finally, Ottenbacher and Gnoth (2005) classify innovation in the field of service into 2 types; “True innovation” (i.e. “new-to-the-world services with entirely new markets), and “innovation with minor adaptation” (i.e. existing services with value added).

In the latter period, researches in service pay more attention in incremental innovation (Camisóna & Monfort-Mirb, 2012; Cheng & Krumwiede, 2012). Paper from the area of health care talks about technology and managerial innovation (Tsai Y. , 2013). Finally, paper focusing on hotel industry consider 4 types of innovation which are product innovation, process innovation, organizational innovation, and marketing innovation (Nicolaua & Santa-Maríab, 2013).

DISCUSSION AND RECOMMENDATION

From the survey, the definition can be grouped into 2 main groups according to focusing context. Researches in Organization- and Human Resource-related (Group 1), Management (Group 2), Business (Group 3), and Economics and Finance (Group 4) define innovation under the scope of organization context. On the other hand, researches in Technology-related area (Group 5) and Others (Group 6) does not pay much attention on such thing. They focus more on scale of innovation.

Comparing the definition between 2 observing periods, the definition of innovation has been changed over time. During the first period (1995-2005), innovation is defined as process or tool that is new to either organization or wider context. The main change in the latter period is that researchers emphasize more on the impact or value from an implementation or introduction of innovation. These finding is true to all research groups except the field of Economics and Finance where the definition is quite constant. According to the findings, innovation in the field of Economics and Finance is defined as something new or something that bring improvement to an existing thing in the organization. Furthermore, this research area is the only one that emphasizes benefit from an introduction of innovation from the first period. Such findings might relate to characteristics of the research field.

Beside above findings, researches from the technology-related field also give very interesting viewpoint in their given definition. That is, to call something as an innovation, it requires knowledge in a construction of the tool (Prescott & van Slyke, 1996). This aspect is very important, especially when we consider innovation under the concept of innovation economy. Innovation economy does not require only STEM (Science, Technology, Engineering, and Mathematics) workforce but also those who have interdisciplinary skills (Atkinson & Mayo, 2010). Such requirement means that both fundamental and applied knowledges are required to construct innovation so that the innovation can give larger impact to society.

The classification of innovation usually comes in pairs. Most of the researches in the start set focus on product and process innovations, administrative and technological innovations, and incremental and radical innovations. These 3 pairs of innovation can be found regardless the field of research. However, findings from the latter period show diverse types of innovation. For example, business model innovation, cultural innovation, green innovation, ICT-based innovation, etc. From these findings, we can see clear differences on how researchers classify innovation among 2 selected periods. The researches in earlier period reflect limited range of innovation and the viewpoints on how researchers look at innovation. In contrast, researches in the latter period give an idea that innovation can come in varieties. These varieties of innovation depend on core and focusing activities, considering intangible aspect (e.g. cultural innovation), utilized technology, type of business as well as stages belongs to the business or considering context.

In addition to the fact that product innovation and technological innovation have been mentioned for a long time, another part of reason why technology is what people usually thinking of when talking about innovation is that technology-related innovation (i.e. technological innovation) gives dramatic influence on changes (Choi, Kim, Yoon, Kim , & Lee, 2013). Beside technological innovation, product innovation, which is also another type of innovation that people usually search on the internet, can be perceived by observing number of patents and R&D investment as proxies (Rosenkranz, 1995; Archibugi & Pianta, 1996; Kortum & Lerner, 2001; Kleinknecht, Van Montfort, & Brouwer, 2002; Lee & Lee, 2013). Therefore, people can easily perceive these 2 types of innovation.

From the above findings, the author defines innovation as process, tool, or something which is constructed from fundamental or applied knowledge or both. The introduction of innovation can either bring change(s), improvement to existing thing(s) or new thing(s) to a considering context. Furthermore, this introduction will bring benefit and/or value to the owner of that context (i.e. firm, individual, or society). For

the classification of innovation, we can conclude that innovation is not limited to product and technology-related innovation. However, it is diverse. The type of innovation can be classified based on implementing technique or approach that the new thing is used and area or activity where the new thing is introduced.

LIMITATION AND FUTURE RESEARCH

The main limitation of this paper is that only English articles with accessibility via the network of affiliated institute are used. Other sources such as book, thesis, survey and report from the private firms are excluded from this paper. Survey and/or study on sources of innovation and impact from the introduction of innovation and study on blockage or barrier to the success of an implementation of innovation are suggested. Furthermore, study on articles in another language (i.e. Thai language) would help illustrating local image and understanding of innovation. These suggested studies would fulfill other dimensions and provide further understanding on the characteristic of innovation.

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