Academic review on literatures pertaining to the definitions of technological innovation capabilities in the new millennium

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Abstract. The aim of this paper is to review the literatures on technological innovation of industries in relating to the growth of the economy in past decade. The data and ideas on this paper come primarily from review articles relating to the economic development of the nations. The level of success in innovation in the various technology differs among countries because of the different national background and cultures. Innovation technology has always played a critical role for the long-term survival of organizations. This paper serves as a description to the researchers in predicting for the next future study to improve the better quality and standard of living.

1. Introduction
The world nowadays is moving at a rapid partly due the effect of robust competiveness among the countries for a bigger part of the global economy portion. Rapidity is contributed with various in the extent of technology dissemination. The prompt level of the innovativeness in technology is enabling it crucial to enable technology as the principal element causing economic development. Technology capability is tightly related with company’s productivity, thus concentrating on increasing the surroundings that encourages and allows the establishment of company-level is crucial for the countries. Technological capability encompasses technical and managerial linkages where the organizational skills companies need to efficiently employ the hardware (equipment) and software (information) of technology and to resolve all methods of transformation technology [1]. Furthermore Wang and Lo in Yonggui et al. [2] argue besides to dominate the technological proficiency, likewise the proficiency to disseminate and increase the implication of essence capabilities, integrate assorted flow of technology and deploy fount of technology in all companies. Almost all organization are constrained to be continuously innovative to survive for long period. A country substantiaility and growth of economy have become primary consideration for the countries which continually elaborating and establishing tactics that can be applied to provoke the development of economy and welfare. In past few years, a measurement is renewal of technology. Innovation capabilities has still good position in keeping viability and continuously for most companies to compete the startegy. Many investigations and discussions propose a newness as the great importance element to be reflected for multiplying the competitive edge of a country and a company [3]. More countries are focusing on
enhancing their competitiveness by means of innovation for establishment because a nation’s standard of living is dependent on the competitiveness of its company is known as a driver for world economic growth with advantage for all and is a provider for better social stability. Perpetual innovation is perceived as a crucial instrument to construct the competitiveness [4]. Miriam et al. [5] also find that the innovation capability of a company relies on intellectual capital and organizational awareness. These organizations are developed on the foundation of applied research, where modern or innovative products come up as power solutions to problems gained on the market. The rate of the technological system added to the product or service is very high. The probability of innovation in technology-based firms, was the concentration of the present article. This paper criticizes the literatures on technological innovation of industries in relating to the economic development in several yeras.

2. Technology
There are many definitions of technology. Many scholars define technology as knowledge, processes, tools, methods and systems applied to produce goods or provide services. Technology is a method we perform the things, technology is the simple application of knowledge, a means of supporting human initiative [6]. The rate of implementation of technologies can vary from being very basic to being advanced technologies. According to Santos in Oliva et al. [7], firms with modern technology perform with processes, proceeds and services that technological matter is regarded modern and advance. According to Fabio et al. [8], the word “technologies” means the assorted methods or the implication of distinguish sources for each study within the varied levels of the way. Companies using the technologies are assumed production companies that results in the transformation of resources into goods or services. The resources encompass natural resources, human resources, and other resources. The rate of a firm was previously valued mainly by the basis of its capital and physical assets such as land, buildings, equipment and inventory. However, now technology also becomes values to the intangible assets of a firm. The technology resides in the company’s people and its technological system. Technology is a declaration of human creativity. Infrastructure and management of R & D is now a key feature and crucial for the establishment of new technologies [6]. Knowledge and technological systems have a primary influence in a country’s grade of competitive advantage, hence, the process of technology method should be well comprehend. Further more Tarek [6] infers that technology is the driver for such improvement. Technology drives another mechanism for economic development. Technology can be also related to productivities, service or trading. Technology transforming into proceeds have supported to the development of economy and welfare and rectified the level of living. The technological period as well as product and process period becomes faster. Kylaheiko et al. [9] state on their research that the capital of technology include machinery and manufacturing method. Technology capitals as well as abilities of persons and teamwork support to the company’s pathway technology prospect. Some researchers like Wei et al. [10] have proposed that technological procuration is considered as the commencement deed of technology competence cultivation, and it must be performed continually. Emilia and Masi [11] infer that technology encompasses two parts, competence and knowing, that are highly correlated and employed in productivity processes. Technology is a relationship of two Greek words applied in many yeras ago: Techne (skill), know-how (skill to create something), and Logos (knowing). From a view of technological productivity technology is considered as a way of correlated competence (know-how), and knowing (why, where and whom) realized in proceeds with production technology system and productive method which are compiled by correlated technological parts. The writers imply that organizing technology is an attempt to create technology continually, develop new proceeds, services, and market them. The conceptual knowledge facet should be emphasized as a major impact. It needs enormous imagination in a pattern system to utilize it. It also needs to invest R & D. The value of R & D cannot be underestimated as it is an investment for the future. It is an expensive endeavor and have high risks, hence it has to be managed well. Normally, it will take time between scholarly invention and contrivance. It may take much time to transform knowledge into technological development. It may take much time to encash an invention as a product or service.
3. Innovation

Some developed dictionaries denote the origin of word innovation comes from “innovaire” refers to reform or do modification. Therefore, innovation is to add a novelty to product or process. “Create” is determined as to creat something, such as: producing something new, typical, genuine or something difference from the existing ones [12]. Innovation is determined as an identity and confiscation of chances to develop recent proceeds, services or processes [13]. Different idea is suggested by Bates and Khasawneh [14], innovation is equaled with levitation and implication of new knowing and application, involving the competence of a firm to employ or develop new thought and perform these new thoughts to creat recent and better proceeds, services and working process and methods. Innovation is regarded as is not a tangible source which is rigid to commence. Those sources denote an organizational asset and a resource of beneficial competition. There are several sources of innovation. Caloghirou et al. [15] classify the things i.e: statement of technology, patent management usage, involvement in conference, and science journal as outer resource of novelty knowledge. Obtaining outer knowing through science publication was proven to be beneficial. Most companies normally apply this way to discover recent thought for innovation. Richard et al. [16] propose another category of innovation source, such as cooperation with external organizations. The outer knowing obtained throughout technological sources activity classified by kind of organization, i.e: knowing obtained from investigation institutes and kowing obtained from consultant’s companies. It is deduced the innovative companies are highly competitive advantage. Many scholars investigated that the power of quality control is highly related to the newness and the competence of manufacturing was considered to enhance beneficial competition of the company [17]. The innovation encompasses all employee and sections. Hence, it is considered as a collaboration implementation. Collaboration reflects the nonformal and powerful realm of intersection connection [18]. This is in line with Trott [19] who says the innovation appears at the same time with knowing and share in company sections. Innovation capability is based on effective communication among personnel, groups, firms, and subsystems because the relationship enhance knowing and studying. Oliva et al. [7] restate what Schumpeter says innovation comprises modifying a factor already discovered to mercantile beneficial tool that finally to be approved in a socoal structure. Kaizen philosophy is an utilization to this kind of newness that may lead a notable refinement in the operational companies. An innovation can be a recent creation or process, or usage of new crude substance or a recent from companies. The concept developed by Joseph Schumpeter also is cited by Figueiredo et al. [20] who define innovation as introduction process, expose new trades, establishment of new resources of crude material and other supplies, development of new trading which concern for origal asset as well as supplying addition returns. The designation of innovation is connected to R & D related to developing new proceeds. Many researches about innovation that declare that escalated R & D direct to innovative proceeds which allow firms to gain beneficial competition and obtain marker shares [21]. While from the business view, Patterson [22] argues that innovation is determined as implementation thought to construct value. Business companies implant in innovation, they use money for it with looking forward a benefit. Therefore, main objectives of defending firm business is to construct patent including innovation which produces higher return than others. Innovation is seen larger, involving business parts beyond traditional outcome establishment nature. Moreover, Ar Murat and Baki [23] postulate the innovation takes part in economical establishment, in broading and supporting high achievement of companies, in constructing competitive advantage of the company, in rectifying normative living, and developing an improved living quality. Innovation can occur in three wide fields: product, process, and firms which are known as a new to the society, organizations, and industry area. According to Damanpour in Richard et al. [16] the innovative organization merges the establishment and practice of new thought, methods, products, or technologies. At the rivalry marketplace, firms have to escalate the knowing to absorve to new products and technologies and continually deploy the knowing to workers. Some elements support distinguish innovation competence of distinguish nations. Many of them involve the establishment of history pattern, composition of finance, system of education, wisdom of government, management methods, etc. [24]. Two closely
associated terms are frequently used invention and innovation, wherever creativity is discussed in circumstances of technology change. Inventions and innovations are not the same but are intimately related. Inventions occur as an outcome of human being intelligence and reflection. An invention is uncommon and can be likening as an event, while innovation is of process. Innovation manner includes integrated of available technology and creation to develop a new better proceeds, method, or system. A finding normally generates many novelties. For example, the invention of the transistor initiated the phenomenal development, thus triggering radical innovation in the electronic industries. Invention may be embodied by an individu, firm, but innovation is normally embodied by the attempt of by inter-correlation companies. In measuring innovation performance, Prajogo et al. [25] determine innovation achievement by quantifying productivity and process innovation utilizing quantitative and qualitative indicators. On the contrary, Wu in Richard et al. [16] used four elements to gauge innovation achievement: 1) innovative production (productivity establishment competence, marketing speed, and oversee consumer requirements), 2) innovation method (concern rate, quality of productivity, and competence to minimize costs), 3) innovative organization (global sale, global trademark impression and competence to develop global distribution, and 4) innovation strategy (new productivity process, new utilize, and establishment of worth chain). In the writers opinion, innovation is the source of the evolution and revolution. Innovation is not only a current issue, it is perpetual one. The innovation is application of new or better product (goods/services) or new organizational way. Innovation is also an establishment and application of new thought by the human being who participate in dealing with others in an agency situation. The digest of innovation is transformation, and it is described in two aspects, i.e. things (product/service) and the level of newness.

4. Technological Innovation Capabilities (TICs)
Guan and Ma [26] determine TICs are a kind of particular assets or resources that include technology, product, process, knowledge, experience and organization. Meanwhile Burgelman et al. [27] propose that TICs as a comprehensive set of features of an organization that simplifies and bolsters its technological innovation strategies. Furthermore, Adler and Shenbar in Richard et al. [28] stipulate that there are four classifications of TICs viz. (1) the ability of fulfilling trade condition by developing new products, (2) the competence to manufacture the product by means of appropriate process technologies, (3) the ability of fulfilling forthcoming needs by developing and identifying new outcomes and new method of technologies, and (4) the ability to respond to an unpredicted technology activities carried out by rivals and unpredicted matters. These capabilities exist in a company and at company levels. Assorted researches have sought to find out the TIC elements that are crucial to companies. Yam et al. [17] infer the components of TIC as functional method, such as: learning capability, R & D capability, resources allocation capability, manufacturing capability, marketing capability, organization capability, and strategy planning capability. They also discover that TIC is definitively referred to recent outcome introduction and renewal sale. Antonio et al. [29] rewrite the findings of Lall that TIC as the competence and knowing to good objective permeate, dominate and improve existing technologies and to establish new ones. In line with the definition, Shan and Jolly [30] postulated TIC as a capability of the organization to choose, obtain, capture, and unite new technologies and thereafter manage kinds of sources to generate new technologies. Meanwhile Burgelman et al. [27] argue the TIC components as process method consisting of abilities of a company, sources existence and classification, knowing rival innovative tactics method and market, knowing technology establishment appropriate to company, constructional and cultural influencing internal innovative programs and tactics management competence to handle inner newlyness activities. Successful technological capability means that organization can fulfill client requirements with consider to cost, speed, quality, and novelty. Zahra and Nielsen [31] divide technological capabilities into four features:
(1) frequency to introduce new product
(2) introducing new products better than rivals
They also argue that technological capabilities are the adjust of competence the company has in constructing and influencing different technologies and systems. Technological capabilities are various and include research and development, producing, and incorporated abilities, and so forth. Manufacturing technological capabilities can specify whether a company can modify research and development outcomes victoriously to become proceeds, and rectify the characteristic of product. Mooraman and Slotegraaf in Zhou and Wu [32] state the technology proficiency not only develops recent proceeds activity but also simplifies the productivity establishment rapidly. Hence, the capabilities of technology take part to innovate the proceeds and ensures particular investigation. Kylaheiko et al. [9] infer that technological capabilities indicate the compiled knowing of technology the company can apply when constructing novel proceeds/services and rectifying them. Guan, Yam, Mok and Ma in Shan and Jolly [30] also notice that the renewal of technology is the association of knowing strategy and administration ability from distinct fields, that by reinforcing these fields, the firms may construct their competitive advantage. Bond [33] has declared that technology and renewal are crucial for the country and competitive of the territory and the primary elements for encouraging economic achievement. The innovative of technology is very crucial element to be reflected by countries for magnifying the competitive, the establishment of economy, and social constancy. In global of magnifying rivalry and transformation of technology, the descendant and deployment of innovation intensifyingly depend on recent knowing technology resulted not only via inner R&D section but also via the company’s connection with outer resources of newness, especially in a certain area of the company performs [15]. They further say that knowledge base of the firm recommends that a company’s innovation achievement is a result of intensifies in its fundamental knowing. Mei Chih Hu [34] proposes that the development of innovative technology competence is a highly necessary step in developing a fruitfulness industry in a nation. The potential is depicted in a nation’s patent program, and rely on a large grade on the track of worldwide the establishment of industry, which is assessed in rate technological name and rate of economy. Based on experience of the Hongkong’s industries, an important aspect of innovative technology fruitful is competence of a company to employ and apply outer knowing in a certain part area innovative method. Mei Chih Hu [34] restates what Hu and Mathews study at the sectoral stage that the beginners “tiger economies” of East Asia (i.e., Korea, Taiwan, Singapore, and Hong Kong) were successful in 1990s because they adhered combative production systems which was planned to cultivate the competence of innovative technology, modifying from impersonators to become renewers. Similarly, Japan with educational capital and national method of innovation, emerges to have gained the stability of thought power and knowing of technology is crucial for triumphant of newness, at least for innovative technology. The authors propose that the capability is as competence of company to disseminate sources which is planned to obtain a final purpose. Capability enables the firm to establish and employ outer chances and construct the benefit continually. Innovation capability is determined as a power to establish a novelty and beneficial knowing related to knowing before and total aggregate of features of a company which simplify and bolster the newness method. Innovation capability designates to the competence to continually convert knowing and concept to become recent proceeds, processes, and method for advantage of the company and participators. It is almost impossible to achieve effective innovation without certain innovation capability. Technology capability is a competence to develop the potent usage to diffuse, employ, apply, and transform the current technology, or a competence to employ the current knowing and in turn generate new knowledge. Technology has been and continuous to be the primary driving force of growth.
5. Conclusion

Organizations should construct innovation productivity and respond promptly to the consumers’s requirement in order to succeed in worldwide rivalry. Most company regulation system is not compatible with the current business (Gaither and Frazier in Oliva et al. [7]. Focusing on the customers’ request to construct modern technology, firms must concern on innovative things as a particular tool to encounter fluctuation market. Quality also has become an element of rivalry in past few decades. The strain of improving needs led to this circumstances and the emphasis to refine proceeds and services to be more effective. Firms and nations become rivalry in the economic matters of the world, because the outputs should satisfy the customers’ needs, such as: quality, pattern and cost [35]. A firm’s competitive advantage could come from the efficiency and capabilities obtained from new product establishments [36]. An increase in product innovation is attributable to the accumulation of capabilities and contributes to innovation outputs. In most condition, high-performance companies have stronger capabilities than low-performance firms. Innovation is a process through which the nation cultivates and modifies new knowledge and technologies into beneficial products, services and processes for national and global markets-leading to value creation for stakeholders. Innovation also plays an important role in constructing the economy, in expanding and sustaining the high performance of companies, in composing industrial competitiveness, in improving the standard of living and in creating a better quality of life.

6. References

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