Technological capability and business success: The mediating role of innovation

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Abstract. Innovation is the main key of competitive advantage and business success that can be represented by firm performance. Drawing on the literature review, we conduct a research model which technological capability not only influence firm performance but also impact capability innovation that in turn firm performance. The aim of the study is to investigate the influence of the technological capability to firm performance of SMEs who operating in Batu – Indonesia. Related to this research, hypothesis have been developed. A questionnaire was prepared for collecting data. In order to test hypothesis using Partial Least Square (PLS). Result indicated that technological capability not only a direct but also an indirect effect on firm performance through innovation.

1. Introduction
The contribution of innovation is to sustainable competitive advantage widely recognized. Innovation has become critical value in many industries, especially for anticipate the dynamic environment. To survive in those rapid changes of technological, companies must innovate in order to gain competitiveness. Innovation can be described as the introduction and implementation of new ideas and new knowledge. It is very important because it responds to a dynamic market that requires the development of new products [1, 2]. At the firm level, innovation has been associated with the existence of certain types of capabilities more specific is technological capability [3]. According to the RBV theory, superior performance will be achieved when the company has the resources and capabilities that can create competitiveness [4,5]. Those abilities are not easily acquired they are the result of efforts to learn and improve both the process and the final product. Thus, companies should accumulate resources and competencies to strengthen technological capabilities.

High technology capabilities help the firm to produce better products than its competitors. At the same time, the technological capability could be associated with a firm performance [2]. Firms with better technological capabilities tend to be high performance [6, 7]. Besides, few discuss conclude that firms in emerging-economies do not develop sufficient technological capabilities cause firms’ failures in long terms because that firms do not depend primarily on developing technology for survival, such as low-tech.

Keskin [8] revealed that studies on innovation in SMEs are often ignored. Generally, small industries are faced with many obstacles in carry out innovations, such as limited capabilities, financial resources, the quality of human resources, also risks [9]. However, since small industries must compete in the global economy with intense competition, they must also develop the
competencies needed to improve product and process development. So, promoting their innovative capacity will help to acquire the capabilities required for competitive processes. Additionally, technology is a supporting factor for the creation of an innovation. It can make the results of innovation which are new products and new ideas more competitive in market.

This study attempts to analyze the role of technological capability in promoting firm performance directly and indirectly via innovation in small industries of apple-based processing in Batu City-Indonesia.

2. Literature review and hypothesis

2.1. Technological capability and innovation

The firm needs the capability to compete in the global era, especially a vital component of absorb capacity which is the ability to acquire new knowledge and assimilate to apply for commercial purposes. That is technological capability. There are various arguments about the definition of technological capability. Ortega [10] for the example, asserts that technological capability is the company's ability to perform technical functions, to develop new products, to develop new processes, and to operate company facilities effectively. It is important to emphasize that the main goal of the technological capability is to have an impact on the product and/or process. Moreover, technological capabilities can be defined as “the capabilities to develop and design new product, new process and more effectively operate the equipment” [11] or “resources which are needed to produce manageral technique revolution including skills, knowledge and experiences as well as institutional structures and ties” [12].

Various studies show that technological capability plays an important role in innovation. For instance, Huang [13] has proven that determinants of technological capability such as exploring or exploiting technological opportunities, core technology capability, and autonomy of R&D are important to firm innovation, particularly in turbulence market in Taiwan's information and communication technology (ICT) industry. In addition, Hsieh and Tsai [14] revealed technological capability is the driving force of a firm’s innovation. Research study by Sobanke et al. [15] in SMEs Nigeria concluded that accumulation of technological capability is associated with experiencing, in-house training, and networking with the associated industries. By studying in SMEs Colombia, Cuero-Acosta et al. [16] assert that absorptive capacity of firm contributes significantly to the improvement of technological capability. Moreover, Ritala and Hurmelinna-Laukkanen [17] expressed that firms with stronger technological capabilities can easier assimilate knowledge from outside sources and useful in creating innovation. Wu [18] stated that firm use knowledge and skills effectively would augment technological capability. Thus, can improving innovation better. Similarly, many researchers have contributed ideas that are a positive relationship between technological capability and innovation [19-21].

H1. Technological capability positively affects innovation

2.2 Technological capability and firm performance

Technology capabilities can be considered to develop a firm competitiveness. In this highly competitive market, manage the technological capabilities for superior firm performance is very critical. Following Molina-Domene and Pietrobelli [22] technological capability is the ability to use effectively technological knowledge for production, engineering, and innovation. In addition, Hobday and Rush [23] described that technological capability as accumulated knowledge, skill, experience and organizational base which enable a firm to acquire, develop and use technology to achieve competitive advantage.

Many developing countries have developed infrastructure to support innovation and explore technological capabilities, especially in small industries. In contrast, previous study on technological capability has less attention in small industries. The study which reported by Cuero-Acosta et al. [16] absorptive capacity contributes significantly on technological capability in SMEs Colombia. Gewe et
al. [24] claimed that to enhance the technological capabilities of SMEs in low-income developing countries, like Ethiopia need to learned technological outsourcing. Next, Aw and Batra [25] examines the relationship between technological capabilities and company efficiency in manufacturing industries in Taiwan using indicators of R & D expenditure and training personnel, which show that technological capabilities have a positive correlation with performance. Similarly, Acha [26] has also applied R&D expenditures, publications, and patents as indicators of technological capabilities in the petroleum industry. Many empirical findings highlight the direct effect of technological capabilities on firm performance [27-31].

H2. Technological capability affects firm performance

2.3. Innovation and firm performance
Innovation is one of the key factors for long-term business success, especially in a dynamic market [32]. The ability of innovation is not only introduction of new processes and new products but also opening new markets and modification of existing products. That can increase both the number of product variations and the firm performance. Company should pay attention to not only external factors, but also internal factors to develop new products for improve their firm performance [33]. Because successful innovation is associated with good performance. Companies with innovative capabilities will be able to respond the challenges faster, launch new products and better market opportunities.

Most empirical studies the relationship between innovation and firm performance proves there is a positive relationship. Lestari et al. [34], for example, have been examined that studies in small industries in Batu City-Indonesia which concluded that product innovation has an effect on firm performance. According to Varis and Littunen [35] who researched 264 small industries in Finland stated that the introduction of novelty of the products and the innovation process was significant influenced to the growth of the firm but did not have affect with the profitability of the firm. By investigating the diffusion of innovation among Malaysian manufacturing SMEs, Mamun [36] also found that adoption innovation affects performance. Nonetheless, Simpson et al. [37] point out that innovation is not only expensive, risky, and produces a positive output on performance, but can also be negative output on performance. Although there is inconsistent evidence, in general, there is a positive correlation between innovation and the firm’s performance.

H3. Innovation affects firm performance

2.4. The mediating effect of innovation
From the previous discussion, it is known that technological capabilities affect innovation at the same time technological capability could also be associated with the firm’s performance. Bolivar-Ramos et al. [30] asserted that distinctive technological capabilities have a positive effect on firm performance both directly and indirectly through innovation. Besides, Camison and Villar-Lopez [38] stated that innovation as a mediating variable in the relationship between manufacturing flexibility and firm performance. Moreover, Chantanaphant et al. [39] found that innovative processes and product innovation determine the success of Thai SMEs in the international market. Thus, SMEs need to accumulate technological knowledge acquired from internal and external sources in order to improve performance. Tzokas et al. [2] added that technological capability could contribute to firm’s innovative and firm performance.

H4. Technological capability affects firm performance via innovation

3. Method
The research population is all apple-based processing business of SMEs in Batu City, Indonesia, accounted for 47 units. To measure technological capability, innovation, and firm performance multi-items were used. Then, all constructs were measured using a five-point Likert-type scales ranging from 1 (strongly disagree) to 5 (strongly agree) throughout the questionnaire. The questions for measuring technological capability were developed from Wang [19] and Guifu and Hongjia [40].
Innovation was adopted from previous studies [9, 41, 42], which reflects the outcomes of product and process innovation, each measured by using three indicators. Then, firm performance was measured by financial indicators was adapted [9, 41, 42].

4. Analysis and result
The hypotheses were designed and tested by using structural equation modeling. Figure 1 shows the results and the analysis results were summarized in Table 1 and Figure 1.

| Hypothesis | Variable correlations | Path Coefficient | p value | Description |
|------------|-----------------------|------------------|---------|-------------|
| H1         | Technological capability => innovation | 0.77             | <0.01   | Supported   |
| H2         | Technological capability => firm performance | 0.27             | <0.01   | Supported   |
| H3         | Innovation => firm performance | 0.34             | 0.02    | Supported   |
| H4         | Technological capability => innovation => firm performance | 0.24             | 0.04    | Supported   |

The result indicated the effect of technological capability on innovation, with the path coefficient of 0.77 and p value < 0.01, so H1 was accepted. The coefficient of determination ($R^2$) showed that 59% of innovation variation is explained by technological capability. For H2, the relationship between technological capability and firm performance has path coefficient 0.27 and p value <0.01, provide that H2 supported. The hypothesis test of H3, which is innovation has a significantly positive impact on firm performance can be shown by the path coefficient of 0.34 and p value <0.05 that means H3 proved. Additionally, the determination coefficient ($R^2$) revealed that 31% of the firm performance variation is expressed by technological capability and innovation. Furthermore, the partial mediation of innovation is detected in relationship between technological capability and firm performance with the path coefficient of 0.24 and p value < 0.05, so H4 was supported.

5. Discussion
Based on analyzes of hypothesis, our finding explains that technological capability not only a direct but also indirect influence on firm performance with innovation as a mediator. The accumulation of technological capacity in a firm can be achieved by acquiring knowledge from internal and external sources then assimilating and applying for commercial purpose. According to Khayyat and Lee [43]...
enhancing the technological capabilities would facilitate innovation. Apart from that, SMEs should learn new knowledge from the other experience to gain innovation skill. Furthermore, it emphasizes that SMEs must be proactive to upgrade their technological capability and innovation. As explained by Garcia-Morales et al. [44] even though SMEs lack number of qualified workers, inadequate capital due to R&D, and innovation, they have advantages than large firms, such as lack bureaucracy. That is an opportunity to respond quickly, to changes market tastes, and to easily adapt the production process. Generally, the technology capability investments made by these companies are not on R&D activities, but to achieve that their operational level is better than competitor’s. Those characteristics make SMEs have greater efficiency in innovation. Finally, this study illustrates the importance of technological capability to ensure superior firm’s performance.

6. Conclusion and implication
The number of studies in the field of technological capability usually is only carried out on large-scale companies. Nevertheless, the role of small industry in economic development, employment provision has been widely appreciated. However, few studies have been investigated innovation in small industries. This research has practical implications, that the relationship between technological capabilities, innovation, and firm performance as a key strategic for companies can achieve better performance. Although with limited resources, enterprises should improve technological capabilities with develop innovation, which can be stimulated by workforce appropriate training, participation in various seminars, exhibitions, interaction with suppliers, customers, public institutions and industry associations through the learning process continuously.

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