

# Innovation Capability and Barriers to Entry-Based Competitive Advantage in Indonesian Manufacturing Companies

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This study aims to explain the effect of innovation capability on competitive advantage through the creation of barriers to entry which includes economies of scale, product differentiation, innovation, and capital requirements. The study was conducted on manufacturing companies listed on the Indonesia Stock Exchange with an observation period of 2010 to 2018. Data were analysed using linear regression analysis. The results of the analysis conclude that the innovation capability has a positive and significant effect on creating barriers for competitors in terms of economies of scale and capital requirements, but product differentiation and innovation are not significantly influenced by the innovation capability. Future studies can develop research models by involving components of competitive advantage based on market/industry indicators.

**Key words:** *Innovation Capability, Economies of scale, Product differentiation, Innovation, Capital requirements.*

## Introduction

Innovation is an essential capability for companies in achieving competitive advantage. Creative destruction eliminated many companies due to innovations from competitors. Innovation has been an interesting subject since the mid-1990s as a theory that challenges the Ricardian and Penrosian perspectives that emphasises more on the company's resource base (Moustaghfir, 2009). Innovation was introduced by Joseph A. Schumpeter in 1934, which emphasised the importance of innovation capability rather than resources.

Schumpeter argues that innovation capability is a factor that determines success, performance, and competitive advantage (Amit & Schoemaker, 1993; Makadok, 2001; Teece & Pisano, 1994; Winter, 2003). In his writings, Schumpeter introduced the term "New Combinations" (Sledzik, 2013). This term refers to new combinations as a result of innovation, which can include new products, new product quality, new production methods, new markets, new sources of raw materials, and so on (Hagedoorn, 1996). Innovation is a new combination of existing knowledge and incremental learning (Kogut & Zander, 1993). Manufacturers possessing higher product and service innovation capability can earn twice the profits of those manufacturers without innovation (Tidd, Bessant, & Pavitt, 2005).

The concept is similar to dynamic capabilities, which refers to the company's ability to transform old capabilities into new capabilities to deal with environmental changes (Eisenhardt & Martin, 2000). Teece (2009) define dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Teece & Pisano (1994) highlighted and criticised the role of resources and capabilities in achieving sustainable competitive advantage. He argues that it is not only the resources that are important in gaining competitive advantage, but also depends on the mechanism through which companies learn and accumulate new skills and capabilities and the forces that limit the process.

Wang & Ahmed (2007) identified three main components of dynamic capabilities, namely adaptive capability, absorptive capability and innovative capability. Adaptive capability is the ability of companies to adapt to the scope of their product-market to respond to external opportunities. Absorptive capability is the company's ability to assimilate and replicate new knowledge gained from external sources. Innovative capability refers to the company's ability to develop new products and/or markets, by aligning strategic, innovative orientations with innovative behaviours and processes (Alinaghian, 2012; Rothaermel & Hess, 2007).

Dynamic Capabilities View of the firm (DCV) states that success in achieving competitive advantage depends on the mechanism through which the company learns and accumulates new skills and capabilities and the forces that limit the process. New skills and capabilities are the results of innovation capability. The new skills and capabilities will be a barrier to the entry of competitors which is a requirement to have a competitive advantage for the company. O'Regan, Ghobadian, & Sims (2006) suggested that innovation is the key to achieving sustainable competitive advantage.

Several studies have been conducted to prove the effectiveness of innovation capability on competitive advantage based on the creation of entry barriers. Delgado, Ardila, & Ibarra (2012) and O'Regan et al. (2006) in his research, concluded that innovation is the key to achieving sustainable competitive advantage. Research by Breznik & Lahovnik (2014)

concludes that innovation capability, managerial capability and human resource capability are the most relevant capabilities that enable companies to adapt to changing environments and strong market demands successfully. Aziz & Samad (2016) also concluded that innovation has a strong positive impact on competitive advantage.

However, the influence of dynamic capabilities on competitive advantage is still considered fragile because dynamic capabilities do not lead directly to achieving competitive advantage, but provide a basis for achieving it through a combination of new resources (Cepeda & Vera 2007). Previous studies have not examined the relationship between innovation capability and the creation of barriers to entry for competitors. This research was conducted to fill this gap by examining the effect of innovation capability as an important component of dynamic capabilities on the creation of barriers to entry which are essential components of competitive advantage.

The barriers to entry are a vital element for competitive advantage because it allows companies to be able to enjoy benefits for a long time. This is because the competitive advantage is based on four pillars which include resource heterogeneity, ex-post limits to competition, imperfect resource mobility, and ex-ante limits to competition (Peteraf, 1993). The Ex Post Limits to Competition pillar means that companies must have the power to limit competition. This pillar can be achieved if it fulfils two conditions, namely imperfect imitability (difficult to imitate) and imperfect substitutability (difficult to make an equivalent substitute product).

## **Literature Review**

### ***Innovation Capability***

Innovation defined as the successful introduction of new products and processes (Hagedoorn, 1996). Innovation by Schumpeter is defined as "new combinations". These new combinations refer to the introduction of a new product or a new quality of a product, a new production method, a new market, a new source of supply of raw materials or half-manufactured goods, and implementing the new organization of any industry (Hagedoorn, 1996). The firms' capabilities in synthesizing and acquiring knowledge resources, and generate new applications from those resources are called the "firm's combinative capabilities" (Kogut & Zander, 1993; Moustaghfir, 2009). Schumpeter argued that innovations are new combinations of existing knowledge and incremental learning (Kogut & Zander, 1993). Moustaghfir (2009) states that this understanding is similar to dynamic capabilities which refers to the company's ability to transform old capabilities into new capabilities to deal with environmental changes (Eisenhardt & Martin, 2000; Teece & Pisano, 1994).

**Table 1:** Definitions of innovation capability

Author	Definition
Lawson & Samson (2001)	The ability to transform continuously knowledge and ideas into new products, processes and systems that benefit the organisation and its stakeholders.
Wang & Ahmed 2004	An organisation's ability to develop new products or markets through the orientation and alignment of their innovation strategy and innovation processes.
Koc (2007)	Continuous improvement of overall capabilities and resources of the firm to exploit opportunities to develop new products / services to meet the needs of the market.
Xu, Lin, & Lin (1998)	The ability to access the development and implementation of innovative technologies for design and manufacturing processes.
Chang & Lee (2008)	The implementation or creation of technology as applied to systems, policies, programs, products, processes, devices, or services that are new to an organisation
Zawislak, Alves, Tello-gamarra, Barbieux, & Reichert (2012)	The technological learning process from the firm translated into the technology development and operations capabilities, as well as the managerial and transactional routines represented by the management and transaction capabilities

The innovation capability of a company is demonstrated through its Research and Development (R&D) activities (Chen, 2005; Dickinson & Sommers, 2012). According to Ou, Hsu, & Ou (2015), maintaining and increasing investment in a sustainable R&D process can increase a company's dynamic capabilities and create competitive advantage. Dynamic capabilities for R&D activities have two roles. Companies that invest in R&D activities not only encourage innovation but also build and maintain broader capabilities in using knowledge. Investment in R&D capabilities will increase absorptive capacity (Kor & Mahoney, 2005). This activity is measured by the percentage increase in R&D investment ratio.

$$\text{InCap} = \frac{\{(RDE_{t-1} - RDE_{t-2})/RDE_{t-2}\} + \{(RDE_{t-2} - RDE_{t-3})/RDE_{t-3}\}}{2}$$

Source: Wang & Hsu (2010)

InCap is innovation capability, proxied by a percentage increase in R&D investment; RDE is Research and Development expenditure; t is the year.

### ***Barriers to Entry of Competitive Advantage***

Competitive advantage is a position of superiority in which a company has a successful strategy and therefore is difficult to imitate. Barney (1991) states that a company has a competitive advantage if it implements a value creation strategy that is not simultaneously applied by current and potential competitors. Competitive advantage is an outcome of valuable company resources, rarely owned by competitors, difficult to imitate and non-substitutable (Chahal & Bakshi, 2014). A company will gain a sustainable competitive advantage if competitors find it difficult to imitate other products or because of barriers to entry (Gaya, Struwig, & Smith, 2013).

A barrier to entry is defined as the incumbent's advantage over potential entrants so that economic rent can be obtained without attracting new entrants to the market (Bain, 1956). Barriers to entry that support the achievement of competitive advantage include economies of scale, product differentiation, innovation, and capital requirements (Dickinson & Sommers, 2012).

According to Peteraf (1993), several theoretical conditions underlie competitive advantage, including resource heterogeneity, ex-post limits to competition, imperfect resource mobility, and ex-ante limits to competition. The Heterogeneity pillar shows that the bundle of resources and capabilities that underlie production is heterogeneous between companies (Barney, 1991; Peteraf, 1993). Different resource ownership determines different levels of efficiency. Superior resources will enable the company to be able to produce more economically so that it meets customer expectations. The Ex Post Limits to Competition Pillar means that there must be a barrier that can limit competition. This pillar can be achieved if it fulfils two conditions, namely imperfect imitability (difficult to imitate) and imperfect substitutability (difficult to make an equivalent substitute product). Ex Ante Limits to competition means that for competitive advantage to be maintained, heterogeneity of resources must be maintained by keeping income above costs. Imperfect mobility means that the resource cannot be moved because it cannot be traded. Resources are imperfectly moved because they meet the specific needs of companies that currently have them.

### ***Research Hypothesis***

The innovation capability is an essential factor in achieving sustainable competitive advantage (Calantone, Cavusgil, & Zhao, 2002; Li & Calantone, 1998). Innovation has been widely recognised as the key to competitive advantage. Innovation capabilities are needed so companies can maintain continuous innovation and place it among their top priorities and concerns (Tidd et al., 2005). Innovation contributes to competitive advantage in several ways. Innovations in new products contribute to marketing performance through increased market

share and profitability. Innovation equips companies with the ability to respond to market changes. Innovation in the process equips companies with the ability to produce products that are better or cannot be done by competitors. Innovation enables companies to find ways to provide faster, better and cheaper services. Thus, innovation capabilities play a role in creating barriers to entry for competitors so as to provide sustainable competitive advantage. A study by Aziz & Samad (2016) also concluded that innovation has a strong positive impact on competitive advantage. Therefore, the authors arrange the research hypothesis as follows: *innovation capability has a significant effect on competitive advantage based on barriers to entry.*

### **Research Methods**

This is an analytical research paper. The population is all manufacturing companies listed on the Indonesia Stock Exchange in the period 2010 to 2018 with a total of 166 companies (*IDX Fact Book*, 2018). The sample is determined by a purposive sampling technique, which is a sampling technique that is adapted to a specific purpose (Lyons & Doueck, 2010). Samples were taken based on several criteria. The manufacturing companies must be listed on the Indonesia Stock Exchange and publish annual financial statements during the period 2010-2018, respectively. The financial statements must disclose the expenses for R&D. R & D activities show that the company is innovating to achieve competitive advantage (Dickinson & Sommers, 2012). Based on these criteria, the sample is determined as 35 companies with a period of observation for 9 years or 315-panel data. Data obtained from Indonesian Capital Market Directory (ICMD), the company's financial report, company's annual report, performance summary of listed companies, and *IDX Fact Book* from the Indonesia Stock Exchange (IDX).

The innovation capability variable is measured using the average percentage increase in R&D development (Wang & Hsu, 2010). Company expenditures for research and development activities demonstrate its ability to innovate. The economies of scale variable is measured using the Cost of Sales (CoS) ratio, which is the cost of goods sold divided by net sales. Product differentiation variable is measured by the advertising intensity ratio (AdvInt), which is advertising expense divided by net sales. The innovation variable is measured by the ratio between the amount of research and development costs and the patent amortisation expense divided by net sales. Capital requirements variable is measured by capital intensity (CapInt), that is depreciation expense divided by net sales (Chen, 2005; Dickinson & Sommers, 2012). Data analysis was performed using linear regression analysis. In accordance with the research hypothesis, four regression equation models were developed for testing purposes. Model 1 was developed to prove the hypothesis of the effect of innovation capability on the economies of scale. Model 2 was developed to prove the hypothesis of the effect of innovation capability on product differentiation. Model 3 was developed to prove the hypothesis of the effect of

innovation capability on innovation. Model 4 was developed to prove the hypothesis of the effect of innovation capability on capital requirements.

Model 1:  $Y_{Eos} = a + b_1IC + e$

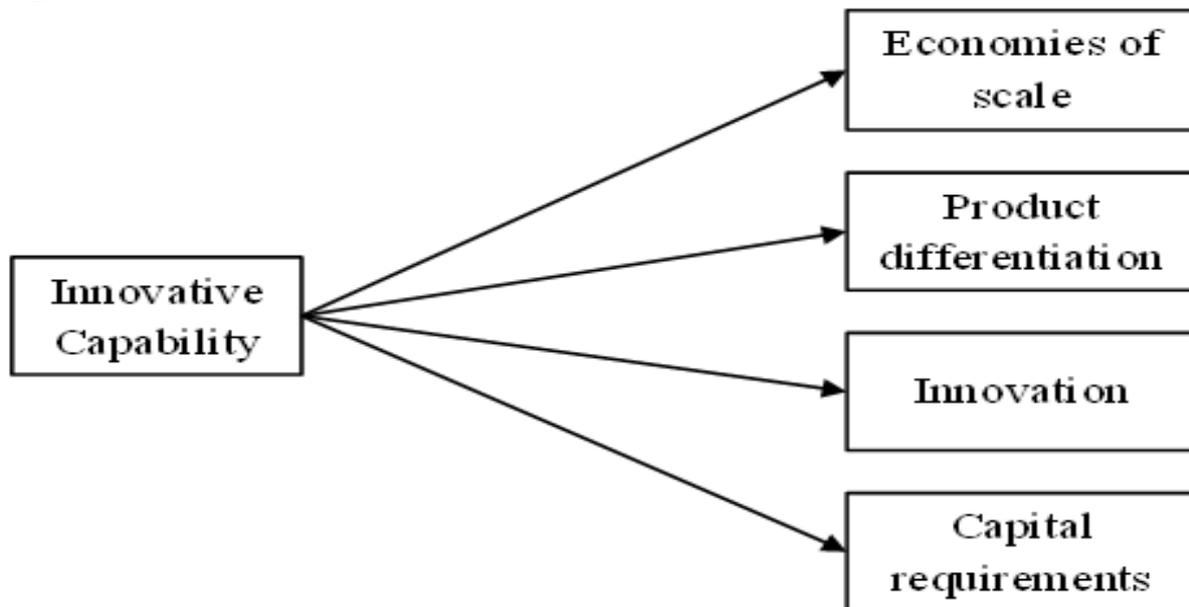
Model 2:  $Y_{Pdif} = a + b_1IC + e$

Model 3:  $Y_{Inn} = a + b_1IC + e$

Model 4:  $Y_{CapReq} = a + b_1IC + e$

Where a is a constant,  $b_1$  is regression coefficient, IC is innovative capability, Eos is economies of scale, Pdif is a Product differentiation, Inn is Innovation, and CapReq is a Capital requirements. The research model is shown in Figure 1.

**Figure 1.** Research Model



## Result and Discussion

A description of the research variables, including innovation capability, economies of scale, product differentiation, innovation, capital requirements is shown in Table 1.

**Table 1:** Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Innovation capability	-0.97	10.74	0.6894	1.60325
Economies of Scale	0.89	3.10	1.4290	0.37113
Product differentiation	0.00	0.29	0.0371	0.05245
Innovation	0.0000	0.0473	0.003247	0.0082622
Capital requirements	0.00	2.00	0.0318	0.11360

During the observed period, from 2010 to 2018, the innovation capabilities of 35 manufacturing companies in Indonesia, as measured by the average increase in R&D expenditures, showed an average of 0.6894. Manufacturing companies in Indonesia consistently demonstrate continuous efforts in building innovation capabilities. This is indicated by the average increase in expenditure in positive R&D, which amounted to 68.94 per cent.

The lowest innovation capability value was recorded by PT Sidomuncul Tbk in 2018. In that year, the average expenditure of PT Sidomuncul Tbk calculated from the last three years continued to decline. In 2015, the amount of PT Sidomuncul Tbk's expenditure on R&D activities was IDR 7.5 billion, decreased to IDR 0.498 billion in 2016 and even zero in 2017. The highest innovation capability value was recorded by PT Semen Baturaja Tbk in 2013. In that year, the average expenditure of PT Semen Baturaja Tbk calculated from three years experienced a significant increase. In 2010, the amount of PT Semen Baturaja Tbk's expenditure on R&D activities was very small at IDR 48.6 million. In 2011, the amount of PT Semen Baturaja Tbk's expenditure on R&D activities increased significantly to IDR 1.114 billion. Although it declined to IDR 631.62 million in 2012, it increased again to IDR 874.12 million in 2013. This shows a strong commitment from PT Semen Baturaja Tbk to continue building its innovation capabilities.

The economies of scale variable, which is proxied by the cost of sales ratio show an average of 1.429. Manufacturing companies in Indonesia have a reasonably good economic scale where the amount of net sales realised is 142.9 percent of the cost of good sold. The higher this ratio means the higher the level of efficiency due to the achievement of economies of scale.

PT recorded the lowest economies of scale value. Jakarta Kyoei Steel Works Tbk in 2012 which amounted to 0.89. The net sales value in that year was only 89 per cent of the cost of good sold, meaning that the company was in a loss condition. The company has operated inefficiently so that the costs incurred to produce goods or services exceed the net sales value. The highest value of economies of scale was achieved by PT Pyridam Farma Tbk in 2013, amounting to 3.10. The net sales value in that year reached 310 per cent of the cost of good sold, meaning that the realized sales value was more than three times the cost of good sold. The company has operated so efficiently that the costs incurred to produce goods or services are much lower than the net sales value. During the 2010-2018 period, the company always recorded a net sales value of above 200 per cent.

Product differentiation variable, which is proxy with advertising intensity ratio shows an average of 0.0371 or 3.71 per cent. Manufacturing companies in Indonesia spend an average of 3.71 per cent of their net sales for promotional activities, especially advertising. The

highest advertising intensity was carried out by PT Pyridam Farma Tbk in 2013, amounting to 29 per cent. This company consistently spends a significant amount of advertising costs on an average of 23.87 per cent. However, consistency in building product differentiation is quite low, where spending on advertising is not done annually by some other manufacturing companies. Many companies, in certain years, do not perform advertising activities to build product differentiation.

The innovation variable, which is proxy by the ratio between R&D costs and patent amortisation with net sales shows an average of 0.003247 or 0.32 per cent. This is a very low number, indicating the small number of patents resulting from innovation activities. Most innovations were made by PT. Lion Metal Works Tbk in 2017, which amounted to 4.73 per cent. Patents are produced more by pharmaceutical companies than other manufacturing companies. PT Kalbe Farma Tbk and PT Pyridam Farma Tbk are the two pharmaceutical companies with the most patents.

Capital requirements variable, which is proxied by capital intensity ratio shows an average of 0.0318 or 3.18 per cent. This is a fairly low amount, indicating quite a low barrier to entry because it does not require significant investment to enter an industry. This opens up opportunities for the entry of competitors or new entrants into the industry. The highest capital intensity ratio is carried out by PT. Jakarta Kyoei Steel Works Tbk in 2018, which is 200 per cent. This indicates the high barriers to entering the steel industry by new competitors because of the high capital investment needed to operate efficiently in the industry.

This study examines the effect of innovation capability with a proxy for average investment in R&D on competitive advantages based on barriers to entry which includes economies of scale (cost of sales), product differentiation (advertising intensity), innovation, and capital requirements (Capital intensity). The results of the linear regression analysis are shown in Table 2.

**Table 2:** The Results of the Linear Regression Analysis

	Dependent Variable			
	Model 1: Economies of scale	Model 2: Product differentiation	Model 3: Innovation	Model 4: Capital requirements
Constant	1.419	0.036	0.004	0.027
Regression Coefficient	0.040	0.003	7.62E-005	0.014
T <sub>test</sub>	2.480	1.178	0.186	2.436
Sig.	0.014*	0.240	0.852	0.016*

\*Significant at 0.05

Table 2 shows the results of testing the effect of innovation capability on economies of scale, product differentiation, innovation, and capital requirements. Model 1 shows the results of a regression analysis of the effect of innovation capability on economies of scale. T-test value is 2.480, with a significance of 0.014. The test results are significant at alpha 0.05. Thus it can be concluded that the capability of innovation has a positive and significant effect on economies of scale, H1 is accepted.

The direction of the influence of innovation capability on economies of scale is positive with a regression coefficient of 0.040. The capability of innovation through continuous investment in R&D activities enables companies to improve the quality of products and business processes so that higher economies of scale are achieved. This proves that innovation is the key to achieving sustainable competitive advantage (Delgado, Ardila, & Ibarra, 2012; Teece & Pisano, 1994). The ability of innovation is the most relevant capability that enables a company to successfully adapt to a changing environment and strong market demands (Breznik & Lahovnik, 2014).

This conclusion supports dynamic capabilities View which states that innovation capabilities as a component of dynamic capabilities encourage companies to achieve sustainable competitive advantage (Delgado et al., 2012; Teece, Pisano, & Shuen, 1997; Wang & Ahmed, 2007). This conclusion supports the conclusions of the study by Adeniran & Johnston (2012), Aziz & Samad (2016), and Breznik & Lahovnik (2014).

The test results on the effect of innovation capabilities on product differentiation are shown in Model 2. The calculated t value generated from the regression analysis is 1.178, with a significance of 0.240. The test results are not significant at alpha 0.05. Thus it can be concluded that the capability of innovation has no significant effect on product differentiation; H2 is rejected.

The capability of innovation through continuous investment in R&D activities does not encourage companies to increase product differentiation through more intensive promotional and advertising activities. Expenditure on advertising does not depend on the high or low average expenditure in R & D. The company does not focus on creating product differentiation based on efforts to build desired consumer perceptions. This conclusion does not support the theory of Dynamic Capabilities View by Teece & Pisano (1994). The findings of this study differ from the results of research by Adeniran & Johnston (2012), Aziz & Samad (2016), and Breznik & Lahovnik (2014).

Model 3 shows the results of the regression analysis of the hypothesis of the effect of innovation capabilities on innovation. The t-test value of the regression analysis was 0.186, with a significance of 0.852. The test results were not significant at alpha 0.05. Thus it can be

concluded that the capability of innovation has no significant effect on innovation; H3 is rejected.

The capability of innovation through continuous investment in R&D activities also does not encourage companies to increase the amount of innovation produced by manufacturing companies in Indonesia. Although companies spend a lot of money on R&D activities, it does not affect the number of patents produced so as not to strengthen barriers to entry for new competitors. Only pharmaceutical companies have significant patents. This conclusion does not support the theory of dynamic capabilities view by Teece & Pisano (1994). The findings of this study are also different from the results of the Cui & Jiao (2011) study, Adeniran & Johnston (2012), Aziz & Samad (2016), and Breznik & Lahovnik (2014).

Model 4 shows the results of the regression analysis of the hypothesis of the effect of innovation capability on capital requirements. The t-test value generated from the regression analysis was 2.436, with a significance of 0.016. The test results are significant at alpha 0.05. Thus it can be concluded that the capability of innovation has a significant effect on capital requirements; H4 is accepted.

The direction of the effect of innovation capability on capital requirements is positive, with a regression coefficient of 0.014. The capability of innovation through continuous investment in R&D activities enables companies to improve the quality of productive assets or resources that are difficult for competitors to match because of the large capital requirements to have equal resources. This proves that innovation is the key to achieving sustainable competitive advantage (Delgado, Ardila, & Ibarra, 2012; Teece & Pisano, 1994). The ability of innovation is the most relevant ability that enables companies to successfully adapt to changing environments and strong market demands (Breznik & Lahovnik, 2014).

This conclusion supports Dynamic Capabilities View which states that innovation capability is a component of Dynamic Capabilities that drives companies to achieve sustainable Competitive Advantage (Delgado et al., 2012; Teece, Pisano, & Shuen, 1997; Wang & Ahmed, 2007). This conclusion supports the research results of Adeniran & Johnston (2012), Aziz & Samad (2016), and Breznik & Lahovnik (2014).

The main finding of this research is that the capability of innovation owned by manufacturing companies in Indonesia has succeeded in building barriers to entry that leads to the achievement of competitive advantage. Innovative capability is proven to increase economies of scale (cost of sales) and capital requirements (capital intensity) through process innovation and product innovation. However, these companies have not been optimal in differentiating their products and patents produced. Market Innovation must be carried out in an integrated manner with innovations in the field of processes and products.

## Conclusions

This research was conducted to prove the effect of innovation capability by using the proxy of average investment in R&D against barriers to entry-based competitive advantages which includes Economies of scale (Cost of Sales), Product differentiation (Advertising intensity), Innovation, and Capital requirements (Capital intensity). The results of the analysis conclude that innovation capability has a positive and significant effect on creating barriers for competitors in terms of economies of scale and capital requirements. Whereas the capability of innovation does not significantly influence product differentiation and innovation.

The company's lack of effort in increasing product differentiation must be a concern. Market innovation must be improved so that product excellence can continue to be remembered by consumers. Promotion and advertising activities should be implemented more intensively. Companies must focus more on creating product differentiation through efforts to build desired consumer perceptions.

This study examines the relationship between innovation capability with competitive advantage components based on the concept of barriers to entry. It will be interesting for further research to prove the link between innovation capabilities and competitive advantage components based on market/industry indicators such as power over suppliers, power over customers, and the credibility of the expected threat of retaliation.

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