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The Strengthening of Industrial Competitiveness through Industrial Fundamental Factors and Information Technology

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Abstract

This research is descriptive and quantitative that aims to determine the effect of the direct relationship of antecedent variables to the consequence variable and this study tests the hypothesis and provides an objective explanation, justification, and evaluation of a fact or event that is happening and examines the relationship between different variables to seek influence and explain causality relationships between factor condition variables, industrial value chains, firm strategy, structure, and rivalry, business opportunities, demand conditions, and information technology affect industry competitiveness. By using Path Analysis, where Ghozali and Fuad (2005) recommend the estimation of the model equation through the Maximum Likelihood method to be effective, the number of samples will be 200. The results of the study show that almost all latent variables such as factor conditions, industrial value chains, firm strategies, structures, and rivalry, business opportunities, and information technology affect industry competitiveness, except demand conditions.

Keywords: Factor Condition, Industrial Value Chain, Firm Strategy, Structure, and Rivalry, Business Opportunities, Demand Conditions, Teknologi Informasi, Daya Saing

Background

The Strengthening of national industrial innovation can increase competitiveness. Therefore, industry players are required to master the latest technology and actively conduct research and development (Kementerian Peridustrian, 2019). Policies on industrial development cannot continuously rely on sporadic and momentary handling by providing various policies such as incentives and subsidies and other protective facilities to suppress competitiveness of competitors, but rather emphasizing strengthening internal resources to develop strategies to strengthen existing technology.

The data from the World Economic Forum (WEF) in the Global Competitiveness Report, Indonesia's Competitiveness Index in the period 2012 - 2013 ranks 50th out of 144 countries. Then the government provides facilities to create a business climate for national industries through various

policies as mentioned above. As a result, Indonesia's competitiveness index increased significantly and ranked 38th out of 148 countries in the 2013-2014 period and 34th out of 144 countries in the 2014-2015 period. However, the provision of these facilities was not successful enough to maintain an increase in power Indonesia's competitiveness in the next period and tends to provide a sloping index value trend. This is indicated by the data that Indonesia ranks 37th out of 140 countries in the 2015-2016 period, and lastly, in the 2016-2017 period, it continued to decline to rank 41st of the 138 countries surveyed.

According to the World Economic Forum, Indonesia's competitiveness index in 2016-2017 ranks 41st out of 138 countries. When compared to ASEAN countries, it is still below Singapore which is ranked second, Malaysia 25th, and Thailand 34th. Meanwhile, based on the innovation index, Indonesia is in 31st position. As for the technology readiness index, Indonesia ranks 91th. The government is trying to improve Indonesia's competitiveness and benefit from changes in the global industrial system in the current revolutionary era, an important thing that must be built is to strengthen innovation in the industrial sector. In the global value chain, the greatest added value of industrial products is generated in the R&D and after-sales process, then followed by the branding, marketing, design, and distribution processes, "he explained. Therefore, the quality and intensity of industrial business activities continue to be improved in various lines by considering aspects of market behavior. Moreover, currently, the global industrial sector has entered a new phase, namely the fourth industrial revolution or known as Industry 4.0.

The competitive advantage according to Amadeo (2019) is what makes the entity's goods or services superior to all other customer choices. This term is commonly used for business and marketing. The implementation of the strategy can be used by any organization, country or individual in a highly competitive environment. To create competitive advantage, Amadeo (2019) then explains the three determinants of competitiveness, namely the real benefits provided by the product. The implications of the benefits if a product is needed by customers, even market surveys are growing demand. Besides, every business person needs to know the features of the products offered, their strengths, and how they benefit customers. To maintain its sustainability, it must keep abreast of new developments or trends that affect products developed in the market, including changes in new technology, including observations about technological changes, obtained online, even the latest news must be updated every day. Then the thing to consider in developing competitiveness is also determining the target market, target customers, identifying market needs. Every industry marketer needs to know exactly who bought the product, and how sales can make buyers more satisfied and their lives better and more comfortable with the product being developed. That is the way to create demand, and it can be considered as the driver of all economic growth. And the last thing to note is that competitors in the market need to identify competitors, both competitors of similar and non-similar products. By strengthening these three factors, industry competitiveness is getting stronger in the competition.

The case above raises the question of whether to increase competitiveness still requires a policy of partiality (the creation of incentives) or there needs to be a change in the policy paradigm where the increase in industrial competitiveness must be triggered and controlled by strengthening industrial innovation and technology through R&D. Indeed, the innovations produced by R & D are proven to be able to accelerate the increase in the competitiveness and independence of national industries so that the competitiveness obtained is stable and tends to increase. This is proven by the increasing competitiveness of products originating from countries that systematically and consistently develop their innovation and technology capabilities through R&D activities. Developed countries are countries that have strong and developing R&D activities.

Competitive quality is inseparable from product quality, which means what customers want. In other words, a high-quality product when it suits the needs and demands of the customer. Perceived quality refers to the customer's judgment about the total superiority or advantage of a product. Quality perception is a form of vision-related to satisfaction. However, it is not the same as vision and results from comparing the performance of expectations and perceptions (Thijs and Staes, 2008). Higher

levels of service quality lead to higher sales revenue and productivity (Gounaris, Stathakopoulos, and Athanassopoulos, 2003). High-quality products are products and services that can be relied on, meaning that they perform tasks well designed for them, and create special properties to increase value for customers. When customers know that the products of one company are following their needs, then provide higher value for them compared to those offered by competitors, then this product is said to be of high quality. When a customer experiences positive emotions, a higher level of satisfaction with service is expressed (Chang, Chen, and Hsu, 2010). High-quality products increase the value of the product in front of customers and make it special. This high perception of value allows the company to set a higher price for its products.

Innovative products become an important point in the industry, with the development of innovative products, customers get the benefits of the good features, designs or new functions (Khin, et.al, 2010). Competitive companies no longer continue to offer similar products or only compete based on traditional reasons such as price and quality. Many companies are following the trend of opening product offerings with innovation in gaining a competitive advantage over competitors. Khin et.al. (2010) stated that product innovation is related to strategy and resources. By taking a strategic approach, innovation is a differentiator for competitors (Porter, 1985). Lynn and Akgun (1998) divided innovation strategies to gain high competitiveness into three, namely strategies driven by customers, strategies driven by processes and strategies driven by pioneers. Lynn, et.al (1998) suggested that innovation strategies can be divided into strategies based on process, speed, market, learning and qualitative. According to Akman & Yilmaz (2008) that the innovation strategy consists of six strategic elements including aggressiveness, analysis, defensive, futuristic, proactive and responsive. A company is said to be able to innovate after successfully applying creative ideas into its products/services (Amabile, et.al, 1996). The findings and suggestions of Khin et al. (2010) that a product is said to be innovative when customers get various benefits from new designs, functions, and features. Even Janssen & Putters (2015) views innovation as a novelty. Innovation means that there is something new that can be applied to processes, products, and ideas (West, 1990).

Industry Revolution 4.0, marked by increased connectivity between people, machines and natural resources built by the application of information technology and advanced generation manufacturing. This forces some of the world's supply chains to increase the mastery of modern technology to adapt to the progress of the global industry. Technologies that prioritize industrial processes that are more effective, efficient, and environmentally friendly. To obtain optimal benefits from strengthening industrial innovation, according to Airlangga, strong and consistent commitments from all stakeholders are needed to work together in carrying out the various efforts needed to improve the competitiveness of national industries in the current industrial revolution era.

To strengthen domestic industries, it is necessary to have government intervention through the adoption of strategic steps that can provide sustainable benefits for the national economy. These steps include strengthening and collaborating on industrial research and development, improving workforce competence, building strategic infrastructure for industry, and implementing standardization of industrial products. Followed by measures to strengthen and protect intellectual property in the industrial sector as well as industrialization efforts in all regions in Indonesia. To achieve these objectives, improvements are made from the beginning such as the determination of ideas based on market research reviews, manufacturing readiness, and readiness of after-sales service, which is supported by adequate R&D infrastructure both in terms of technology, humanware, infoware, and software.

The rapid spread of the Internet and corporate databases in the 80s and 90s has improved the process of adjusting business practices and their communication fields. This situation and its possible development present several challenges to our ability to design and provide information systems. However, for many organizations, Information Systems (ICTs) still have an innovative role in line with market performance and communication with stakeholders. This means that the acceptance process has been formed as a possible object of the decision making process and management problems. Incentives

for innovation will be created in organizations when decision-makers consider functional gaps or find that the current organizational situation is unsatisfactory. Technology and process improvement has a real role in achieving quality targets and performance. Identification of improvements that improve organizational quality levels is an important process for processing performance.

Since the beginning of the information technology revolution, it has succeeded in changing the way companies conduct and conduct their business, the products they produce, and even how they are produced using highly advanced information technology. The description of product competitive advantage is inseparable from information technology. After being able to identify the importance of information technology that supports product competitiveness, each industry player can communicate it to employees and customers. The information technology revolution has engulfed our economy and thus affected all businesses both positively and negatively. Information technology affects business in three ways: modifying the structure of the business industry and thus changing the rules of the game in the industry. This provides a way in which a business can outperform its competitors to provide a competitive advantage. In this way, it can create new business opportunities even with existing businesses. The value created by a company is measured by the amount of money that the buyer is willing to exchange for the product or service. Thus, the use of information technology in a business is said to be beneficial if the value created by the business is more than the costs involved in running the business.

Some writers have revealed the use of information technology in strategically reducing company costs and increasing orders to gain competitiveness in revenue. With the use of information technology, it can become a source of industrial excellence. The competitive advantage of information technology that is sustainable makes information technology integrated into the industry, so it is necessary to build a competitive advantage in information technology (Porter and Millar, 1985). information technology has also shown its role in creating sustainable information technology competencies and focuses on the use of information technology to gain competitive advantage and profit for the company (Mata, et.al, 1995; Betts, et.al, 1991; and Betts and Ofori, 1992). The use of information technology is strategic and has an impact on the level of information technology usage, the level of information technology skills, and information technology being a weapon to gain competitive advantage, increase productivity and performance, and even allow companies to remain competitive (Glazer, 1993, and Bryson and Currie, 1995).

The information technology revolution is fast, can reduce the increased risk of globalization, and hopes companies can read the environmental changes facing organizations today. Information technology is an effective and efficient factor in achieving competitive advantage increasingly considered by modern organizations. Competitive advantage is achieved when companies can develop new products or provide better services than competitors, or as an alternative if they can provide the same products and services at lower prices or quality.

Theoretical Background

Companies need to continue to develop innovative ideas to create new products, improve materials and develop processes. Innovations are carried out starting from training and courses needed for product development. Furthermore, this can also be applied to product updates or in the design of new product processing technologies (Miller, 2001). Referring to Michael Porter's theory of competitive advantage, a government entity can provide equipment or indicators to analyze the competitiveness of products developed with all its implications. Porter's theory contributes to understanding the country's competitive advantage in international trade and production (Porter, M, 1990).

Product excellence and competitiveness should be done with constant innovation. Khin et al. (2010) stated that product innovation is related to strategy and use of quality resources. Innovation according to Porter (1985) can be done by using a strategic approach. The same thing according to Lynn and Akgun (1998) is a strategy that is driven by customers, a strategy that is driven by a process and a strategy that is driven by a pioneer. Innovations according to Lynn, et.al (1998) were obtained

based on process, speed, market, learning and qualitative. According to Akman & Yilmaz (2008) that the innovation strategy consists of also including aggressiveness, analysis, defensive, futuristic, proactive and responsive.

The superiority of products that compete remains focused on individual industries, or industry groups, then keep the principles of competitive advantage applied. In developing competitiveness, Porter (1990) should start from individual industries and develop the economy as a whole. Because individual companies can compete in international markets, understanding how companies create and maintain a competitive advantage is key to explaining what role the nation plays in the process. Therefore, each country of origin of these products can affect the company's ability to succeed in more globalized industries and competitive markets. Michael Porter considers a country's competitiveness as a function of the four main determinants of factor conditions, demand conditions, related and supporting industries, and a strong strategy, structure, and competition. Although these determinants influence the existence of competitive advantage of products in all countries, their nature indicates that they are more specific to a particular industry than are typical of a country. The basis of the analysis of Porter's (1990) theory for the understanding competition is industry. So the effort to isolate a country's competitive advantage means to explain the role played by national attributes such as the economic environment, institutions, and national policies to promote the ability of companies to compete in certain industries.

Some factors that become inputs that affect industry competitiveness according to Porter (1990) are:

1. Factor conditions consisting of:
    a. Human resources: which consists of quantity, skills, and personnel costs, including management costs).
    b. Physical resources: Quantity, quality, accessibility, and costs for the use of land, water, minerals, or natural potential, power sources, water, places, and other physical resources.
    c. Knowledge resources: accumulation of scientific, technical and market knowledge in a country in the field of goods and services
    d. Capital resources: the stock of capital available in a country and its distribution costs;
    e. Infrastructure resources: characteristics (including type, quality) and costs of using available infrastructure. While analyzing these factors as a prerequisite for building a competitive advantage, it is relatively not important to only emphasize their quantity or involvement in certain industries. What determines their influence on competitiveness is the level of efficiency and effectiveness in the way they are used in the industry.
2. Demand conditions. The importance of demand conditions as a factor influencing competitive advantage. The types of goods produced are generally determined by the needs of the buyer, so competitiveness in an industry cannot be achieved unless demand conditions cannot be realized. Underlying this demand condition is that it can shape the level and character of innovation by companies. Demand conditions are divided into three attributes, namely the composition of housing demand, the size and pattern of growth in demand for housing, and the mechanism. The conditions of the request consist of:
    a. Home Demand Composition. Home demand composition by interpreting, and responding to buyer needs.
    b. Demand Size and Pattern of Growth. The importance of knowing the size of the demand is to be part of the investment. Another important factor that can create or increase competitive advantage is the rate of growth in home demand. The underlying logic is that demand can lead companies to the type of product and product features desired.
    c. Internalization of Domestic Demand. To create a continuous demand, this attribute refers to the existence of local buyers who can create profits for a country's companies because domestic buyers are also foreign buyers. The conditions of domestic demand

can be attractive through foreign sales and are related to domestic needs and desires transmitted to or invested in foreign buyers.

3. Related and supporting industries. To determine the source of competitive advantage in an industry, it can refer to access to competitive industry suppliers and can save costs. Then make an emphasis on the availability of inputs and their effective utilization of products that are superior in competition. Therefore, an important aspect of competitive advantage in the supplier industry is that it can influence the creation of downstream industries by creating value chains. Another way to create value chains in related industries that can affect competitiveness is to strengthen the demand for products and services. The greater the number of related industries that have a competitive advantage with market demand, the more likely it is to achieve sustainable success in an industry.
4. Firm strategy, structure, and rivalry. The purpose of developing strategies in the industry is strongly influenced by national circumstances. Achieving national excellence depends on the extent of the source of competitive advantage in an industry. The company's strategy and structure reflects the company's goals and individual goals. The company's strategic objectives are largely determined by:
    a. Ownership structure
    b. Owner motivation
    c. Debt holders
    d. The nature of corporate governance
    e. Incentive processes (that shape the motivation of senior managers

Achieving motivation in everyone is to develop skills and to put out the effort needed for the company's success. These factors influence the quality of industrial human resources and strengthen the motivation of individuals and shareholders in achieving the company's strategic goals. The existence of several factors that influence the achievement of industrial competitiveness should be ensured and made an ongoing commitment to the availability of capital and the quality of human resources. The stimulus for increasing productivity and effectiveness must also be explored at a higher level than not only covers the way the organization of the company but also the performance of its competitors against the achievements of its competitors. The underlying logic is that competition pressures the company to increase and innovate. Strong local competition can also stimulate competitiveness by enlarging the company's market to grow. This is most likely to occur with economies of scale when local competitors force each other to direct their business activities abroad in pursuit of greater efficiency and higher profitability. Domestic competition not only creates pressure to innovate but also to innovate in ways that increase competitive advantage.

The presence of business rivals decreases significance. Therefore forcing companies to look for sources of higher competitive advantage and ultimately will be sustainable. Apart from the main determinants of the creation of industrial competitiveness, Porter (1990) considers two additional variables that are not as important as the determining factors in influencing the creation of competitive advantage. The variable is the opportunity or business opportunity and government policy. Business opportunities are developments that occur outside the company's control, such as technological inventions, breakthroughs in basic technology, and others. These factors can play an important role in shifting the competitive advantage in several industries. Then the importance of government support to influence the entire business system to increase competitive advantage. It is important in understanding the determining power to foster competitiveness in the industry. The meaning is that the determining factor must form a mutually reinforcing system. This implies that it is not only beneficial to induce competitive advantage itself but also to other aspects.

Customer buying behavior through offers according to Egan (2004). Oghojafor, et.al (2011) has noted that, in the strategic business world, it can create a competitive advantage. To strengthen this position, Murphy (2000) has previously postulated that service to customers, customer satisfaction can improve organizational sustainability and competitiveness. The findings of Achimugu et al. (2009), not too many organizations buy information technology philosophies but Sawyer, et.al (2003) revealed that

there is a coexistence between strategic uncertainty, environmental change, use of information resources, and organizational performance. Thus the competitiveness will build relationships between suppliers, buyers, and other beneficiaries (Gummesson, 2008).

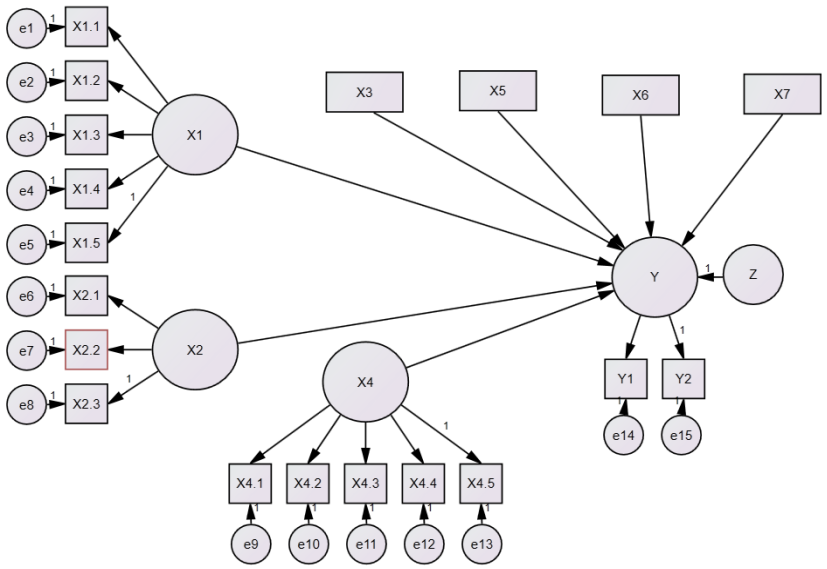
Some definitions of competitive advantage are presented below: Competitive advantage is an increase in the level of attractiveness offered by a company compared to competitors from the customer's perspective (Keegan, 2007). In the literature on competition strategies, competitive advantage can be considered as a framework of value creation that can increase revenue beyond costs (Rumelt, 2003). Zabieh (2014) believes that competitive advantage lies in the nature or dimensions of the company which enables it to offer better services to customers than its competitors (Porter, 1990). Competitive advantage is defined as the value of a company that is feasible for the customer's value greater than the price paid by customers (De Toni, Tonchia, 2003). According to the definition of competitive advantage above, there seems to be a direct relationship between the value expected by the customer, the value offered by the company, and the value offered by competitors that determine the dimensions and conditions of competitive advantage. If the value presented by the company approaches the value expected by the customer then compared to the value offered by competitors, it can be said that the company has a higher competitive advantage compared to its competitors in one or more indexes. This advantage makes the company superior to its competitors in being close to customers and capturing their hearts.

Method

The research design is descriptive and quantitative then strengthened in depth through empirical reinforcement that aims to determine the effect of the direct relationship of the antecedent variable to the consequence variable and this study tests the hypothesis and provides an objective explanation, justification, and evaluation of a fact or event that is happening and examines relationships between different variables to look for influence and explain causal relationships between variables.

The purpose of this research is to improve operational efficiency, it might emphasize the use of information technology to get a change in the way businesses to compete (McFarlan, 1984). Then use the innovation strategy to gain industrial competitiveness. According to Hair et.al. (1998) and Kuncoro (2003) that this associative descriptive study aims to answer research hypotheses arising from the main problem of research. While the determination of sample size in this study will follow the provisions of the appropriate sample size used. Ghozali and Fuad (2005) argue that the sample size of 100-150 is the minimum sample size when using covariance structure models. Boomsma (1987) in Ghozali and Fuad (2005) recommends estimating structural equations through the Maximum Likelihood method to be effective if the number of samples is at least 200, studies that use a sample of 200 to produce the right inference. As seen in Figure 1 below:

Figure 1: Research Model



From this model, the latent variables and indicators used can be seen as follows:

X1 *Factor condition*
X1.1 = *Human resources*
X1.2 = *Physical resources*
X1.3 = *Knowledge resources*
X1.4 = *Capital resources*
X1.5 = *Infrastructure resources*
X2 = ***Demand conditions).***
X2.1 = *Home Demand Composition*
X2.2 = *Demand Size and Pattern of Growth*
X2.3 = *Internalization of Domestic Demand*
X3 = ***Value Chain Industry***
X4 = ***Firm strategy, structure, and rivalry***
X4.1 = *Ownership structure*
X4.2 = *Owner motivation*
X4.3 = *Debt holders*
X4.4 = *The nature of corporate governance*
X4.5 = *Incentive processes (that shape the motivation of senior managers*
X5 = ***Business opportunities***
X6 = ***Government policy.***
X7 = ***Information Technology***
Y = ***Competitive Advantage***
Y1 = *Satisfaction*
Y2 = *Service*

The unit of analysis of the object of this study were 120 industrial players spread across 14 industrial companies in Makassar. Data collection techniques in this study were conducted by survey method, namely research that takes samples from a population and uses a questionnaire as a means of collecting data in the actual environment (Sekaran, 2003). The method of collecting data which is carried out by survey method according to Anderson and Gerbing (1984) is the data collected at a point in time, in accordance with the description of conditions at a particular time where the data is obtained in one take in the field, the contents of the data are adjusted to the answers of respondents, where the data varies according to the characteristics of respondents not based on time series. Survey Method is a study conducted in large and small populations, but the data studied are data from samples taken from

these populations, so that relative distribution events are found, and relationships between variables, sociological and psychological (Sugiyono, 1999).

The bias assumption in this study still refers to the principle of ordinary least square. Based on the estimation model that the competitiveness of industrial products is predicted by factor condition variables, industrial value chains, firm strategy, structure, and rivalry, business opportunities, demand conditions, and information technology. Regarding latent variables, $X_{1....n}$we showed that if X_i is Bernoulli random variables with parameter p, then: $\hat{p} = \frac{1}{n} \sum_{i=1}^{n} Xi$ is the maximum likelihood estimator of p. And, if X_i is normally distributed random variables with mean μ and variance σ^2, then: $\hat{\mu} = \sum \frac{Xi}{n}$ $= \hat{X}$ and $\hat{\sigma}^2 = \frac{\sum (Xi - X^-)]^2}{n}$ are the maximum likelihood estimators of μ and σ^2, respectively. One measure regarded as a good estimator is when the measurement indicating the unbiasedness. If X_i is a Bernoulli random variable with parameter p, then: $\hat{p} = \frac{1}{n} \sum_{i=1}^{n} Xi$ is the maximum likelihood estimator (MLE) of p. Is the MLE of p an unbiased estimator of p. If X_i is a Bernoulli random variable with parameter p, then $E(X_i) = p$. Therefore: $E(\hat{p}) = E(\frac{1}{n} \sum_{i=1}^{n} Xi) = \frac{1}{n} \sum_{i=1}^{n} E(Xi) = \frac{1}{n} \sum_{i=1}^{n} (p) = \frac{1}{n}(np) = p$.

The first equality holds because we've merely replaced p-hat with its definition. The second equality holds by the rules of expectation for a linear combination. The third equality holds because of $E(X_i) = p$. The fourth equality holds because when you add the value p up n times, you get np. And, of course, the last equality is simple algebra. In summary, we have shown that: $E(\hat{p}) = p$, therefore, the maximum likelihood estimator is an unbiased estimator of p, if X_i are normally distributed random variables with mean μ and variance σ^2, then: $\hat{\mu} = \sum \frac{Xi}{n} = \bar{X}$ and $\hat{\sigma}^2 = \frac{\sum (Xi - X^-)^2}{n}$ are the maximum likelihood estimators of μ and σ^2, respectively unbiased for their respective parameters?.

In summary, we have shown that: $E(\bar{X}) = \mu$ Therefore, the maximum likelihood estimator of μ is unbiased. Now, let's check the maximum likelihood estimator of σ^2. First, note that we can rewrite the formula for the maximum likelihood estimator as $\hat{\sigma}^2 = \frac{\sum (Xi - X^-)^2}{n} - \bar{X}^2$ then, taking the expectation of the maximum likelihood estimator, we get: $E(\hat{\sigma}^2) = \frac{(n-1)}{n} \sigma^2$ as illustrated to $E(\hat{\sigma}^2) = E[\frac{1}{n} \sum_{i=1}^{n} Xi^2 - \bar{X}^2] = [\frac{1}{n} \sum_{i=1}^{n} Xi^2] - E(X^2) = \frac{1}{n} \sum_{i=1}^{n} (\sigma^2 + \mu^2) - \left(\frac{\sigma^2}{n} + \mu^2\right) = \frac{1}{n} (n\sigma^2 + n\mu^2) - \frac{\sigma^2}{n} + \mu^2 = \sigma^2 - \frac{\sigma^2}{n} = \frac{n\sigma^2 - \sigma^2}{n} = \frac{(n-1)\sigma^2}{n}$. The first equality holds from the rewritten form of the maximum likelihood estimator. The second equality holds from the properties of expectation. The third equality holds from manipulating the alternative formulas for the variance, namely $Var(X) = \sigma^2 = E(X^2) - \mu^2$ and $Var(\bar{X}) = \frac{\sigma^2}{n} = E(\bar{X}^2) - \mu 2$.

The remaining equalities hold from simple algebraic manipulation. Now, because we have shown that $E(\hat{\sigma}^2) \neq \sigma^2$, so that the maximum likelihood estimator of σ^2 is biased. However, X_i is normally distributed random variables with mean μ and variance σ^2, what is an unbiased estimator of σ^2?. Is S^2 unbiased?, if X_i is a normally distributed random variable with mean μ and variance σ^2, then $\frac{(n-1)S^2}{\sigma^2} \sim \chi 2\ n-1$. The expected value of a chi-square random variable is its degrees of freedom. That is if $X \sim \chi 2(r)$ then $E(X) = r$. Therefore: $E(S2) = E[\frac{\sigma 2}{n-1} - \frac{(n-1)S^2}{\sigma^2}] = \frac{\sigma 2}{n-1} E[\frac{(n-1)S^2}{\sigma^2}] = \frac{\sigma 2}{n-1} - (n - 1) = \sigma^2$. The first equality holds because we effectively multiplied the sample variance by 1. The second equality holds by the law of expectation that tells us we can pull a constant through the expectation. The third equality holds because of the two facts we recalled above. That is: $E[\frac{(n-1)S^2}{\sigma^2}] =$ n-1, if X_i is a normally distributed random variable with mean μ and variance σ^2, then S^2 is an unbiased estimator of σ^2. It turns out, however, that S^2 is *always* an unbiased estimator of σ^2, that is, for *any* model, not just the normal model.

Result

Based on the results of the data analysis shown in table 1, it shows that almost all test indicators can be said to be feasible to continue the research model, so that. According to Joreskog and Sorbom (2008) to test a statistical model can be done by testing the measurement model and after that the measurement and structural model testers simultaneously. In statistical analysis, methods are tested individually using the t-test and the significance of the model. Besides individually, also testing the overall proposed model, namely through the model suitability test (overall model fit test). Therefore, the main question raised in the model suitability test is whether the proposed model produces an estimate of the population covariance matrix that is consistent with the sample covariance matrix. Then the statistical hypothesis to test the suitability of the model in the formulated statistical model.

Model suitability test is expected to accept the null hypothesis. How is the model suitability test carried out? In SEM the test is carried out using a number of Goodness of Fit Test (GOF). GOF size consists of three, namely absolute (absolute fit-test), comparative (incremental fit measures) and parsimonious (parsimonious fit measures) measures. Chi-Square and P-value: the measure of the suitability of the maximum likelihood (ML) based model. It is expected that the value is low so that a high P-value (probability) is obtained exceeding 0.05. The goodness of Fit Index (GFI): a measure of the suitability of the model descriptively. Its expected value is greater than 0.90. Root Mean Square Error of Approximation (RMSEA): the mean root square approximation value of the error. It is expected that the low value is approximately equal to 0.08. Expected Cross-Validation Index (ECVI): a measure of the suitability of the model if the estimated model is tested again with a different sample but with the same size. Adjusted GFI (AGFI): adjusted GFI value. Its expected value is greater than 0.90. Normed Fit Index (NFI): a measure of the suitability of a model on a comparative basis with a baseline or null model. The null model is generally a model that states that the variables contained in the estimated model are not interconnected. Its expected value is greater than 0.90. Comparative Fit Index (CFI): a measure of the compatibility of a comparative-based model with a null model. Its expected value is greater than 0.90. Incremental Fit Index (IFI): a measure of comparative conformity put forward by Bollen. Its expected value is greater than 0.90. Relative Fit Index (RFI): The value is expected to be higher, equal to 0.90. Tucker-Lewis Index: a measure of the suitability of the model as a correction to the size of the NFI. Its expected value is greater than 0.90.

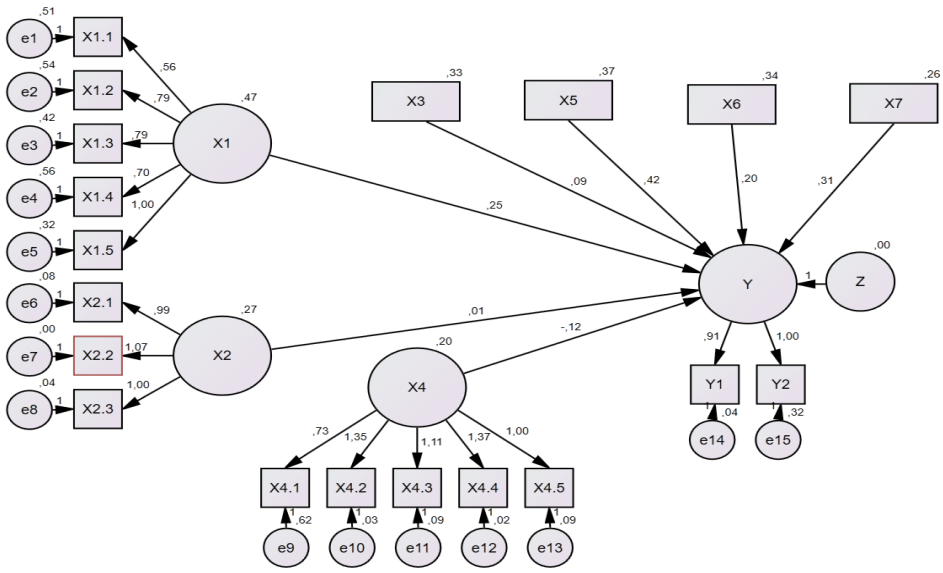
Table 1: Model Fit Summary

Cut off	Model	Default model	Label
≤2,00	Chi-square	3215,588	Marginal
≤0,05	Significance probability	0,000	Fit
≤2,00	Relative Chi-square	21,581	Marginal
≤0,08	RMSEA	0,024	Fit
≥9,00	GFI	0,342	Marginal
≥9,00	AGFI	0,160	Marginal
≤2,00	PGFI	0,268	Fit
≥0,90	PCFI	0,379	Marginal
≥0,90	TLI	0,352	Marginal

Sumber: Joreskog dan Sorbom (2008)

The model that meets the GOF measures described above is a good model for data. The more size criteria that are met by the model, the model is suitable for the data or sample to be continued. Because in principle statistics will test a theory modeled on sample data, it is necessary to be careful in determining the conclusions of the model obtained based on GOF criteria. And then it can be seen in Figure 2 below.

Figure 2: Estimation and Goodness of Fit Test-GOF



Based on the test results of the relationship between the variables in table 2 shows that some variables such as Factor conditions, Industrial Value Chain, firm strategy, structure, and rivalry, Business opportunities, and information technology affect industry competitiveness. Almost all factor condition variables are supported by all indicators consisting of human resources, physical resources, knowledge resources, capital resources, and infrastructure resources. Then demand conditions consisting of home demand composition, demand size, and pattern of growth, and internalization of domestic demand. while firm variable strategy, structure, and rivalry, all indicators support the latent variable consisting of ownership structure, owner motivation, debt holders, the nature of corporate governance, and incentive processes, and the competitive advantage variable is also supported by the indicator variables consisting of satisfaction and service.

Table 2: Estimated relationship between variables

Determinat			λ	S.E.	t-test	Sig	Label
Competitive Advantange	<-	Factor condition	0,253	0,042	6,056	***	Significant
Competitive Advantange	<-	Demand conditions	0,014	0,031	0,437	0,662	Less Significant
Competitive Advantange	<-	Value Chain Industri	0,094	0,03	3,126	0,002	Significant
Competitive Advantange	<-	Firm strategy, structure, and rivalry	-0,122	0,04	-3,075	0,002	Significant
Competitive Advantange	<-	Business opportunities	0,418	0,051	8,23	***	Significant
Competitive Advantange	<-	Government policy.	0,201	0,035	5,772	***	Significant
Competitive Advantange	<-	Information Technology	0,31	0,045	6,835	***	Significant
Human resources	<-	Factor condition	0,557	0,094	5,91	***	Confirmed
Physical resources	<-	Factor condition	0,795	0,108	7,385	***	Confirmed
Knowledge resources	<-	Factor condition	0,794	0,1	7,904	***	Confirmed
Capital resources	<-	Factor condition	0,695	0,104	6,696	***	Confirmed
Infrastructure resources	<-	Factor condition	1				Confirmed
Home Demand Composition	<-	Demand conditions	0,99	0,046	21,422	***	Confirmed
Demand Size and Pattern of Growth	<-	Demand conditions	1,072	0,032	33,313	***	Confirmed
Internalization of Domestic Demand	<-	Demand conditions	1				Confirmed
Ownership structure	<-	Firm strategy, structure, and rivalry	0,733	0,132	5,535	***	Confirmed

Determinat			λ	S.E.	t-test	Sig	Label
Owner motivation	<-	Firm strategy, structure, and rivalry	1,349	0,072	18,707	***	Confirmed
Debt holders	<-	Firm strategy, structure, and rivalry	1,114	0,074	15,028	***	Confirmed
The nature of corporate governance	<-	Firm strategy, structure, and rivalry	1,372	0,073	18,855	***	Confirmed
Incentive processes	<-	Firm strategy, structure, and rivalry	1				Confirmed
Satisfaction	<-	Competitive Advantange	0,912	0,108	8,433	***	Confirmed
Service	<-	Competitive Advantange	1				Confirmed

Discussion

Basically, almost all latent variables such as factor conditions, industrial value chains, firm strategy, structure, and rivalry, business opportunities, and information technology affect industry competitiveness, except demand conditions, basically only internal efforts are made to make products into superior to its competitors, while what is needed is a broad and strategic and comprehensive effort to meet customer desires that exceed what is given by competitors. In developing competitiveness, according to Porter (1990), it starts from individual industries and builds the economy as a whole. According to that, it should also be accompanied by strategic strengthening (Egan, 2004; Oghojafor, et.al, 2011). In fact, according to Murphy (2000) to strengthen a superior position in competition it should strengthen service to customers, and maintain customer satisfaction. Competitiveness is also built from the industrial chain, thus the competitiveness will build relationships between suppliers, buyers, and other beneficiaries (Gummesson, 2008).

Finding

To strengthen competitiveness in addition to strengthening the factor condition, industrial value chain, firm strategy, structure, and rivalry, business opportunities, and information technology affect the competitiveness of the industry, then also strengthen the strategic environment to strengthen the competitiveness of products that exceed service and satisfaction provided by competitors.

Conclusions

The competitiveness of small and medium scale industries can be strengthened by factor conditions, industrial value chains, firm strategy, structure, and rivalry, business opportunities, and information technology. The other determinants can be explained based on the characteristics of the industry understudy

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