“Design of the competitiveness model in leather tanning industry”

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ARTICLE INFO	Muhamad Dzikron, Ina Primiana, Umi Kaltum and Dermawan Wibisono (2020). Design of the competitiveness model in leather tanning industry. *Development Management*, *18*(2), 1-8. doi:10.21511/dm.18(2).2020.01
DOI	http://dx.doi.org/10.21511/dm.18(2).2020.01
RELEASED ON	Friday, 31 July 2020
RECEIVED ON	Tuesday, 31 December 2019
ACCEPTED ON	Tuesday, 07 April 2020

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JOURNAL	"Development Management"
ISSN PRINT	2413-9610
ISSN ONLINE	2663-2365
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	Simon Kuznets Kharkiv National University of Economics

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
28	1	0

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BUSINESS PERSPECTIVES

Publisher

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

S. KUZNETS KHNUE

Founder

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Received on: 31nd of December, 2019
Accepted on: 7th of April, 2020
Published on: 31th of July, 2020

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DESIGN OF THE COMPETITIVENESS MODEL IN LEATHER TANNING INDUSTRY

Abstract

The Indonesian leather industry has low competitiveness among ASEAN Countries. The government, entrepreneurs, and researchers are trying to find solutions to improve competitiveness. However, there are differences in understanding the dimensions of competitiveness. This research aims to construct and validate the competitiveness model in the manufacturing industry. In general, the concept of competitiveness is more oriented to the final result than to the process dimension. To improve competitiveness, this study using a manufacturing strategy approach based on process capability. The design of the competitiveness model contains the relationship between exogenous and endogenous variables with formative patterns. Exogenous variables are dimensions that makeup competitiveness, consisting of resources, operational processes, and performance. The data were obtained from 42 leather tanning factories in Indonesia, which was analyzed using Partial Least Square. This study reveals that industrial competitiveness is influenced by the dimensions of resources, operational processes, and performance, where the dimensions of operational processes have a greater influence. This research confirms that the government and entrepreneurs must prioritize process capabilities to improve their competitiveness.

Keywords competitiveness model, manufacturing strategy, operational process, the leather tanning industry

JEL Classification M21, N15

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РОЗРОБКА МОДЕЛІ КОНКУРЕНТОСПРОМОЖНОСТІ В ШКІРЯНІЙ ПРОМИСЛОВОСТІ

Анотація

Індонезійська шкіряна промисловість має низьку конкурентоспроможність серед країн Південно-Східної Азії. Уряд, підприємці та вчені намагаються знайти рішення для підвищення конкурентоспроможності. Однак існують відмінності в розумінні складових конкурентоспроможності. Метою дослідження є побудова та затвердження моделі конкурентоспроможності у виробничій галузі. В цілому концепція конкурентоспроможності більше орієнтована на кінцевий результат, ніж на процес. Для підвищення конкурентоспроможності в дослідженні використовується підхід з використанням виробничої стратегії на основі можливостей процесу. Структура моделі конкурентоспроможності містить взаємозв'язок екзогенних та ендогенних змінних із формаційними моделями. Екзогенні змінні – це складові конкурентоспроможності: ресурси, операційні процеси та продуктивність. Дані було отримано від 42 шкіряних заводів у Індонезії та проаналізовано з використанням методу часткових найменших квадратів. Дослідження показує, що на конкурентоспроможність промисловості впливають ресурси, операційні процеси та продуктивність, а більший вплив мають операційні процеси. Підтверджено, що уряд та підприємці повинні надавати пріоритет можливостям процесу для підвищення своєї конкурентоспроможності.

Ключові слова модель конкурентоспроможності, виробнича стратегія, операційний процес, шкіряна промисловість

Класифікація JEL M21, N15

http://dx.doi.org/10.21511/dm.18(2).2020.01

INTRODUCTION

The industrial sector is the driving force of the Indonesian economy. However, this industrial sector has low competitiveness. Ministry of Industry stated that low competitiveness is caused by the constraints of raw materials, capital, technological level, and product quality. Competitiveness is the concern of governments, entrepreneurs, and intellectuals in the face of economic competition. This topic is important to study because competitiveness study will be useful for identifying the strengths and weaknesses, creating efficiency, and designing capabilities to survive in the competition (Malakauskaite & Navickas, 2011).

The leather industry is a potential economy in Indonesia. Leather and footwear commodities are among Indonesia's ten biggest exports (Trade, 2018). The leather tanning industry has a long history and has begun since the 1970s. One of the famous leather producing area is Garut leather tanning industry, which produces genuine leather made from cow, sheep, and goat's skin. Garut leather tanning industry involves 1,522 workers, processes 18,692 tons/year raw materials, and produces 28,283,000 square feet of leather.

In the last decade, the performance of the leather industry has decreased. Among the leather producers in ASEAN, the Indonesian leather industry has lower competitiveness compared to Thailand and Vietnam (Association, 2016). Statistics Indonesia reports that industry capacity is reduced to 50%. Meanwhile, based on the structure of production technology, 75% is traditional and 25% is advanced technology. Utilization of facilities in the leather industry during the 2010–2016 averaged 50.13% which showed low productivity performance (BPS, 2018). Related to this phenomenon, the government has authority through regulations and policies to improve industrial performance (Porter, 1998; Camison, 2004). This research aims to develop a model of competitiveness in the manufacturing industry and the government to encourage the SME industry to improve their capabilities and competitiveness.

1. LITERATURE REVIEW

1.1. Competitiveness

The term competitiveness is often used in economics, but there is no agreement about the definition of competitiveness. Competitiveness studies are viewed from various perspectives, the studies generally are grouped into three levels: macro-nations, mezzo-industry, and micro-firms (Willoughby, 2000; Ambastha & Momaya, 2004). Porter (1990) focused on competitiveness in macro and mezzo perspective, he argued that national competitiveness is influenced by industrial competitiveness and industrial competitiveness is determined by the competitiveness of the companies in the industry. While Chika'n (2008) has developed a structural model to explain the relationship between macro and micro competitiveness (nations and firms), a structural model to overcome the gap in measurement between the two.

Competitiveness is determined by the capability of the industry to increase their productivity, where productivity depends on the dimensions of the capability of the company. Many researchers still do not agree on a clear dimension of capability, because the concept of competitiveness is relative to a certain time and spatial condition (Cerrato & Depperu, 2011). In addition, Bulis and Skapars (2012) stated the measurement of competitiveness has different dimensions between the competitiveness of countries, industries, or cities because each measurement has dimensions with specific indicators.

Porter (1990) developed the Diamond model as a result of variable interactions within industrial organizations. The Diamond model consists of four endogenous factors and two exogenous factors. Four exogenous factors are factor conditions; demand conditions; firm strategy & competition structure; and supporting & related industries. Two exogenous factors are environmental change and the role of government. However, Cho and Moon (2002) criticizing diamond models are only suitable for developed countries because they already have many competitive firms.

Cho and Moon continues his criticism by stating that industrial competition was determined by human resources as the main actors. In this case, Cho and Moon uses a micro perspective namely the dimension of the human

http://dx.doi.org/10.21511/dm.18(2).2020.01

resource into the competitiveness dimension. Meanwhile, Buckley and Bulis and Skapars (2012) study competitiveness at the firm level, which has three dimensions, namely: potential, management processes, and performance. Buckley's analysis is useful to explain how a firm can turn potential resources into performance so it can improve industrial competitiveness (Buckley, Pass & Prescott, 1988).

The diamond model has a weakness because it does not fit the context of the situation. Research in the manufacturing industry is not in accordance with the diamond model, because it does not explain the relationship between variables as the process flow in the manufacturing industry. Therefore, this study designed a measurement method with a manufacturing strategy approach applied to the leather industry in Indonesia. The manufacturing strategies are based on the process flow of the scheme: input-process-output (Anderson, Schroeder & Cleveland, 1991).

In the manufacturing industry, stages of the process starting from the input of raw materials, machinery facilities, and production activities to produce goods are visible. The manufacturing system as a raw material flow of the production process so that products are delivered to consumers (Sawhney, 2006; Bayraktar, Jothishankar, Tatoglu & Wu, 2007). Manufacturing strategies are applied to face competition based on flexibility in the transformation of production (Brettel, Klein & Friederichsen, 2015). In this study, competitiveness models were formed by three dimensions: resources, processes, and performance. The indicator dimension was compiled based on the mapping of business processes in the leather tanning industry.

This study adopts exogenous-endogenous variables in Diamond Porter which are grouped into three manufacturing stages: resources (inputs), operational process, and products received by consumers (output). The manufacturing system functions to process raw materials based on the ability of internal processes to produce productive output (Demeter, 2003). The orientation of the manufacturing system is to meet the needs of consumers productively. In this research, manufacturing strategies are applied to build models with relevant dimensions.

1.2. Dimensions of competitiveness

Manufacturing strategies are applied to identify the dimensions of competitiveness. There are various internal-external factors that affect the organization, but external factors are less influential. Basically, every company faces the same environment, but the results of operations are determined by internal capabilities (Siudek & Zawojska, 2014). From the perspective of manufacturing, strategy competitiveness is determined by the capability of the process to obtain productive results. In this study competitiveness defined as the ability to achieve company goals through a series of processes of resource management, operational control, so as to produce products that are accepted by consumers.

The composition of dimensions corresponds to the input-process-output stage in the manufacturing system. Previously, Buckley and Bulis-Skapars mentioned the potential aspect as a dimension of competitiveness, but this is not appropriate because the potential is beyond the company's control. The external potential has no direct impact, different from the resources as inputs that have a direct impact. Therefore the potential dimensions are replaced by resources, so the three dimensions are resources, operational processes, and performance.

Resources, as the first dimension that forms competitiveness, becomes an input in manufacturing systems. While in the Diamond model the resource dimension is referred to as condition factor. This is also consistent with the statement that competitiveness is the ability to achieve goals in a sustainable manner through the use of resources (Esterhuizen & Van Rooyen, 2006). Similarly, Ambhasta and Momaya also Siudek and Zawojska mentioned that the dimensions of assets or resources are factors that determine competitiveness.

The second dimension, Operational Process which is the ability to achieve productivity that affects competitiveness (Oral, Cinar & Chabchoub, 1999). Meanwhile, manufacturing strategy relies on operational processes as a determinant of competitiveness (Sawhney, 2006; Brettel, Klein & Friederichsen, 2015). Sirikrai and Tang (2006) states that internal process capacity is a differentiator and determinant of competitiveness (Carayannis & Grigoroudis, 2014).

As the third dimension, Performance is determined as a result of a series of resource management processes. Performance is generally measured based on financial and market parameters such as profitability, return on equity, and market share (Siudek & Zawojska, 2014). In the manufacturing system Performance is also measured based on product quality (Mills, Platts & Gregory, 1995). This is in line with the application of manufacturing strategies aimed at producing productive performance and efficiency (Anderson, Schroeder & Cleveland, 1991; Bayraktar, Jothishankar, Tatoglu & Wu, 2007). Taking those references from the previous studies, this study takes some indicators as a guide to conduct the research, namely; Resources Variables, Operational Processes, and Performance that affect Competitiveness.

2. METHODOLOGY

The research aims to build a model and validate empirically in encouraging competitiveness in the manufacturing industry. The structural model contains the relationship between exogenous variables and endogenous variables with formative patterns. The population consisted of formal and informal firms of the SME's leather tanning industry in Garut, Indonesia. The formal firm has a legal business, complete machinery facilities, an organizational structure, and it is registered as a member of the Indonesian Tanners Association. According to local officials, there are 50 formal companies and 250 informal business units.

The data collection is taken based on purposive sampling (non-probability sampling) to 50 formal companies, with the number of questionnaires collected 42 companies or a response rate of 84%. Respondents are entrepreneurs as the factory owners or managers, while competitiveness measured through self-assessment. Data were analyzed using Partial Least Square (PLS). This PLS analysis is used because it does not require a lot of assumptions, it is adequate for small sample size (minimum > 30), it does not require a data normality test, and it can be applied to various types of scales (Hair, Hult, Ringle & Sarstedt, 2017).

3. RESULT

The dimensions used to analyze are resource variables, operational processes, and performance that affect competitiveness in the leather tanning industry. Then, the data is processed to get the result as shown in Table 1.

The outer model refers to the convergent validity based on loading factor > 0.7, Composite reliability > 0.7, and Cronbach's Alpha > 0.7 so the measuring instrument can be applied to model testing. Outer Model testing also refers to discriminant analysis with AVE criteria > 0.5 as shown in Table 2.

Table 1. Dimensions of industrial competitiveness

Dimensions	Indicators	Loading factor	Notes
Resources (RC)	Raw material	0.820	Valid
	Production facilities	0.862	Valid
	Market Information	0.687	Not valid
	Capital Capability	0.618	Not valid
	Skilled workers	0.841	Valid
Ops'l Processes (OP)	Have a Firm Strategy	0.857	Valid
	Production Mgt Implementation	0.788	Valid
	Production technology levels	0.865	Valid
	Production capacity	0.689	Not valid
	Cooperation within the SME's	0.428	Not valid
	Collaboration Suppliers & Distr	0.712	Valid
Performance (PF)	Turnover Volume	0.864	Valid
	Profit margin	0.869	Valid
	Product quality	0.566	Not valid
	Worker Welfare	0.753	Valid

http://dx.doi.org/10.21511/dm.18(2).2020.01

Table 2. Construct reliability and validity

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Industrial Competitiveness (IC)	0.905	0.923	0.600
Performance (PF)	0.773	0.870	0.691
Operational Processes (OP)	0.820	0.881	0.651
Resources (RC)	0.794	0.878	0.706

Test of structural model (inner model) using path analysis and model capabilities. The structural model shows the relationship between the independent variables and the dependent variable. The model test results are shown in Table 3 and Figure 1. The test criteria are based on the path coefficient and the coefficient of determination (*R*2). The path coefficient is a standard regression coefficient (ß) that reflects the direct impact of the independent variable on the dependent variable. In addition, the coefficient of determination (*R*2) shows the magnitude of the effect of the three independent variables on the dependent variable.

The results of the analysis are shown in Table 3, determining the dimensions of Resources (*RC*), Operational Process (*OP*) and Performance (*PF*) have a significant and positive effect on Industrial Competitiveness (*IC*), with the coefficients of each $ß_1 = 0.294$; $ß_2 = 0.419$ and $ß_3 = 0.384$.

Figure 1 shows the structural model reflects relationship between variables as linear regression with the equation $IC = 0.394\ RS + 0.419\ OP + 0.384\ PF$. The coefficient of determination (R^2) = 0.992 this means that the three independent variables can explain competitiveness variance of 99.2%.

Table 3. Path coefficient

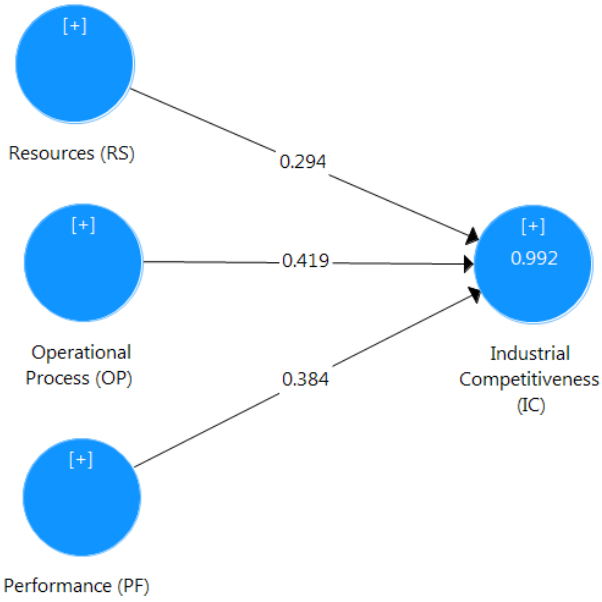
	Original sample	Sample mean	Standard deviation	T statistics	P values
PF -> IC	0.384	0.377	0.045	8.476	0.000
OP -> IC	0.419	0.422	0.042	9.831	0.000
RC -> IC	0.294	0.294	0.027	10.926	0.000

Among these three variables, the Operational Process dimension has a greater impact on the formation of industrial competitiveness. In another hand, the model capability test is performed with the Stone-Geissler's parameter or *Q*-Square denoted by *Q*2. Capability Test reflects the ability of the model to predict relationships between variables (predictive relevance). PLS analysis with blindfolding procedure shows the value of $Q2 = 0.501$, while the category of value of $Q2 > 0.35$ shows that the model has great capabilities so that the model is stated as robust and accurate.

Hypothesis Testing is conducted to evaluate whether there is an impact between the variables Resources, Operational Processes, and Performance on Competitiveness? Decision criteria refer to data calculations (*t*-values) compared to t-tables at the level of significance (α). The result analysis in Table 3 shows that all dimensions of competitiveness are positive with a coefficient of $ß1 = ß2 = ß3 \neq 0$, *t*-value > 1.96 so *H*0 is rejected. Thus the alternative hypothesis (*H*1) is accepted and it is stated that dimensions Resources, Operational Processes, and Performance have a positive effect on competitiveness. The results of the analysis show the overall model is fit with the data, which describes the phenomenon and reality in the leather tanning industry.

4. DISCUSSIONS

This research provides a perspective on competitiveness based on process approaches in industrial systems. The strategy for increasing industrial competitiveness refers to manufacturing strategies (Skinner, 1969; Anderson, Schroeder & Cleveland, 1991). Manufacturing strategies based on the process approach to generate productive



Source: Developed by the authors.

Figure 1. The structural model of competitiveness

output. Competitiveness research based on a process approach is in line with Esterhuizen which stated competitiveness is the ability of an industry or company to achieve goals sustainably by using existing resources to get opportunities and benefits amid a global environment (Esterhuizen & Van Rooyen, 2006).

Economic researchers tend to measure competitiveness based on a macro perspective so that they pay little attention to process mechanisms within companies or industries. The reason for measuring output is probably because it is more difficult to measure a process than measuring input volume or output value. Therefore, this study applied the process dimension to the industry competitiveness model. The competitiveness model based on process flow is also under the scope of research in the manufacturing industry which is the subject of research, namely the leather tanning industry.

The test results show that the dimensions of the operational process have a greater influence on competitiveness (Figure 1). This study confirms that government programs in industrial development as the main driver of the economy are not running effectively. The industrial sector has constraints on utilization, production technology, and product quality at a low level. Likewise, the leather industry sector has experienced since the 1970s but still has low competitiveness, where process capabilities are lacking attention. Therefore the Government and entrepreneurs need to encourage SMEs to improve competitiveness by implementing manufacturing strategies based on internal processes.

Manufacturing strategy includes the application of business processes aligned with the company's goals. Mills argue that the scope of manufacturing strategies illustrates internal, external and decision making views (Mills, Platts & Gregory, 1995). This opinion is supported by who argued that manufacturing strategy affects the competitiveness of companies. Competitiveness can be seen in a static and dynamic perspective. A static perspective is the assessment of output-based competitiveness as measured by financial indicators and market share for short-term goals. On the other hand, a dynamic perspective is a process-based manufacturing strategy to achieve company goals in the long term. It should be noted that manufacturing strategies have an effect on the company's performance in the long term.

CONCLUSION

In the perspective of manufacturing strategies, industrial competitiveness is determined by the capabilities of the company and the relationships between companies in the industry. Competitiveness is defined as the ability to achieve goals through the process of managing resources, controlling operations, so as to produce products that

http://dx.doi.org/10.21511/dm.18(2).2020.01

are accepted by consumers. The results showed that competitiveness was formed by the dimensions of resources, operational processes, and performance. The operational dimension of the process has the greatest influence on increasing industrial competitiveness.

This research confirms that the government and entrepreneurs must prioritize process capabilities to improve competitiveness. Furthermore, based on the dimensions and indicators that form competitiveness, research provides recommendations to companies and governments to encourage SMEs to develop workers' skills and improve production technology.

IMPLICATION

The competitiveness model is misunderstood when researchers focus more on the final output dimension rather than the process, where competitiveness measurement generally refers to market and financial parameters. The tendency to measure based on market sales and income causes a lack of attention to the ability of the process in the company. This is similar to the performance of the industry in Indonesia which has declined in the last two decades. The issue of industrial development tends to follow the agreement of the global market and capital flow compared to efforts to increase the capability of local industries.

The results showed the competitiveness model can be applied to the manufacturing industry and is valid for measuring industrial competitiveness. Competitiveness models can be evaluated based on flow from the input, process, and output stages. Consideration measures competitiveness based on process flow because it is more comprehensive, sequential, and balanced. The study has limitations in the number of samples compared to the population because the sample only includes formal companies and does not include informal companies that have more numbers. Therefore it is recommended to test the competitiveness model in large scale industries and various other business fields.

AUTHORS CONTRIBUTIONS

Conceptualization: Muhamad Dzikron, Ina Primiana, Dermawan Wibisono.
Data curation: Muhamad Dzikron, Umi Kaltum.
Formal Analysis: Muhamad Dzikron, Umi Kaltum, Dermawan Wibisono.
Funding acquisition: Muhamad Dzikron.
Investigation: Muhamad Dzikron.
Methodology: Muhamad Dzikron, Ina Primiana, Umi Kaltum.
Supervision: Ina Primiana, Umi Kaltum, Dermawan Wibisono.
Validation: Umi Kaltum.
Visualization: Muhamad Dzikron.
Writing – original draft: Muhamad Dzikron.
Writing – review & editing: Muhamad Dzikron, Ina Primiana.

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