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Analysis of Company Policies and Strategies Based on Identification of The Contribution Technology Needs in MSMEs Leather Processing Industry

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Abstract - **Technology is crucial to the success of any company, especially for Micro, Small and Medium Enterprises (MSME). MSMEs XYZ is a small and medium industry in Bandung that processes leather into bags. As a result, it is vital to boost technology by conducting a technology management analysis on these SMEs in order to maintain quality products and compete with the competition. This research aims to use the technology assessment analysis based on Technometrics models as a foundation for evaluating strengths and weaknesses linked to products and processes in MSMEs XYZ in order to get alternative strategies and policies. The measured technology components include technoware (production equipment), humanware (human resource capabilities), infoware (information tools), and orgaware are the measured technological components (organizational tools). The component contribution values for technoware (0,223), humanware (0,688), infoware (0,156), and orgaware (0,311). The Technologies Contribution value received (0,279) is a type of traditional technology with a low classification level. Recommendation for this research is acquisition within procurement of manufacturing machinery and equipment. In order to preserve company sustainability in terms of technology, MSMEs XYZ to raise investment, update products and manufacturing methods, and expand human resources.**

Keywords*: MSME, Production, Technometrics Model.*

INTRODUCTION

Micro Small and Medium Enterprises (MSME) are businesses that dominate the industrial market share of 99,99% of all industry in Indonesia. It is not surprising that MSMEs are the most developed units in Indonesia currently [1]. MSMEs sector gives a vital role in the Indonesian economy by contributing to the proportion of Indonesia's Gross Domestic Product (GDP) of 61,07% in 2018, and human resources absorption from this sector is known to be 97% in the same year [2]. This employment can reduce the open unemployment rate, impacting economic development and improving welfare. In addition, MSMEs have various advantages, including resilience in dealing with the financial crisis and adjusting to market needs. Based on the multiple benefits of the MSMEs sector, the growth and development of the points in the RPJMN 2015 -2019 [3] focus on the growth and development of the micro, small, and medium business sector.

MSMEs in an area can improve the welfare of its population faster than other sectors [1]. However, data from the Ministry of Cooperatives and Small and Medium Business of the Republic of Indonesia in 2019 revealed that the productivity of Indonesian Small and Medium Enterprises (SME) is still considered low based on the trade chain in the Southeast Asia Region, where the SMEs sector only has a contribution of 6,3%. MSMEs are still experiencing obstacles, especially in terms of limited capital, difficulty in market access, raw materials with good quality and low prices, limited technology adoption and human resources [4]. In addition to capital and marketing aspects, the application of technology in SMEs is one of the critical elements in improving the performance of SMEs [5].

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Technology has an important influence in creating excellence and competition between companies. Technology provides convenience in innovation and creativity as well as knowledge about market tastes and potential products to be developed in realizing competitive MSMEs [1]. Technological support according to the characteristic of MSMEs is needed to establish MSMEs to increase efficiency and reduce production costs [6]. The application of technology to MSMEs can support achieving business goals, so it is necessary to analyze the impact of applying existing technology and whether it has been done appropriately [7]. These technological components have a relationship between one element and another, affecting the industry's overall ability [6].

Technology can be seen in four components based on the understanding developed by United Nations–Economic and Social Commission for Asia and the Pacific (UNESCAP). This technology results from dynamic transformations or interactions in the builder's process. In other words, technoware (embodied of production plants/equipment), humanware (represented of human resources as users/operators), infoware (described of operation/procedure processes), orgaware (represented of management). The value of the Technology Contribution Coefficient (TCC/Coefficient of Technology Contribution) is the end of the result technometrics method, which is then translated into an assessment scheme to find out the classification of level. The assessment results of technological contributions can be used to determine strategies that can choose in adjusting the speed of technological change to increase productivity in the production process [6]. However, the results of technical portraits in the industry can continue as preliminary guidance for improving the industry itself and by stakeholders such as governments interested in becoming regulators and industry promoters [8].

Based on various studies conducted using technical models to measure the level of technical components, specialized methods have different levels of industrial scale (small and medium-sized industries) in goods and services, and large enterprises are known to be usable. It is applied and can be used to confirm the competitiveness of the industry [1]. [6] comparing two MSMEs and stating the contribution of the technological components in the production process of small and medium-sized industrial production processes is included in the reasonable classification and used the technology both of MSME based on the assessment of the level technology included in the semi-modern category. [9] using a combination of technometrics methods and Analytical Network Process (ANP) to measure company's technological capabilities in manufacturing transport ships. This research classifies object research in the classification range of semi-modern technologies. In the middle-class shipbuilding industry, the application of unique technometrics methods for one component, humanware, is carried out. The level of technological classification owned by the research object is semi-modern. Hence, the direction of the policy proposal is in the form of providing training and certification for workers to increase human resources [10].

MSMEs XYZ is a small and medium industry engaged in leather processing in the form of bags in Bandung City. Established in 1995, this MSMEs owner began to pioneer the production of leather bags due to the high demand of consumers and leather bag manufacturers are still very few. This business mainly focuses on leather bags and other by-products, namely leather wallets, belts, key chains and accessories. A significant development made these MSME XYZ successfully open their outlet in 2000. The product offered has prices ranging from Rp600.000,00 - Rp900.000,00. To support the increasing customer need and increasingly fierce competition, MSMEs XYZ continues to strive to maintain market share by improving the quality and quantity of production.

One way to survive and improve the quality of these leather products is to create good technology management. The development of technology is faster and more complex over time. Therefore, it is necessary to strengthen technology by conducting a technology management analysis on these SMEs to maintain quality products and compete with the competition.

The aims of this research are determine the value of intensity contribution components of technoware, humanware, infoware and orgaware in MSMEs XYZ, determine the contribution components value of technoware, humanware, infoware dan orgaware in MSMEs XYZ, identify and assess the technology by MSMEs XYZ, suggested alternative strategies and policies overcome or deal with problems.

METHOD

This research is intended to apply the technology assessment method based on the technometrics model [11] as a basis for identifying strengths and weaknesses related to products and processes. Data collection is primarily based on direct observations, interviews with MSMEs owners and questionnaires to determine the criteria for assessing technology components. Secondary data used include the organizational structure and brief history of the company studied. This research conducts on MSMEs XYZ located in Bandung City, Jawa Barat. Research methodology can be seen in figure 1. The scope of the problem in this research is as follows: this research only reaches the research stage, namely the stage of proposing or recommending technology development strategies, not including the step of technology audits (the continuous process of assessment), implementation and supervision or control of the implementation strategy. The data used is in the form of interviews with MSMEs owners. The method of approaching assessment technology used is technometrics [11].

The general definition of technology, according to the Economic and Social Commission for Asia and the Pacific (ESCAP) of the United Nations (1989), divides the technology into four essential components, as follows: Technoware (T) = object-embodied technology = physical facilities = technical device; Humanware (H) = person-embodied technology = human abilities = human resource capabilities; Infoware (I) = document-embodied technology = document fact = information device; Orgaware (O) = institution-embodied technology = organizational devices/ Institutional.

Estimation Degree of The Sophistication Technology Components.

The degree value of sophistication shows the level of sophistication from each technological component which will be calculated based on the results from observations and interviews in the field. Based on the procedure from ESCAP, the degree of sophistication of technology components is determined by giving a scale score of 1-9.

Assessment State of The Art

An up-to-date technological component assessment requires proper technical performance knowledge and is adapted to the world's best conditions at the time [12]. Criterion scores range from 1 – 10, and a score of ten gives the best specification score of 0 for the lowest specification. Then interpolation is carried out to help provide a score for the specification values in between [5], as follows equation (1).

$$ST_i = \frac{1}{10}\left[\frac{\sum_k t_{ik}}{k_t}\right] \quad (1)$$

Description:
ST_i: state of the art technology; k_t: number of component criteria technology; k = 1, 2, ..., k_t; t_{ik}: The value criteria to-k from technology components category to-i.

Determination of Component Contribution (Normalized Contributions)

The contribution of components is determined using values obtained from the limits of sophistication and state of the art. The contribution of components can be made according to the equation (2).

$$T/H/I/O \ = \frac{1}{9}[LT + ST\ (UT - LT)] \quad (2)$$

Description:
LT: Technology Lower Limit; UT: Technology Upper Limit; ST: SOTA Technology

Calculation Technology Contribution Coefficient (TCC)

The value component of technology and value β obtained previously are then used as a reference to calculate the contribution of technology, which is as follows. Qualitative assessment of TCC and interval of TCC can be seen in table 1 and table 2.

$$TCC = T^{\beta t} x H^{\beta h} x I^{\beta i} x O^{\beta o} \quad (3)$$

Description:
TCC: Technology Contribution Coefficient; T/H/I/O: Component Contribution Value of Technology (Technoware, Humanware, Infoware, Orgaware); Bt/Bh/ Bi/ Bo: Component Contribution Intensity Value of Technology.

Table 1. Qualitative Assessment of TCC [5]

TCC Value	Technology Level
0 < TCC ≤ 0,3	Traditional
0,3 < TCC ≤ 0,7	Semi modern
0,7 < TCC ≤ 1,0	Modern

Table 2. Qualitative Assessment Interval of TCC

TCC Pricing	Classification Level
0 < TCC ≤ 0,1	Very Low
0,1 < TCC ≤ 0,3	Low
0,3 < TCC ≤ 0,5	Enough
0,5 < TCC ≤ 0,7	Good
0,7 < TCC ≤ 0,9	Excellent
0,9 < TCC ≤ 1,0	Modern Sophistication

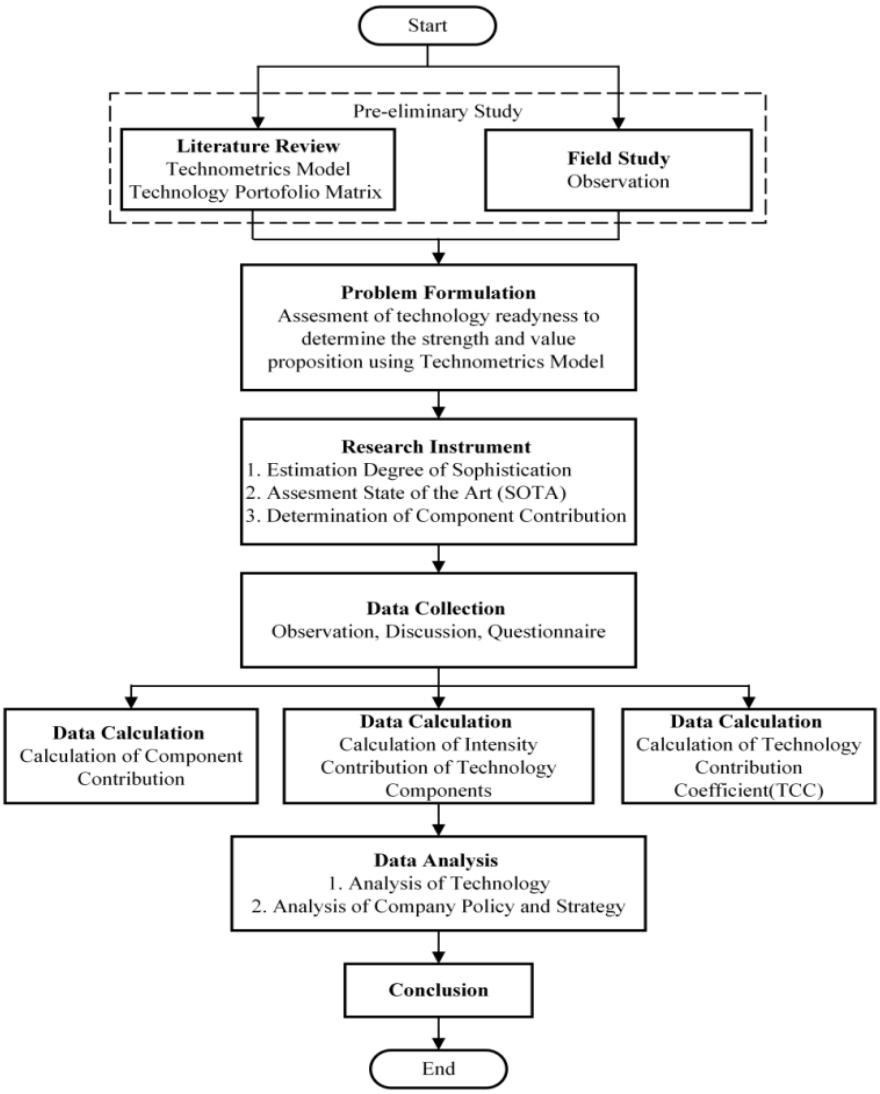

Figure 1. Research Methodology

RESULT AND DISCUSSION

Table 3. The Contribution of Technological Component to MSMEs XYZ

Technology Components	Level Sophistication		State of the Art	Normalized Contributions (T/H/I/O)	Weight	Total Contribution
	Lower Limit (LL)	Upper Limit (UL)	SOTA Technology			
1. Technoware						
a. The stage of pattern creation on pattern paper	1	3	0,3	0,177	0,212	
b. The stage of applying the design pattern to the raw material product and the step of cutting material following the design pattern	1 2	3 4	0,3 0,367	0,177 0,3037	0,212 0,364	0,223
c. The stage of sewing, cutting handles and installing accessories.	1	3	0,3	0,177	0,212	
d. Finishing Stage						
2. Humanware						
a. Management	5	7	0,6	0,688	0,5	0,688

Technology Components	Level Sophistication		State of the Art	Normalized Contributions (T/H/I/O)	Weight	Total Contribution
	Lower Limit (LL)	Upper Limit (UL)	SOTA Technology			
b. Employee	5	7	0,6	0,688	0,5	
3. Infoware	1	3	0,2	0,156	1	0,156
4. Orgaware	2	4	0,4	0,311	1	0,311

Calculation Intensity Contribution of Technology Component

The intensity contribution of technological component is estimated using the Analytical Hierarchy Process method. AHP calculation carries out through pairwise comparison and Saaty's Scale [8]. Furthermore, calculating the β values by calculating the average normalized amount of technoware, humanware, infoware, and orgaware (Tabel 4).

Table 4. β values

Technology	β
Technoware	0,612
Humanware	0,216
Infoware	0,108
Orgaware	0,064

Calculation Technology Contribution Coefficient (TCC)

TCC of a company demonstrates the contribution of technology to the overall transformation operation. The calculation TCC value for each technology component is as follows equation (3).

$$TCC = 0{,}223^{0.612} x\ 0{,}688^{0{,}216} x 0{,}156^{0{,}108} x 0{,}311^{0{,}064} = 0{,}279$$

The calculation TCC value shows the number 0,279, which, compared with table 1 and table 2, shows that the technology used in MSME XYZ is a type of traditional technology with a low classification level. Calculation results obtain from a radar diagram in figure 2.

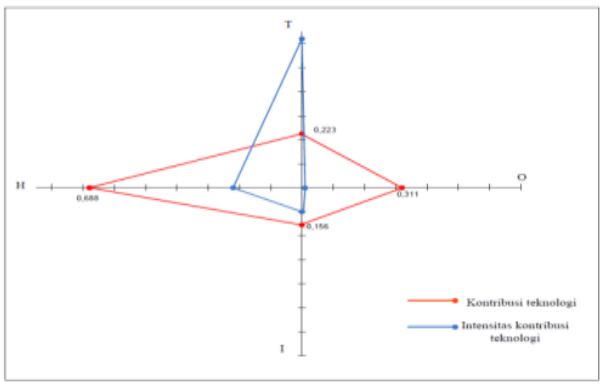

Figure 2. THIO Radar Diagram

Analysis of Technoware, Humanware, Infoware, and Orgaware

The THIO diagram shows that if the points of the value of the contribution of technological components are more comprehensive than before, then the level of technology in the industry is more sophisticated. In comparison, if the value of technical contribution points is narrower or goes to the midpoint, the level of technology is still traditional [14]. Based on the calculation results, it obtains pieces of information that humanware factors have the highest contribution to the leather industry in MSMEs XYZ, followed by orgaware, technoware and infoware. Therefore, the improved quality of MSMEs XYZ can start from the humanware component. Quality improvement can begin with human resources, organization, technology and data/information improvements. Based on MSMEs XYZ technoware components, the lowest score is indicated on the criteria of the product manufacturing method, which is still simple. To overcome this, MSMEs XYZ should increase the efficiency of using (machinery and equipment) or modernize existing technology, especially in the manual kit. For example, the use of an automatic cutting handle machine reduces product defects due to errors in the cutting handle process.

Based on the humanware component, development through various activities such as job training, seminars and motivation. Training on company employees aims to improve the equality of output, lower the cost of machine maintenance, reduce the number and cost of accidents, and increase job satisfaction [13]. Orgaware's contribution has a positive relationship with other technological components. An excellent manager will be able to direct and help the improvement of the ability of the human resources. This improvement in workability is needed and prioritized to support or deal with the increased progress or development of technoware facilities. It also requires adequate documentation through preparing standard operating procedures for all activities needed to increase the contribution of infoware components. Increasing orgaware contributions can also be made through increased profits, company policies to improve production efficiency, such as the selection of raw material and

company policies to obtain ISO certification. Technoware facilities equip with procedures related to the proper and proper use and maintenance of production facilities to be studied and used by all employees. It is necessary so that employees can optimize their ability to produce maximum output. Improving the infoware component can be through the provision of a readily accessible information center, as well as ISO certification as standardization of production process for companies.

Company Policy and Strategy Analysis

The technology portfolio matrix is designed by dividing the industry's maturity into the embryonic/early and late growth industries [10]. The technology portfolio matrix is in figure 3.

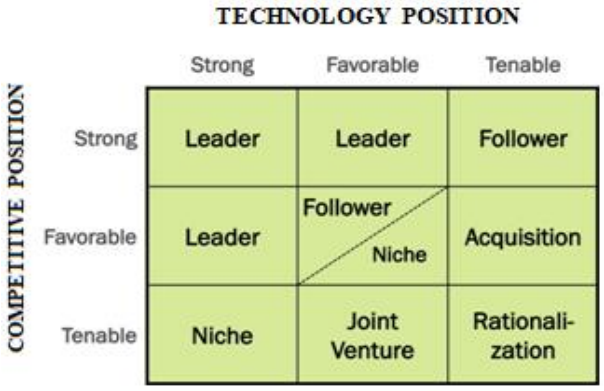

Figure 3. Technology Portfolio Matrix[10]

Based on the technology portfolio matrix, MSMEs XYZ is better off acquisition in the procurement of existing machines, especially sewing machines. It is because, in terms of time, the engine technology in MSMEs XYZ needs to be improved to improve the quality of the products produced. The condition of processing jobs order work is relatively stable so that if the procurement of new machinery or equipment, the new machine or equipment integrates with the old machine according to the needs of the process. Due to limited funds and the lack of internal development capabilities in technology procurement, the acquisition is a feasible option made by MSMEs XYZ. Policy formulation is also prepared based on the technology strategy and weaknesses owned by MSMEs XYZ, namely as follows.

Increase Investment

This policy formulates based on a technology improvement strategy, which requires capital to purchase machines and equipment with better capacity and quality. In addition, money needs to improve the quality of employees internally and externally in the company. Considering that until now, the capital used by MSMEs XYZ for operational activities is personal, that's a new resource of funds needed. The current financial condition is sufficient for the continuity of the MSMEs XYZ business even though the turnover generated is not constant every month. It is mitigated by reducing the product produced (make to stock). Another financial problem arises when the bag model that expects to sell in the market is, in fact, not sold well, causing the lack of financial income expected to obtain within a certain period to obtain over a longer time or not following the sales target. In the waiting period, until the product stock is sold, it is necessary to repair the bag model based on consumers' input so that the bag needs reworking.

Based on the excellent image of MSMEs XYZ, the possibility of applying for loan capital from banks or participating in government programs for developing small and medium industries becomes possible. Another business that can open to investment opportunities for parties interested in the business and potential owned by MSMEs XYZ by following the applicable provisions and procedures.

Product Updates and Production Methods

The policy relates to implementing alternative strategies through quantitative strategic planning matrices. The focus of MSMEs XYZ's business strategy is market penetration. According to the hypothesis examining the relationship between market penetration and company performance, the results indicate that market penetration has a positive impact on marketing performance[14]. Understanding and implementing good market penetration can undoubtedly result in or influence effective marketing results. Effort supporting market penetration require improving technology and the company's work methods so that the quality of the products produced improves. This improvement of technology becomes a price that must paid for the sustainability of the company, has an impact on more production, and has leaner production methods to increase the effectiveness and work efficiency of MSMEs XYZ.

Human Resource Development

Human resource development needs to be carried out training or technology transfer and adjusted to the latest developments in convection trends. Human resources can improve quality and develop product designs continuously. In addition, an organizational structure must be equipped with a clear division of job descriptions and specifications so that the

implementation of MSMEs XYZ business process becomes better than before.

CONCLUSION

Based on the results analysis, technology review and assessment system, several conclusions refer to the aims of the research. First, the contribution intensity components of technoware, humanware, infoware and orgaware 0,612 for technoware, 0,216 for humanware, 0,108 for infoware, and 0,064 for orgaware. Second, the contribution value components of technoware, humanware, infoware, and orgaware 0,223 for technoware, 0,688 for humanware, 0,156 for infoware dan 0,311 for orgaware. Third, the TCC value obtained is 0,279. The TCC value is included in the low classification and uses traditional types of technology based on the category of TCC values issued by UNESCAP. Fourth, the proposed improvement recommendation is acquisition in the procurement of production machinery and equipment due to limited funds and the lack of internal development in the procurement of technology. Then acquisition is an option that is currently feasible for MSMEs XYZ. Fifth, strategies to be implemented to maintain the company's sustainability in terms of technology are increasing investment in UMKM XYZ, updating products, manufacturing methods and developing human resources.

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