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The value chain-based on competitiveness strategy for improvement strategy on prefab products

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ABSTRACT

Prefab building construction is chosen because the construction process is faster than conventional buildings, especially in emergency situations such as the COVID pandemic. The main problem at PT XYZ in selling prefabs is the price. The price components that affect the high price are COGS prefab, expedition cost, insurance cost and installation cost. This problem needs to be evaluated starting from production costs, supply chain to installation costs in order to provide a price quote that can be below the ceiling price of the buyer or owner, which is what the research attempted to discuss. Referring to these problems, in this research the authors used a descriptive method, a case study approach with data processing and analysis techniques consisting of descriptive analysis of the company and analysis of the company's internal and external environment. The analysis, which is used to formulate strategies and the process of using them, is Value Chain analysis, SAP-LAP Analysis, and Analytic Hierarchy Process (AHP). This analysis is interrelated in determining the weight on the Analytic Hierarchy Process (AHP), Hierarchy to determine Strategies to improve Competitiveness Based on Value Chain on Prefab Products. The highest weight value is Improving Product Quality with a weight value of 0.433. What is meant by improving product quality is meeting quality standards. This product quality improvement starts from the quality of the vendor's product materials, the production process in the factory, the handling process during the manufacturing process, and the quality of the product.

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INTRODUCTION

In Indonesia, PT XYZ is a pioneer in developing prefab in construction industry. Prefab products are PT XYZ's backward strategy in strengthening the company's supply chain. With all its advantages, this method has a positive impact on all development stakeholders. Consistent and innovative in construction and concession development since 2008, PT XYZ introduces the latest innovations as a form of commitment to create better life solutions. PT XYZ prefab products provide significant investment value for every residential building and commercial building, offering prefab product solutions that are more precise, dynamic, authentic, quality, simple, and environmentally friendly. PT XYZ's experience covers construction, mining, healthcare, residential, Education and commercial sectors.

Prefab architecture can be generally defined as a design object based on certain modules with the same and repetitive form. According to Carliss Young's book "Design Rule: The Power of Modularity", modular design is a design approach that divides a system into smaller parts called "Modules". Le Corbusier also argues that in "Modular Theory", modularity can be seen as a number that adopts harmony and as a measuring instrument that can calculate distances, surfaces, volumes and "keep human scale everywhere" (Baldwin & Clark, 2000). Modular vertical housing creates standards that can be used and applied to fundamental factors, such as dimensions, material manufacturing, and building assembly, to speed up construction, reduce labor costs and minimize building waste (Sanjaya & Tobing, 2019).

The prefab construction business is currently a very bright business, especially during the COVID-19 pandemic. Some hospital buildings use prefab buildings because the process is faster during emergency

conditions. Pricing needs to be improved in the marketing and sales of prefabs at PT XYZ. This is based on the price bid data from 2019 to 2022 in the tender negotiation process I and II.

Factors that affect the high bid price in the tender are prefabrication price, freight cost, insurance cost and installation cost. This needs to be evaluated starting from production costs, supply chain, to installation costs so that when providing a price quote it can be below the buyer's or owner's ceiling. The prefab price has a large percentage when providing a price quote because PT XYZ prefab specifications are designed using materials that can support a 4-story building. Not all buyers or owners have a 4-story building project so that in providing a price quote PT XYZ is sometimes above the buyer's or owner's ceiling.

Price is a problem in prefab products and this price problem for the Customer Satisfaction Index (CSI) value is the lowest level of satisfaction. With these problems, the author wants to conduct research at PT XYZ regarding the Strategy for Increasing Competitiveness Based on Value Chain in Prefab Products at PT XYZ so that PT XYZ can compete with other products without reducing the quality of its products. Based on the above research, the authors conducted a value chain and SAP-LAP because of the increase in competitiveness from the company's internal analysis and as a determination of strategic priorities using AHP because it describes complex multifactor or multi criteria problems in a multilevel structure with the order of the first level is the goal, followed by the level of factors, criteria, sub criteria, and so on down to the level of alternatives used as decision support (Saaty, 1993).

In general, companies should adopt business strategies to preserve their resources in an evolving environment and market (Hanuláková & Becková, 2016; Mukonza & Swarts, 2020; Nayal et al., 2022; Varadarajan, 2020). A good strategy can help consulting firms to survive in difficult competitive areas and achieve long-term success (Abraham, 2012; Clauss et al., 2022; González-Rodríguez et al., 2018; Jelonek et al., 2022). Strategy represents a whole list of activities with important consequences for consulting activities that should be coordinated by strategic management (Alkhafaji & Nelson, 2013; Fischer et al., 2020).

Previous research identified primary activities in value chain analysis on increasing competitive advantage in order to support cost leadership strategies (Dewi, 2017). SCM (Supply Chain Management) in manufacturing SMEs in India with the Situation-Actor-Process (SAP) Learning-Action-Performance (LAP) Model (Kumar et al., 2013). Qualitative Situation-Actor-Process (SAP) and Leraning-Action-Performance (LAP) models with Quantitative Multi-Criteria decision making (MCDM) and to determine the priority of Supply Chain Complexity using AHP (Analytic Hierarchy Process) Studies (Chand et al., 2018). Therefore, from previous research, the author combines methods by formulating strategies using Value Chain analysis, SAP-LAP Analysis, and AHP.

The research would like to discuss the value chain-based on competitiveness strategy for improvement strategy on prefab products. The research is expected to give more insight into the topic discussed and can be a reference for future research bringing up similar topics.

METHOD

The approach used was quantitative. It was conducted at PT XYZ located in Bogor, with a period of 3 (three) months starting from March 2023 to June 2023. This research uses two types of data sources, namely primary and secondary data. Primary data is obtained from interviews with supporting data for Price Offers at the time of Tender and Customer Satisfaction Index (CSI) in the company. Data processing and analysis techniques in this study used an analysis of the company's internal and external environment using Value Chain Analysis, SAP-LAP Analysis, and AHP.

The first step in value chain analysis is to break down the operations of a company into specific business activities or processes, by grouping the activities of the process into primary or supporting activity categories (Wisdaningrum, 2013). The increasingly fierce competition of prefab industry in building construction requires a strategy to improve the competitiveness of prefab products in PT XYZ. By identifying the stages of the value chain, the company can increase product value for customers by lowering production costs. Reducing costs or increasing added value can make the company more competitive by examining internal and external environmental factors, then using SAP-LAP and AHP to prioritize strategic decisions that must be implemented to improve the competitiveness of PT XYZ company:

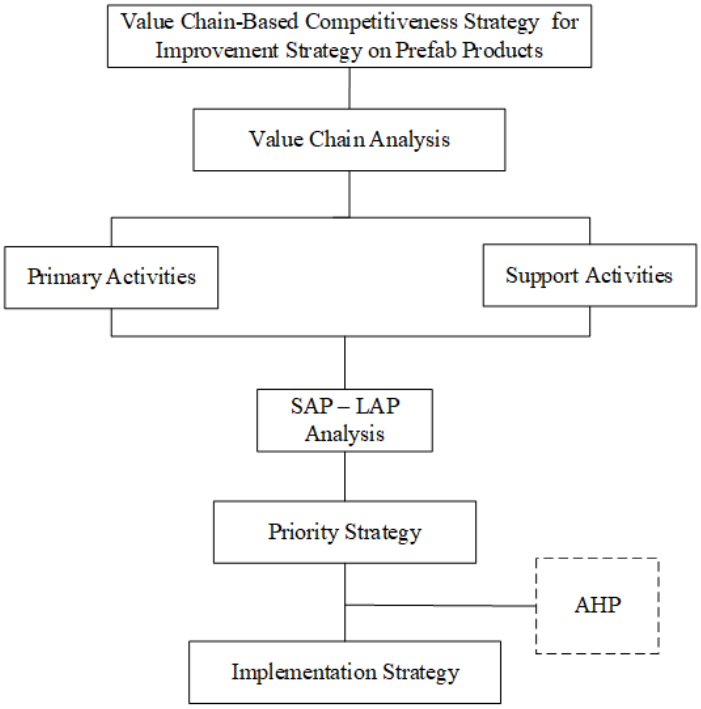


Figure 1. Research Framework

RESULTS AND DISCUSSION

Value Chain Analysis

The first step in value chain analysis is to break down a company's operations into specific business activities or processes by categorizing the process activities into primary or support activities (Wisdaningrum, 2013). In Primary activities, the overall cost burden is also high. But in Primary activities, the margin can still be increased if efficiency is done in Primary activities, namely inbound logistics activities in the form of material arrival and storage activities, outbound logistics activities in the form of prefab product delivery, and operations in the form of production process activities, mobilization, and prefab storage. The implementation of this efficiency can increase the margin for the company. The value chain has a good impact on companies that have a long-term vision so that the value chain is very important to be applied to private companies and public companies (Afrian Damar Luhung & Pradana, 2018).

In supporting activities, the overall cost burden is also high. The largest cost burden is in technology development as it relates to product development costs. These product development costs include mold design costs and mold product testing costs. The cost burden on these supporting activities makes business costs high, thus reducing margins. Based on the analysis of the Main Activities and Supporting Activities, the research Value Chain structure is shown in Figure 2.

Primary and supporting activities in the value chain that are influenced by internal factors have many costs incurred that affect the selling price of prefab products. These costs include business costs in the Prefabrication Division. In the primary activities, the costs include inward logistics, operations, outward logistics, and marketing and sales. There are very high costs in supporting activities, including human resource management, technology development, and purchasing

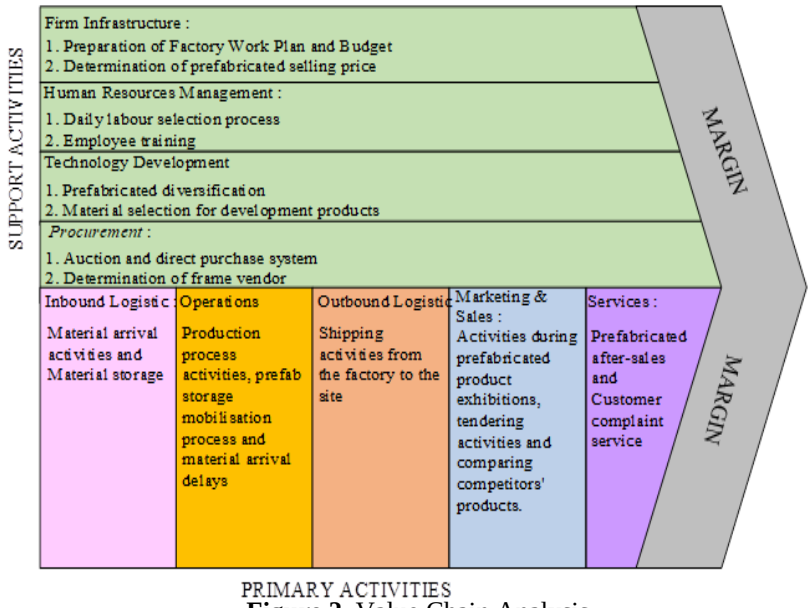


Figure 2. Value Chain Analysis

SAP-LAP Analysis

This research provides new thinking on manufacturing companies through a contemporary internal query framework model called SAP-LAP. SAP and LAP approaches are systemic query models (Sushil, 2000). SAP-LAP framework to analyze supply chain performance (Charan, 2012). Supply chain coordination problems are analyzed by using the SAP-LAP model (Arshinder et al., 2007). In this study, internal information regarding SAP-LAP analysis makes the Strategy in increasing competitiveness at PT XYZ by combining internal and external factors of the value chain with SAP-LAP, thus getting the SAP-LAP framework as follows:

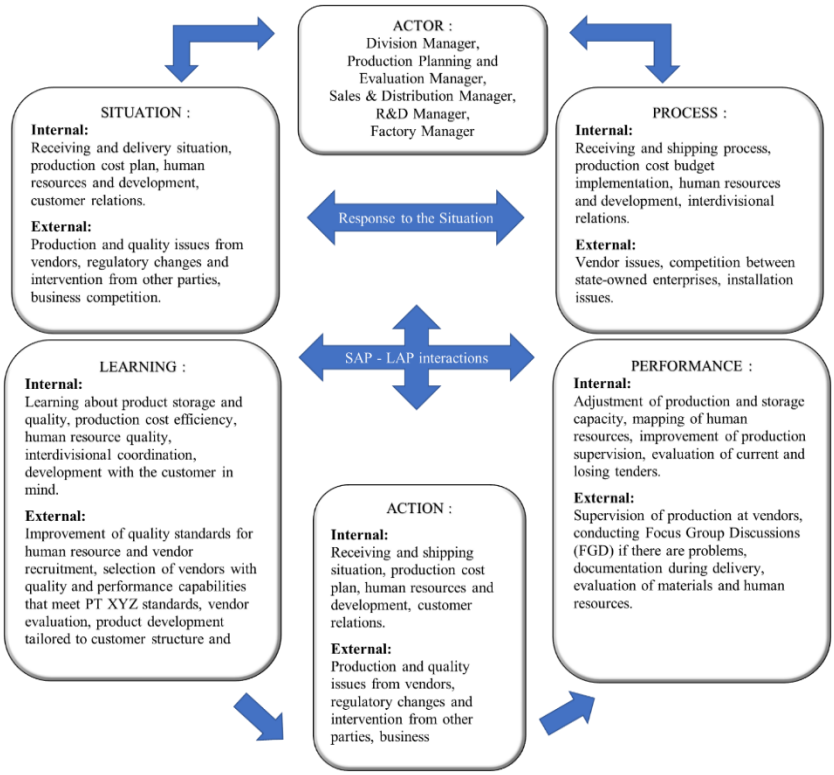


Figure 3. SAP-LAP Analysis

1) Situation:
   a) Primary Activities, Material receipt and product delivery, vendor production and quality issues, rule changes, and other party interventions.
   b) Support Activities, Production cost planning, human resources and development, customer relations, and mapping business competition.
2) Actors:
   a) Primary Activities, Production planning and evaluation manager, Sales and distribution manager, Factory manager.
   b) Support Activities, Divisional manager, R&D manager.
3) Process:
   a) Primary Activities: Material receipt and product delivery, production cost budget execution, HR and development, vendor issues, and site installation issues.
   b) Support activities, Relationships between divisions, and competition between State Owned Enterprises.
4) Learning:
   a) Primary Activities, Product storage and quality, production cost efficiency, HR quality, quality standard improvement.
   b) Support Activities, Coordination between divisions, viewpoint development, customer reference structure, and architecture, vendor selection with PT XYZ standards and quality, and vendor evaluation.
5) Action:
   a) Primary Activities: Receiving and shipping situation, HR and development, production and quality issues.
   b) Support Activities, Production cost plan, customer relationship, regulatory changes, and other party intervention, business competition.
6) Performance:
   a) Primary Activities: Adjustment of production and storage capacity, HR mapping, improvement of production supervision, supervision of production at vendors, conducting FGDs if there are problems, documentation during delivery, evaluation of materials, and HR.

In the SAP-LAP analysis in Figure 3, clusters are then made to determine the factors and alternatives used in the strategy prioritisation stage using AHP. The cluster can be seen in Figure 4.

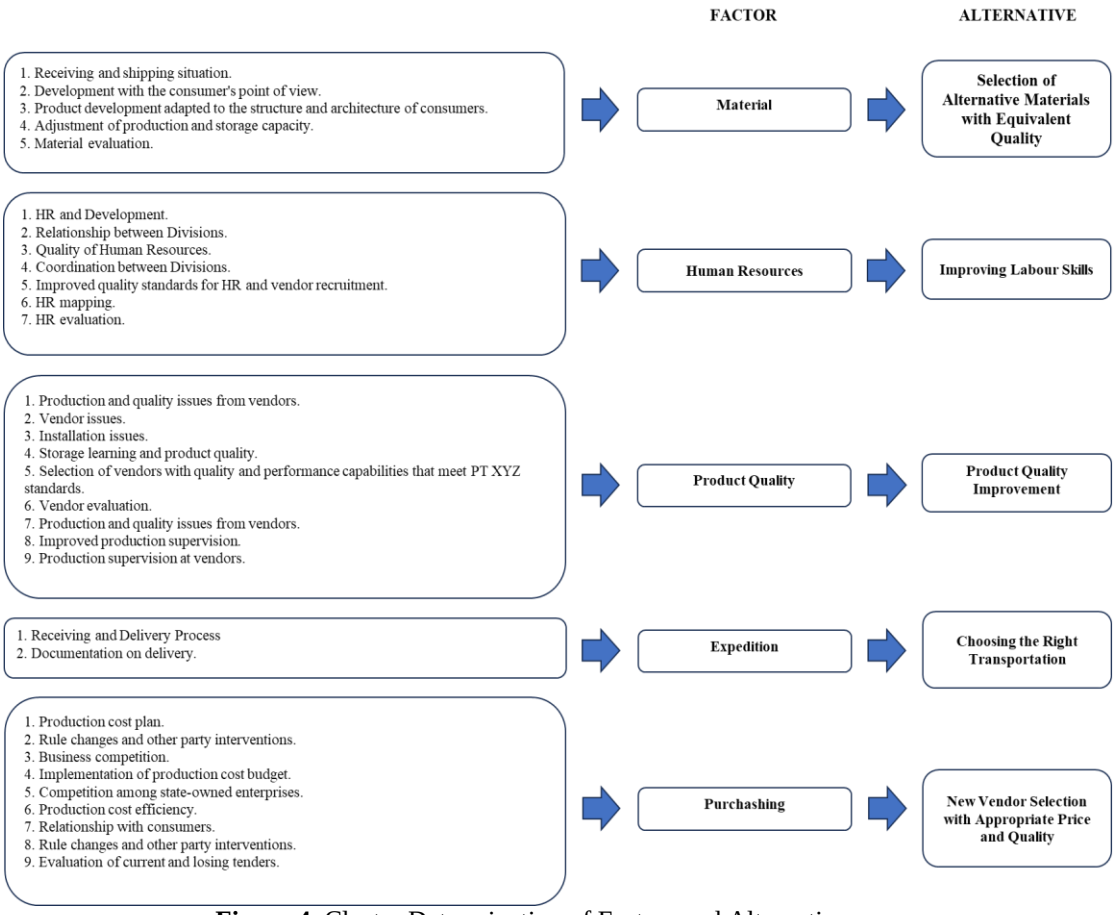


Figure 4. Cluster Determination of Factors and Alternatives

In determining the cluster above, the factors in the AHP calculation for determining strategic priorities include: (1) Material, (2) Human resources, (3) Product quality, (4) Expedition and (5) Purchasing. Alternative strategy prioritization include: (1) Selection of alternative materials with equivalent quality, (2) Improvement of laborr skills, (3) Improvement of product quality, (4) Selection of appropriate transportation, (5) Selection of new vendors with appropriate price and quality. The source of strategy priority formulation is an Actor in SAP-LAP which consists of: (1) Division Manager, (2) Production Planning and Evaluation Manager, (3) Sales & Distribution Manager, (4) R&D Manager, (5) Factory Manager.

Analytic Hierarchy Process Analysis

The theory for measuring priorities using a logical framework and problem solving that can be applied by organizations or businesses is AHP (Abadi et al., 2018). Determination of AHP Factors: the five factors are the conclusions obtained from the SAP-LAP analysis results. Factors such as materials, human resources, product quality, shipping and purchasing affect the improvement of product competitiveness. Furthermore, AHP alternatives are also based on the key points of the five factors, which SAP-LAP analysis determines the strategy to improve the competitiveness of this prefab product. Based on the SAP-LAP analysis, the next step in determining the strategy is to use AHP. The SAP-LAP analysis results obtained from the AHP hierarchy in this study have two levels. Three principles of AHP work in solving problems, namely the preparation of hierarchies, priority setting, and logical consistency (Widiyastuti et al., 2020),

Furthermore, from the hierarchy, a paired questionnaire was made involving 5 (five) actors or experts as decision makers to determine alternative strategies in this study. Statistical calculations from questionnaires answered by actors or experts/experts made a joint opinion matrix used to check the consistency of the hierarchy. This matrix is used to check the consistency of the hierarchy if the value is more than 10%, then the judgment data assessment must be corrected. However, if the Consistency Ratio (CI/IR) ≤ 0.1, then the calculation results can be declared correct.

The calculation of the combined opinion matrix states that the Consistency Ratio (CI / IR) ≤ 0.1, so the results of the combined opinion matrix calculation are declared "TRUE". Furthermore, from the combined opinion matrix calculation, calculations are carried out to determine the global priority weight as a weighting

in determining alternatives. The calculation can be seen in Table 1. Based on the calculation of global priority weights, the weighting in the Analytic Hierarchy Process (AHP) hierarchy can be seen in Figure 5.

Table 1. Global and Alternative Priority Weight Calculation

Factor Global Priority Weight							
Factor	***EF1***	***EF2***	***EF3***	***EF4***	***EF5***	***VE***	***VP***
EF1	1.00	0.29	0.24	3.78	1.37	0.82	0.103
EF2	3.46	1.00	4.30	10.07	5.66	3.85	0.488
EF3	4.12	0.23	1.00	11.71	8.43	2.48	0.314
EF4	0.26	0.10	0.09	1.00	0.56	0.26	0.033
EF5	0.73	0.18	0.12	1.78	1.00	0.49	0.061
Factor Alternative Priority Weight							
Alternatif	***EF1***	***EF2***	***EF3***	***EF4***	***EF5***	***VE***	***VP***
A1	0.12	0.13	0.17	0.10	0.29	0.10	0.151
A2	0.23	0.22	0.18	0.18	0.16	0.49	0.203
A3	0.39	0.43	0.47	0.42	0.35	0.31	0.433
A4	0.06	0.08	0.06	0.12	0.07	0.03	0.074
A5	0.20	0.14	0.11	0.18	0.13	0.06	0.139

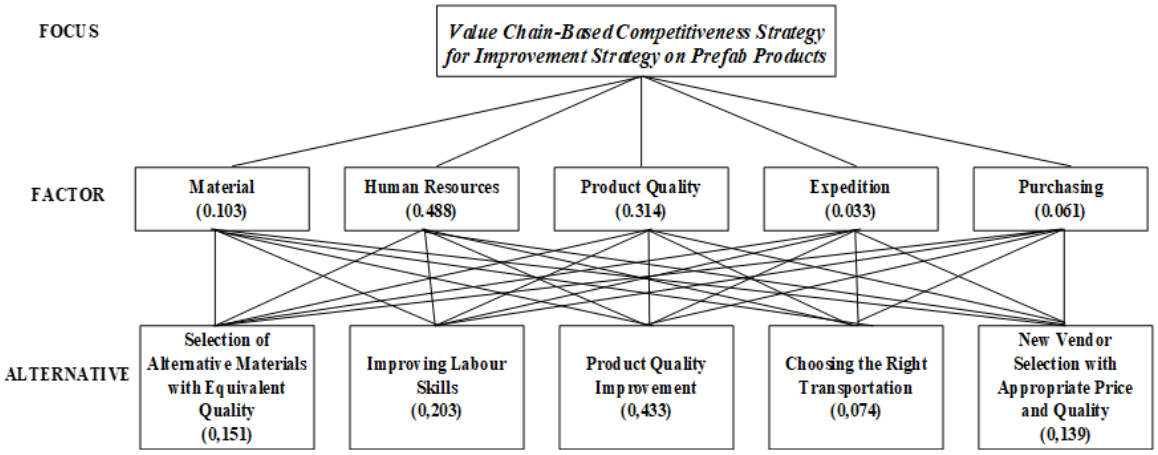


Figure 5. Analytic Hierarchy Process (AHP) Hierarchy Weighting Results

The results of alternative weighting in the Analytic Hierarchy Process (AHP) hierarchy, alternatives in the Strategy for Increasing Competitiveness Based on Value Chain in Prefab Products can be seen in the highest weight value, namely Improving Product Quality with a weight of 0.433 and the second alternative is Increasing Labor Skills with a weight of 0.203. Improving product quality means meeting quality standards. Product quality standards start from the quality of vendor material products, the production process at the factory, the handling process during delivery, the treatment when dropping products on site to the installation process.

Factors that affect the competitiveness of prefab products when viewed from the AHP weighting, the alternative in determining the priority strategy is to improve the quality of products that affect the competitiveness of prefab products at PT XYZ. The main factor is human resources both in the internal factory, namely production and warehouse workers and from external, namely frame vendors, to overcome this problem can be done by training factory workers and PT XYZ vendor workers so that these workers are able to meet the quality standards required by PT XYZ.

In addition to increased training, it is also necessary to develop competence by certifying workers such as welding certification, correct use of measuring instruments and developing competence in reading technical drawings. Daily labor selection also needs to be carried out with a labor placement selection are expected to improve prefab product quality by reducing defect cost in production process, handling process and assembly process on site. By reducing the defect cost by 15%, it is expected that the COGS prefab can decrease so that during the tender PT XYZ can compete with other competitors in prefab construction.

CONCLUSION

Based on the research results, several conclusions are obtained regarding the internal and external factors that affect the value chain on the competitiveness of prefab products and priority strategies for PT XYZ to reduce prices and increase sales. Some of these conclusions are (1) Internal factors that affect the value chain

towards competitiveness when linked to SAP-LAP Analysis are quality, materials, human resources and purchasing. (2) External factors that affect the value chain towards competitiveness when linked to SAP-LAP are vendors, both frame vendors and expedition vendors. The action that needs to be taken is to conduct FGDs with vendors to achieve PT XYZ's quality standards. (3) An alternative strategy to improve value chain-based competitiveness in this prefab product is to improve product quality so that by improving product quality both internally and externally the company is able to reduce recurring production costs due to defects caused by the 4M factor (Man, Machine, Method, Material). By reducing defect costs, it means that it can reduce the COGS prefab can go down so that it can compete with competitor products, with the prioritized strategy in this study, it is expected to reduce product prices with product quality not reducing the quality standards of PT XYZ.

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