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Production Economic Management Model in Product Design

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***Abstract*—This paper is the result of research that produces a design consisting of a production economic management model in designing a product. The problem that is often faced is that there is no synchronization between product planning and production economics, with the aim of making a product design management model based on a production economy. The method used is qualitative by analyzing and finding conclusions from the data with the aim of solving problems, research and development (R & D) is a development research that has commercial interests in relation to scientific research and applicative development in the field of technology related to applied research or It is often said that product development research is based on engineering economics. The results showed that the production process to produce outputs, ranging from inputs, processes, outputs and marketing. In manufacturing or manufacturing companies, the process of producing output is through processing and improving the form or use of various inputs. Clearly, the production economic management model, namely the model shown is a production circle, the relationship with one another is inseparable where experts are company assets that need to be maintained. The market or marketing is closely related to the results of the product if the product is good then the demand increases and vice versa. Experts always read market needs so that the planned products are in accordance with market demands**

Keywords— product planning; production economy;

I. INTRODUCTION

As time goes by, what happens in the world of production economy makes companies that run manufacturers or products produced by factories, start thinking about accurate and quality business concepts. Business concepts will be of good quality if management is carried out properly along with changes in decision making made by product planners and companies as product producers. This paper is the result of research conducted at the Kupang State Polytechnic discussing a design management model combined with a production economy design that will result in technological innovation. This research resulted in a design consisting of a production economic management model in designing a product. The problem that is often faced is that there is no synchronization between product planning and production economics, with the aim of making a product design management model based on a production economy.

In everyday life, of course, we cannot be separated from the use of various products to meet our needs. Diverse needs give rise to creative ideas to create products. The product design process is an activity to add value to a product. By utilizing various existing resources, both individuals and groups try to meet needs.

Production economics is a method used to analyze alternatives that must be selected systematically, according to certain conditions. In alternative selection, where decision makers are faced with several alternatives that have met technical requirements, economic analysis plays a role that provides a basis for consideration to determine which alternative should be chosen.

The exposure is expected to produce a management model in a planning that is closely related to the economics of production. The resulting design is an ejection pump that raises water. The resulting production value is an activity that is carried out to add use value in creating product designs. The production economy in question is an economic activity to convert inputs into value-added outputs.

The results of previous studies show that organizational learning abilities increase product innovation through mediating design management skills, planning management skills and product innovations which can be very useful for better

understanding how to improve innovation performance [1] . These findings suggest that product management, as a dynamic capability, emerges from learning and enables companies to adapt to changing environments.

Production economy is an economic activity to convert inputs into value-added output, while production refers to the number of units produced during a certain period of time. So product planning can be interpreted as a periodic process that considers the results of the design of a product to be developed into a finished product and ready to be marketed. More details product planning pouring working drawings, creating and making that can solve problems for users to meet market needs.

As the results of the research, the classical economic production quantity model assumes that goods are produced by a very reliable production process with fixed set-up costs. While the reliability of the production process cannot be perfect without price, its setup costs can be reduced by investing in increased flexibility [2].

When compared to the results of previous studies and findings, there is no synchronization between products, while in this paper, the design of the production economic management model in planning injection pumps and moving windmills is inseparable. The problem is that there is no synchronization of product planning with the production economy, so this research leads to how to make a production economic management model in planning a product. This paper aims to plan a production economic management model based on product design. Based on this description, this paper includes an information proxy management model that can display information planning images that are effective in producing appropriate products based on production economic management.

1.1 Production Management

In general, management is known as a process that regulates activities or behavior so that it has a good effect. In order to be able to complete a plan or responsibility in a disciplined manner, so as to have good management skills. Without this ability, it is not impossible to feel the ability to complete product planning.

Production management has become the dominant influence in the field of operations management, knowledge of the main elements, quick arrangements, small lots, cells, and so on [3]. From their research they provide insight into diffusion and uneven results. There have been deviations between the companies studied, and some of their manifestations have changed, so it is necessary to correct any problems in the future. Structuring the process of raw materials into the desired product or service so that it has a selling value. So it can be explained that production management is the arrangement of the process of converting raw materials into the desired product or service so that it has a selling value. This production is categorized into several parts based on the technique: 1). Production taken from raw materials directly then extracted into the desired product. For example, oil extraction to be made into various products. 2). Products obtained by modifying materials either chemically or mechanically without changing their physical attributes. For example, it is done by heating raw materials at high temperatures. 3). Production by assembly, for example a computer or a car. This understanding of the notion of production management is often overlooked. Whereas from here a business can make efficiency because this part requires a lot of funds.

[4] Manufacturing planning and management for production quality finds that manufacturing companies continue to face challenges in operating their manufacturing processes and systems to deliver the required production levels of high quality products, while minimizing resource use. Technology-intensive and developing strategic manufacturing sectors, such as aeronautics, automotive, energy, medical technology, micro-manufacturing, electronics and mechatronics. Innovative and integrated quality, production logistics and maintenance design, management and control methods as well as advanced technology support have a key role to play in achieving the overall production quality goal.

1.2 Production Economy

Production economy is an economic activity to convert inputs into value-added outputs. Production refers to the number of units a company produces over a certain period of time. One of the dramatic changes taking place in the world system as we enter the twenty-first century is the increasing openness and interpenetration of national economies and sovereign states. This shift on the one hand is associated with the beginning of the progressive transfer of certain economic and political functions to the plurinational and global level; and on the other hand with the opposite trend to the strengthening of economic and political life in the regions[5].

Production refers to the number of units produced over a certain period of time. Firms that operate efficiently must acquire good knowledge of total product, marginal product, and average product. Such knowledge is useful for making better operational decisions. Economics of production is not only concerned with production choices, but more importantly how the choices made are influenced by technical and economic enterprises. Economics of production is concerned with how producers choose

alternative production processes, such as the selection of product materials and resource allocation.

Research in the fields of construction management and economics can be characterized as a multidisciplinary planning science. The results of science and humanities are necessary inputs for the field of research related to planning, the output of research as a multidisciplinary planning science consists of three types of solution concepts: empirical generalizations based on statistical data analysis (technology laws), concepts that determine what to do, if certain results are to be achieved under certain circumstances (functional rules), and insight into the interrelationships between design, production, and operation and social practice (socio-technological understanding)[6].

II. Product Planning

The product planner's role is to help his company develop and sell the best possible product at the lowest possible price, while making the appropriate profit, delivering what the customer wants, deciding what it is, ensuring that all resources are used, to help management arrive at the decisions needed to produce the desired product [7]. Product planning is the process of creating a product idea and following through until the product is introduced to the market. In addition, the company must have a backup strategy if the product fails in its marketing. This includes product extensions or improvements, distribution, price changes and promotions.

The economic success of a manufacturing plan depends on the ability to identify, create working drawings, and then quickly create a product that can meet those needs at low cost. This is not the responsibility of marketing, manufacturing, or design alone, but is a responsibility that involves many functions.

III. Research methods

The research design is a research design of production economic management model in planning a product to produce added value using qualitative methods by analyzing and finding conclusions from these data with the aim of problem solving, research and development, namely development research that has commercial interests in with scientific research and applicative development in the field of technology related to applied research or often called engineering economics-based product development research. The research and development steps consist of ten stages, namely potential and problems, data collection, product design, design validation, design revision, product testing, product revision, usage trial, product revision, and mass production.

For product design research using five initial stages using a design model based on engineering economics. This study specifically discusses product design R&D presented in Figure 1

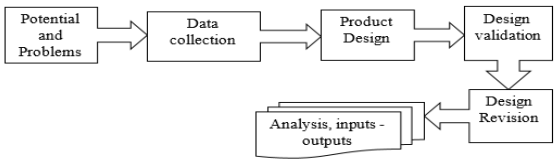

Figure 1. Product design R&D

Analysis of market potential is the potential that exists in nature, in this case wind and water if managed properly will produce added value as renewable energy. Based on preliminary observations, it shows that people throughout Indonesia still use groundwater using wells and reservoirs. The water is raised using an electric dynamo pump, so researchers want to develop R&D to produce an injection pump product design.

Prior to the product design, observations were held, reviewing the concepts or theories of the literature on the development of R&D on product images. This includes documentation studies and literature studies. Data collection can be done by observation (observation), interviews (interviews), questionnaires (questionnaire) and a combination of the three. Before starting this research. At the product design stage where all field data has been collected, product planning is carried out, namely: 1). Product design. 2). Technical economic analysis. The design results are re-validated and then if they are not suitable, they will be redesigned. Then the results of design validation will be revised if an error occurs so that a design revision is needed to produce the planned product.

IV. Results and Discussion

Recent research by Korn Ferry, a global organizational consulting firm from the United States, suggests that experts are predicted to increase throughout the Asia Pacific region, including Indonesia. Indonesia itself is predicted to have a workforce with a bachelor's education background or higher as many as 12.7 million people in 2030. This figure is below the total need which is estimated to reach 16.5 million people that year.

The results of the research show that the more experts according to their expertise, the more developed a company will be. Develop a plan of experts to meet the company's needs in the future that is adjusted to the plan to achieve short-term and long-term goals. The main point of planning for experts is efficiency by optimizing the company's human resources and recruiting as needed. Experts are a very valuable asset in developing a business. If you want to develop a product or make a product design, it is necessary to pay attention to human or professional

experts who are supported by complete facilities, materials and adequate sources of funds. The relationship of experts, product planning, product results and marketing is always continuous. Experts make a design followed by the production of special expertise parts including assembly and marketing. Planning is made in the form of technical drawings that can produce added value to the products produced and have production standards.

This study discusses product design that produces a production drawing model that causes different costs at all stages of production, making it difficult to separate costs into overlapping, because this research produces a production economic management model to produce mass production to reduce production costs. This study emphasizes the role of management in designing product designs that are the source of production. So that it is useful to calculate the cost of goods to reduce the selling price by implementing economic management of production.

To achieve the research objectives, assumptions or hypotheses are made that the use of modern technology affects production costs differently. The most important result is the use of modern technology in creating a product image which reduces the total costs in the production process, especially the aspects of wages, equipment, maintenance and depreciation. The real problem is how to measure and track the production costs of different units because of the strong overlap between production sites to completion.

The results of the study mention [2] The classical economic production quantity model (EPQ) assumes that goods are produced by a highly reliable production process with fixed set-up costs. While the reliability of a production process cannot be perfect without price, its setup costs can be reduced by investing in increased flexibility. An EPQ model with a flexible and imperfect production process is proposed in this paper. This inventory optimization problem is then formulated as a geometric program (GP) and solved to obtain an optimal closed form solution. After theoretical treatment, a numerical example is given to illustrate how GP theory is applied to solve a given problem.

Economic management of production relates to the part of a production organization concerned with the transformation of various inputs into outputs (products) which are required to have the required level of quality. The model that is formed starts with inputs, namely labor, material preparation, capital and inventory of initial data, then the field of process transportation includes product planning, process planning, holding production control, and maintenance of production machines. outputs produce perfect products. Broadly speaking, the production management process is divided into 4 groups, namely: 1. Inputs. 2. Process transformation. 3. Outputs and 4. Continuous. All of this is supported by quality and production costs. The details can be seen in Figure 2.

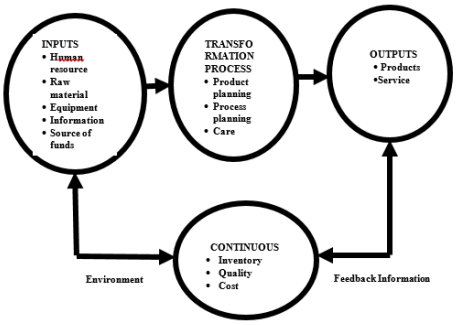

Figure 2. Production management

[8] Knowledge of work processes is a prerequisite for doing work. The research team operationalized these questions in the specific domains of the data production process and data quality. The team also analyzed the responses of the three roles in the data production process, data collector, data maintainer, and data consumer, to investigate the effect of different modes of knowledge that different work roles have on data quality. In particular, data collectors with the why knowledge of the data production process contribute to producing better quality data. Overall, knowledge of data collectors is more important than knowledge of data keepers.

Production information system is a computer-based system that works in conjunction with other functional information systems to support company management in solving problems related to the production activities of a company which basically still relies on inputs, processes and outputs. In other words, the production information system is included in the overall management information system framework. Production information system emphasizes more on the production process that occurs in a production floor, starting from the input of raw materials to the output of finished goods, taking into account all processes that occur.

The production economic management model is presented in Figure 3.3. The model shown is a production circle, the relationship with one another is inseparable where experts are company assets that need to be maintained. The market or marketing is closely related to the results of the product if the product is good then the demand increases and vice versa. Experts always read market needs so that the planned products are in accordance with market demands.

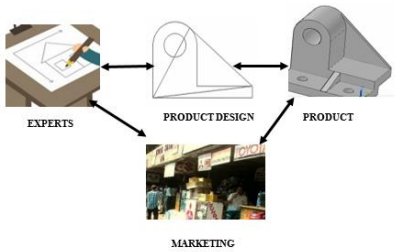

Figure 3.3. Production economic management model

In carrying out production activities there are various factors that must be managed which are often referred to as factors of production, namely: materials or materials, machines or equipment, people or employees, capital or money. The production process to produce output, starting from inputs, processes, outputs and marketing. In manufacturing or manufacturing companies, the process of producing output is through processing and improving the form or use of various inputs. When associated with the production management model, the production management is able to; able to produce quality products, able to increase business profits, able to make cooperative relationships better, punctual in production planning, always identify potential problems and invest in technology.

Building a company needs attention to carry out production management so that the product runs smoothly. Develop a marketing research and sales department in the production section. 3). Improve cooperation between departments including administration. 4). Provide incentives for high achievers to create a spirit of innovation, improve performance, a sense of ownership of facilities and responsibility for their field of work.

V. CONCLUSION

Based on several theories and research results, conclusions can be drawn: (1) Companies or businesses should make a design method as a step carried out in a process that is needed to facilitate the development of design ideas.(2) The process of planning, organizing, directing and controlling always pays attention to production activities combining various resources used in the production system. (3) Always pay attention to the production process to produce output, starting from inputs, processes, outputs and marketing. In manufacturing or manufacturing companies, the process of producing output is through processing and improving the form or use of various inputs.

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