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Production Management of Self-Propelled Mortar Carrier System in Supporting Defense Industry Independence (Case Study PT. SAS Aero Sishan)

Siti Hannah Padliyyah[1)], Syaiful Anwar [2)], Aris Sarjito[3)], Hikmat Zakky Almubaroq[4)]
[1,2,3,4)]Department of Defense Management, Faculty of Defense Management, Republic Indonesia Defense University

*Corresponding Author
Email: siti.hannahpadliyyah@gmail.com[1)], morolawe7760@yahoo.com.au[2)] arissarjito@gmail.com[3)], zakkyauri94@gmail.com[4)]

Abstract

This research examines the production management of self-propelled mortar carrier systems in supporting the independence of Indonesia's defense industry. In accordance with the Law of the Republic of Indonesia No. 16 of 2012 on Defense Industry which aims to ensure that the fulfillment of defense and security equipment can be carried out independently. This research uses the theory of production and production management presented by E.L. Brech. The production system starts from inputs, which consist of information, management, equipment and workers, as well as raw materials and capital, which then get treatment in the form of transformation into outputs in the form of goods and services. This research uses a qualitative research method with a case study approach. Primary data is obtained through interviews and direct observation to related parties, while secondary data is obtained from literature studies, documents and other data. This research reveals that the production process at PT SAS Aero Sishan still requires improvement efforts to increase production effectiveness. This research underlines the importance of production management to optimize the resources owned through the production process so as to produce quality and superior products and services in order to realize the independence of the defense industry.

Keywords : Production, Production Management, Defense Industry and Self-Propelled Mortar Carrier System.

INTRODUCTION

Research and development in the defense industry has now become the focus of developments in various global countries. Haripin (Susdarwono, 2020) said that almost all countries that provide large-scale military equipment are supported by strong domestic research capabilities and technological capacity building. The Cold War, for example, forced the United States, Russia, as well as NATO and Warsaw Pact member countries to dedicate many of their resources to research and development (R&D) activities and develop a massive defense industry (Susdarwono, 2020).

In an effort to fulfill the independence of the defense industry in Indonesia, the government formed a state-owned defense industry company holding, namely Defense Industry Indonesia (Defend Id) and supported by private companies. The defense industry policy has a direction towards independence, which is expected in the development of the defense industry phase IV in the period 2025 to 2029 (Yusgiantoro, 2020). Law of the Republic of Indonesia No. 16 of 2012 on Defense Industry states that the defense industry is a national industry consisting of state-owned company and private company, either individually or in groups, which are determined by the government to partially or wholly produce defense and security equipment, maintenance services to meet strategic interests in the field of defense and security located in the territory of the Unitary State of the Republic of Indonesia. The implementation of the defense industry aims to (1) create a professional, effective, efficient, integrated, and innovative Defense Industry; (2) realize the independence of the fulfillment of Defense and Security Equipment; and

(3) increase the ability to produce Defense and Security Equipment, maintenance services that will be used in order to build reliable defense and security forces.

One of the private companies in Indonesia is PT SAS Aero Sishan. PT SAS Aero Sishan continues to strive to support the self-reliance of the domestic defense industry by conducting research and development in military equipment with related agencies, one of which is Badan Penelitian dan Pengembangan Kementerian Pertahanan (Balitbang Kemhan) in terms of procuring prototypes of 81 mm Mortar Carrier Vehicles. The 81 mm Mortar Carrier Vehicle is known as a self-propelled mortar carrier system that is integrated on the vehicle to provide combat assistance. Based on the Study Manuscript on the Organization and Tasks of the Mechanized Infantry Unit Number Perkasad/15/IV/2011, it is stated that the Mechanized Infantry Unit needs to be equipped with mortar weapons mounted on combat vehicles that can keep up with its maneuvers on the battlefield. It is intended that the Mechanized Infantry Unit has a mortar Combat Assistance capability with maximum speed in changing positions (Mabes TNI AD, 2011). The self-propelled mortar carrier system is expected to have high usability at an efficient cost (saving), have operating capabilities that qualify for future battlefield environments and have a flexible concept to meet the requirements for the Mechanized Infantry Unit (Pusat Kesenjataan Infanteri, 2019).

Self-propelled mortar carrier system is a type of artillery mounted on a mobile chassis and designed to carry and fire mortars. 81 mm Mortar Weapons are used by the Army Infantry Unit to provide combat assistance. 81 mm Mortar Weapons are still manually operated both in the firing mechanism and position displacement maneuvers. 81 mm Mortar Weapons are operated at least by 6 people in a team with each person carrying a load of about ± 35 kg. This is an obstacle and limits the space for movement in battle. So that a technology is needed in the form of a vehicle that can carry weapons and ammunition independently which can be used automatically, maneuver quickly and precisely or what is known as the Self-Propelled Mortar Carrier System. The evolution of mortar carrier vehicles dates back to World War II. Mortar carrier vehicles are used to move infantry mortars and their crews (Military History, 2021). Some examples of self-propelled mortar carrier systems are the 2S4 Tyulpan, which is a Russian-made 240mm caliber system, and the RAK 120mm 8x8, which is a Polish-made wheeled system based on the Rosomak armored personnel carrier chassis.

Production management in the procurement of self-propelled mortar carrier systems at PT SAS Aero Sishan has not been optimal. There are still a number of problems in the production process such as the fulfillment of the supply chain, limited production facilities, unqualified human resources, and unclear management coordination lines. It is difficult to fulfill the supply chain in this case raw materials and materials because some items, especially electronics as an important component in this production must be imported from other countries. In the Regulation of the Minister of Defense of the Republic of Indonesia Number 17 of 2014 on the Implementation of Procurement of Major Weapon System Equipment within the Ministry of Defense and the Indonesian National Army Article 71 explains that domestic products must be used if there is an Alat Utama Sistem Pertahanan (Alutsista) provider offering Alutsista with a Domestic Content Rate (TKDN) value plus the value of the Company's Benefit Weight (BMP) of at least 40%. The limited availability of domestic raw materials and components causes a relatively low TKDN so that the goal of independence of the defense industry cannot be fulfilled.

PT SAS Aero Sishan as a defense industry company is equipped with production machinery and workshop facilities, but these facilities are still limited so that some parts of the work must be done outside or transfer of production. This is certainly a risk to the quality control of goods, delays and cost overruns. PT SAS Aero Sishan has employees from various educational backgrounds and experiences, but they are still limited so that experts and focus group discussions are needed to find solutions to the obstacles faced in the field. In addition to these

problems, the production of the Self-Propelled Mortar Carrier System at PT SAS Aero Sishan also does not have a good flow of coordination and management, unclear work duties and overlapping authority.

Production refers to the sequence of processes that transform inputs into a desired shape ("Production Management," 2019). The products of production can be goods and services. The production process is described as the act of transforming inputs through a process to produce tangible outputs. Kumar & Suresh said that production is one of the business functions in a company, which deals with changing the form of input into output with a certain quality, so that production can be categorized as a value-adding process contained in each stage of production (Soeltanong & Sasongko, 2021). Production is all activities in creating and adding utility to goods or services (Sudarso et al., 2022).

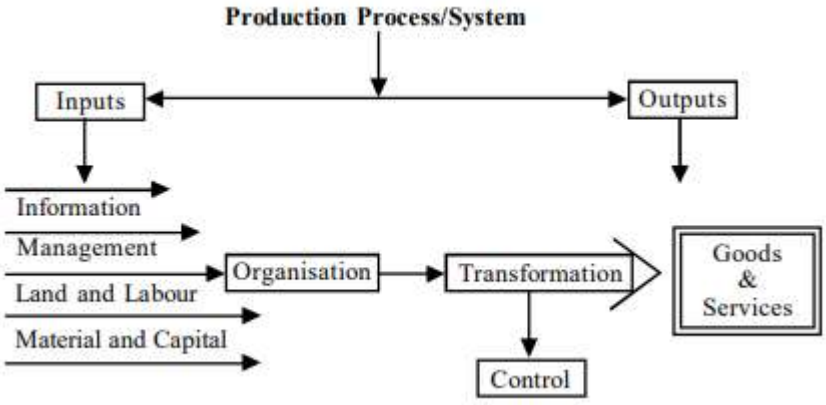

Figure1. Production Process/System
Source: Production Management, 2019

The diagram above in the book entitled Principles of Management explains that the production process starts from inputs, which consist of information, labor, land and capital, and raw materials. Information is used to plan, control, and optimize the production process. Labor plays an important role in running the production process, from operating machines to performing quality control. Land and capital are needed to build infrastructure and provide the necessary equipment for production. Raw materials are the raw materials that will be processed into final products. The transformation process turns raw materials into goods and services. This process can involve various steps, such as cutting, packaging, assembly and testing. The goods and services produced from the production process are the output of the system. These outputs are then distributed to consumers. Control is an important element in the production process to ensure that the products produced conform to specifications and meet quality standards. Control is carried out at every stage of the production process, from the receipt of raw materials to the delivery of the final product.

Pass research show that production management is the process of effective planning and regulating the operations of that section of an enterprise which is reponsible for the actual transformation of materials info finished products (Brech, 1966). Meanwhile, E. S. Buffa conveyed that production management deals with decision making related to production process so that the resulting goods or service is produced according to specifications, in the amounts and by the schedule demanded and at minimum cost (Buffa & Sarin, 1987). Production management is an activity that organizes and coordinates the use of resources in the form of human resources, tool resources and fund resources, as well as materials, effectively and efficiently to create and increase the utility of goods or services (Assauri, 2016). Total Quality Management (TQM) is a management approach that focuses on improving quality in every aspect of the organization, by involving all members of the organization in a continuous improvement process, with the aim of

increasing customer satisfaction (Ahmad & Zaidi, 2020). This study also uses Theory of Constraints (TOC) which identifies bottlenecks in the production process that limit overall output (Gupta & Boyd, 2021). Production management is the process of planning and organizing effective operations to convert raw materials into finished products, involving making decisions related to the production process to meet specifications, quantities, and schedules at minimal cost. The application of TQM and TOC helps in improving product quality and identifying and overcoming bottlenecks in the production process to improve efficiency and customer satisfaction.

This research aims to analyze the production process of self-propelled mortar carrier system at PT SAS Aero Sishan. This research seeks to provide recommendations for effective and efficient production management strategies to optimize the production process of self-propelled mortar carrier systems in order to realize the independence of the domestic defense industry.

RESEARCH METHODS

The research used a qualitative method with a case study approach. Qualitative research methods are research methods based on the philosophy of positivism, used to research on natural object conditions (as opposed to experiments), where the researcher is the key instrument, sampling of data sources is done purposively and snowball, collection techniques with triangulation, data analysis is inductive / qualitative and qualitative research results emphasize meaning rather than generalization (Sugiyono, 2014). Case study is a research strategy to carefully investigate a matter by collecting complete information from various sources (Creswell, 2014). Case study is a type of qualitative research that is conducted thoroughly and in depth with regard to a program, event, or activity, either at the individual, group of people, institution, or organization level. This research uses primary data obtained through interviews and direct observation to related parties, as well as secondary data obtained from literature studies, documents and other data.

RESULT AND DISCUSSION

Production Process Self-Propelled Mortar Carrier System at PT SAS Aero Sishan

PT SAS Aero Sishan as one of the private companies engaged in the defense industry continues to always try to participate in efforts to self-sufficiency in the domestic defense industry. PT SAS Aero Sishan carries out a series of research and development of the Main Defense System Equipment (Alustsista) by utilizing various renewable resources and technologies. One of the products researched and developed is the Self-Propelled Mortar Carrier System. In collaboration with the Research and Development Agency of the Ministry of Defense of the Republic of Indonesia, in 2021-2022 PT SAS Aero Sishan carried out the procurement of 81 mm Self-Propelled Mortar Carrier System prototypes. The Self-Propelled Mortar Carrier System is one of the defense equipment that has been developed and produced by several countries such as China, Russia, South Korea, and European countries. The Self-Propelled Mortar Carrier System is a mortar carrier system equipped with technology that allows self-propelled and towed mortar systems to differ in terms of mobility and flexibility on the battlefield. The self-propelled mortar carrier system is mounted on a moving chassis, such as a wheeled or wheeled vehicle, which allows it to move around the battlefield and quickly position itself to support various engagement areas. The following is the production process of procuring self-propelled mortar carrier systems at PT SAS Aero Sishan.

A. Input

Inputs are the resources needed to produce products in the form of goods and or services. Inputs in production management include:

1) Information

Information includes data or knowledge that is useful and can be used in the production process. Information helps plan, control, and optimize the production process. The self-propelled mortar carrier system as one of the defense equipment research and development products within the Ministry of Defense is supported by information from various sources, one of which is the *Pusat Kesenjataan Infanteri TNI AD* as a user. The user Infantry Unit of this product is also involved, both as consultants, experts and testers in discussion and testing forums. This product is expected to be the answer to the problems faced and in accordance with predetermined specifications and conditions in the field.

Several references to self-propelled mortar carrier systems that have been developed both domestically and abroad are one of the information that supports the production system. The vehicle version of the self-propelled mortar carrier system produced by PT SAS Aero Sishan in 2022 is an improvement of the Aanhang version of the self-propelled mortar carrier system that was produced in 2021. So in terms of engineering, the information has been fulfilled and just applied to the vehicle system.

2) Management

Management plays an important role in running the production process, from operating machines to performing quality control. PT SAS Aero Sishan has a clear management structure with top level, middle level and lower level. At the top level as the highest level of company management consists of the President Director who is assisted by a senior leadership team of 3 Directors who lead the directorate. The top level has the main task of leading, managing and directing the company in accordance with its objectives; controlling, maintaining and managing company assets; and preparing annual work plans. The middle level is responsible for implementing policies and strategies that have been formulated by top level management. The middle level at PT SAS Aero Sishan consists of 5 managers who lead the department. And at the lower level as executors or operations are directly responsible for daily tasks, consisting of heads of staff / staff, operators, technicians, and helpers.

Based on the results of the interview, the management of PT SAS Aero Sishan experienced several problems such as poor communication, unclear work topoksi and task delegation flow. Communication during the production of self-propelled mortar carrier systems involving Balitbang Kemhan as the employer, the Army Infantry Weapons Center as the user and PT SAS Aero Sishan as the production executor experienced miscommunication. Work duties that are not clearly conveyed to employees cause some people to experience confusion, this is exacerbated by the existence of double tasks. In addition, the flow of task delegation still needs to be improved, because the assignment is often not on target. These problems hindered the production process, causing delays and a lack of time effectiveness.

3) Land and Labour

Land and labor in the form of physical resources (land and equipment) and human effort (labor) used in production. required to build infrastructure and provide equipment necessary for production. PT SAS Aero Sishan is equipped with adequate office and workshop facilities to support employee productivity, and is supported by experts from various backgrounds and experiences. PT SAS Aero Sishan is also equipped with work safety support facilities, this is to prevent unwanted events such as work accidents. However, PT SAS Aero Sishan's workshop still has limited equipment, this causes some

work to not be done inhouse. The production of some parts or parts of the self-propelled mortar carrier system must be done outside or in other words divorced. This is certainly an obstacle to the production process. In terms of processing time, the company must ensure that the production timeline is clear and certain. Delays from vendor work can cause delays in overall production time. In addition to time issues, the quality of vendor work is difficult to control. This causes some items that are not in accordance with specifications to be rejected and re-produced. Of course, this has an impact on the acceleration of the production process and product quality. In addition, PT SAS Aero Sishan has a problem with the limited number and expertise of employees. PT SAS Aero Sishan does not have OHS experts, where we know that OHS experts are important to ensure that the occupational safety and health management system is running properly.

4) Material and Capital

The production of a self-propelled mortar carrier system that requires the use of raw materials of at least 40% TKDN, this is not a significant problem because it has met the minimum limit. However, in an effort to make the domestic defense industry independent, of course this still requires improvement. Some raw materials are difficult to find in the country, requiring PT SAS Aero Sishan to make purchases from other countries. Some electronic parts of the self-propelled mortar carrier system come from China, Australia, and European countries. The independence of the defense industry must be fully supported by other domestic industries, so that TKDN Alutsista can increase.

Meanwhile, capital includes financial resources used in production. In terms of working capital, the production of self-propelled mortar carrier systems is obtained from the disbursement of advances, which is 20% of the value of the work. This is intended so that the company can carry out the production process as soon as possible. Working capital is also obtained from the investment of certain parties, in order to support the continuity of production. However, problems in other sectors have an impact on working capital. Where some jobs experience overspending (overcost). This makes the company have to organize a better strategy in managing financial caseflow.

B. Organisation

Organization here involves the structure or arrangement of inputs to be treated or processed. It can include tasks such as scheduling, resource allocation, and workflow design. Production activities begin with the preparation of a plan to ensure the production process can run smoothly and efficiently. This planning process includes organizing human resources, raw materials, machinery and other equipment, as well as the capital needed to produce a predetermined product (Syahlavida et al., 2020). The planning stage is carried out at the beginning of the project after signing the Cooperation contract and being appointed as the implementing provider, at this stage several backup plans are made by considering various possible risks. Poor planning can be the root of the problem and hinder the production process.

Planning in self-propelled mortar carrier system production management includes capacity planning, production planning, supply chain planning, quality planning, human resource planning, financial planning and innovation. Capacity planning ensures that the capacity of owned production facilities can be optimized to meet production needs. Self-propelled mortar carrier system production management can ensure that production facilities remain efficient, productive, and able to optimally meet defense needs because effective capacity planning is the basis for maintaining smooth operations and providing a rapid response to various changing dynamics.

The production planning of the self-propelled mortar carrier system in this case includes determining the ideal time to start each stage, such as raw material processing, component manufacturing, assembly, and testing. The production implementation schedule at the research and development stage takes 11 months, with an estimated design stage taking ± 2 months. If there

are no obstacles, the procurement process for the Self-Propelled Mortar Carrier System can then be carried out within ± 6 months. To reduce the waiting time between production stages, effective workflow coordination is essential. Planning should consider dependencies between processes and optimize the movement of materials and data.

Supply chain planning in production management plays an important role in ensuring smooth operations and timely availability of raw materials. Supply chain planning requires working with suppliers who are competent and have quality materials/components according to the required specifications. A responsive supply chain reduces the risk of delays, and inventory flow remains smooth thanks to good cooperation. Supplier diversification is also an important strategy to reduce the risk of supply disruptions and be more flexible when adapting to market changes. Raw materials and components that are difficult to find in the market because they have to be customized and imported are also taken into consideration in supply chain planning. Careful supply chain planning is the foundation that allows Self-Propelled Mortar Carrier System production management to adapt, reduce risks, and meet production needs efficiently and effectively.

Quality planning begins with setting quality standards in accordance with predetermined specifications, including production process standards, processing of raw materials to the delivery process. The Quality Control Division at PT SAS Aero Sishan ensures production runs in accordance with the provisions of the General Standard (KSU) Material/Supplies of the Army. Quality control is also generally carried out by clients in stages through work visit activities. This quality control helps to find and address deviations immediately and stop problems that may affect the quality of the final product. Product testing at the intermediate stage is also a preventive measure, which makes it possible to find and fix potential problems from the start of production. In addition, quality planning at PT SAS Aero Sishan involves implementing an appropriate quality management system, namely SNI ISO 9001: 2015 to ensure that the entire organization is involved in maintaining and continuously improving quality standards. PT SAS Aero Sishan has a certificate of SNI ISO 9001: 2015 certificate which is renewed regularly every year, this is to increase client confidence.

HR planning to ensure smooth operations and optimal performance starts with assessing the workforce required for each stage of self-propelled mortar carrier system production, then selecting the right employees based on their skills and experience. If a mismatch is found in the process, there is a process of recruitment and selection of new employees, carried out carefully to ensure that the production team consists of people who have the appropriate expertise and skills. Aspects of human resource planning also include monitoring employee productivity and welfare. Examples include implementing various policies related to work-life balance and insurance. Careful human resource planning helps build a self-propelled mortar carrier system production team that is effective, skilled and committed to achieving the best standards of quality and safety.

Financial planning begins with the creation of a comprehensive budget for each stage of production. This budget includes costs for raw materials, labor, overhead, and investment in research and development to ensure smooth operations and sustainability of innovation. PT SAS Aero Sishan previously carried out the procurement of the self-propelled mortar carrier system with a disbursement system of 4 payment terms. With a down payment of 20% of the contract value, disbursed after the signing of the cooperation contract. There are unstable fluctuations that are prone to changes in the price of goods / services. By integrating financial planning as an integral part of production management, the self-propelled mortar carrier system can ensure optimal cost efficiency without compromising quality standards. This creates a strong foundation to support the sustainability of the defense industry and meet the growing demands in this field.

Innovation planning includes improving products and production processes, in the production of self-propelled mortar carrier system, innovation planning is carried out to improve

existing weaknesses, by making directional and sustainable strategies. With production management can make products that are innovative and responsive to national defense and security needs. PT SAS Aero Sishan as a research and development (R&D) company continues to strive to innovate and become a mecca for the defense industry. PT SAS Aero Sishan in innovation planning strives to improve the Company's capabilities by adopting the latest technology to improve production efficiency. Self-propelled mortar carrier system production management creates an environment that supports sustainable growth by creating a holistic innovation plan. This allows the team to adapt to changes and create relevant and innovative products in the dynamic defense industry.

C. Transformation

The transformation process is the core of production, which transforms raw materials into goods and services. This process can involve various steps, such as cutting, packaging, assembly and testing. The transformation process or processing process is a series of activities that transform raw materials into finished products through manufacturing, assembly and service processes. The processing process is a method or technique used by the company for processing raw materials into a product (Syahlavida et al., 2020). In the production management of the self-propelled mortar carrier system, transformation involves a series of careful steps to transform raw materials into a final product that complies with defense and security standards. This process includes product design, selection of high-quality raw materials, component manufacturing, assembly, and quality testing. Successful processing is essential to ensure that the self-propelled mortar carrier system meets the set technical specifications and operates optimally in the field of battle.

During processing, decisions such as the equipment and technology to be used, the process flow to be implemented, including the layout of equipment and all physical aspects of the service facility are taken into consideration. Ideal production management is able to produce quality, efficient, and timely products or services, as well as meet customer needs and increase company profits. In the transformation of the self-propelled mortar carrier system, PT SAS has conducted research and development in 2021 for the Aanhang version of the system, so that in 2022 the system will only be implemented in the vehicle version and does not require further research and development. The processing process can be more easily carried out because it already has an overview of the implementation during the previous research and development process. The processing process can be done by increasing strengths and minimizing or improving weaknesses. PT SAS Aero Sishan carries out the processing process by using goods, raw materials or materials and components that have been collected for the production process.

D. Control

Control is an essential element in the production process to ensure that the products produced conform to specifications and meet quality standards. Control is carried out at every stage of the production process, from the receipt of raw materials to the delivery of the final product. Control or supervision activities are usually carried out to manage, organize, coordinate and direct the production process (equipment, raw materials, machinery and labor) into a flow that provides results at the minimum possible cost and the fastest possible time (Syahlavida et al., 2020). Control aims to ensure that the production process runs according to predetermined plans and standards, if there are obstacles or deviations can be detected and dealt with quickly. Each stage of Self-Propelled Mortar Carrier System production is supervised, evaluated, and controlled by this process. Important aspects of control in the management of the self-propelled mortar carrier system production system include:

1) Production Process Monitoring

This control is carried out directly against each stage in the production flow, covering monitoring of equipment, production rates, and product quality. Equipment control is essential to ensure that all equipment functions according to predetermined standards and

prevent damage or failure that could disrupt smooth production. Control and supervision is carried out periodically by the client in the form of work visits coupled with monitoring and evaluation (Monev) activities according to the number of payment terms in 1 work period.

2) Implementation of Operational Standards

Operational standards as an important part of self-propelled mortar carrier system production, covering product quality consistency, safety and operational efficiency during the production process. PT SAS Aero Sishan has operational standards and is certified by SNI ISO 9001: 2015, this standard must be obeyed by every employee, especially the production department which involves special equipment and machinery to ensure safe work safety and products that meet standards. Operational standards also regulate product quality starting from raw materials and components, production process, to the final result. Every production of self-propelled mortar carrier system as defense equipment will be tested, and at the test stage there is a standard or test protocol. Self-propelled mortar carrier systems that do not meet the standards will certainly endanger and potentially cause casualties, so it is very important to comply with the test protocols that have been made.

3) Measurement Performance

Performance measurement is carried out periodically by sending work progress reports, at least once a month to the employer. Performance measurement is also carried out to ensure that production takes place in accordance with the predetermined work schedule scheme, any delay in progress will be further evaluated to find the source of the problem. Performance measurement in terms of labor helps the Company's management to measure and evaluate labor effectiveness. Comparative analysis of wage costs incurred and output produced.

4) Product Quality

Product quality control includes quality control and specifications of raw materials and components used during the production process that can affect the final quality of self-propelled mortar carrier system products. Production management of the self-propelled mortar carrier system can achieve optimal performance in manufacturing high-quality products, maintaining smooth operations, and responding dynamically to changes in the production environment through the tight integration of quality control, efficient inventory management, and advanced production information systems. With good product management, it can provide accurate data for decision making.

E. Outputs

Goods and services produced from the production process are the output of the system which is then distributed to users. The product produced by PT SAS Aero Sishan, namely the 81 mm Self-Propelled Mortar Carrier System, is the output of a series of research and development processes by gathering the various resources needed and a long transformation process. The 81 mm Self-Propelled Mortar Carrier System is equipped with the latest technology with an automatic system, maneuvering quickly and precisely so that it can assist personnel in the field. The 81 mm Self-Propelled Mortar Carrier System is a product that has a high level of usability at an efficient cost (saving), has operating capabilities that qualify for the future battlefield environment and has a flexible concept to meet the requirements for the Mechanized Infantry Unit, especially in the equipment of Alutsista in accordance with its duties and functions. This 81 mm Self-Propelled Mortar Carrier System is one of the products needed by the Army Infantry Unit. With the production of 81 mm Self-Propelled Mortar Carrier System, it is expected to meet the requirements and specifications both in terms of quantity and quality so as to overcome unit needs.

At this time the 81 mm Self-Propelled Mortar Carrier System is used as a means of training Infantry units in the Kodam III Siliwangi region. In terms of personnel training in the field, it should be made close to the real conditions or circumstances when facing combat. So with this 81 mm Self-Propelled Mortar Carrier System product it can help adjust and familiarize TNI personnel with the latest technology, so that tasks in the field can be lighter. In a study on the Needs of Self-Propelled Mortar Carrier System made by the *Pusat Kesenjataan Infanteri TNI AD*, stated that the need for these products for the present and the future is adjusted to the TOP Morse Yon index of the Mechanized Unit required as many as 68 units. However, the high demand is not followed by a domestic procurement policy by related parties. The Ministry of Defense is still not making it a priority to procure domestic products to increase the independence of the defense industry in Indonesia. The government prefers to buy ready-to-use products such as the 120/81 mm Alakran Light Mortar Carrier (LMC) which is a product of Everis from Spain. Procurement of products from other countries is considered clearer and more certain than domestic products that still require a series of testing tests for mass production and procurement. The low level of demand has caused the production of the 81 mm Self-Propelled Mortar Carrier System developed by PT SAS Aero Sishan to experience problems.

Production Management Strategy of Self-Propelled Mortar Carrier System at PT SAS Aero Sishan

PT SAS Aero Sishan conducts research and development to produce self-propelled mortar carrier systems so that the need for defense equipment is met and achieve the independence of the domestic defense industry. PT SAS Aero Sishan can implement production management to solve the problems faced, this strategy can help the company to streamline the production process not only for the self-propelled mortar carrier system but also for other jobs. The following are strategies in production management that can be seen from various factors, quoted from the Principles of Management book, including:

1. Labor Factors

The company can implement scientific recruitment and employee selection. This recruitment can be done by considering the needs of the Company, educational background and experience background. Proper employee placement is also a consideration to get maximum results. To improve the skills and knowledge of employees, training can be provided in accordance with the field of expertise and the needs of the Company. In addition, providing a good, communicative and conducive work environment so as to increase employee productivity. PT SAS Aero Sishan implements production management by involving various divisions such as engineers, technicians, and procurement to ensure resource optimization and efficiency in production.

2. Management Factors

Management factors in this case can be in the form of an appropriate division of labor, a balance between authority and responsibility of all levels, and the principles of unity of command. So that the level of ambiguity in job duties can be clarified. The production management of the Self-Propelled Mortar Carrier System at PT SAS Aero Sishan involves after-sales support services, interdivisional cooperation, capacity planning, quality control, and integration of the latest technology to maintain the quality, efficiency, and independence of the defense industry.

The production management of the Self-Propelled Mortar Carrier System at PT SAS Aero Sishan also involves product maintenance services during the Maintenance Guarantee period, repairs, provision of spare parts, and training to TNI personnel for knowledge transfer. Software and hardware updates are also continuously provided to maintain product relevance with the latest technology. Regular performance evaluations are conducted after field use to gain feedback and

knowledge required in the development of future versions of the Self-Propelled Mortar Carrier System.

3. Organizational Factors

Important organizational factors have clear and specific goals, PT SAS Aero Sishan has a vision to become a technology, product and service provider company in the defense sector that has a good reputation in Indonesia and internationally because it has qualified technological engineering capabilities, production facilities that meet international standards, quality and effective defense products, as well as human resources and organizations that are well managed and sustainable. To make it happen, it is supported by an organizational structure with proper and directed coordination.

4. Production Factors

In the production process it is important to ensure the availability of the supply chain. In overcoming the problem of limited supply chain for the production of self-propelled mortar carrier systems, PT SAS Aero Sishan can form a procurement division supported by qualified human resources; make a list of domestic suppliers; collaborate with several trusted suppliers; and make a backup plan for goods and services to be used. To support the independence of the defense industry, PT SAS Aero Sishan can prioritize the use of domestic products in accordance with predetermined specifications. Controlling product quality through quality control and raw material specifications is very important to maintain the final quality of the Self-Propelled Mortar Carrier System product. Tight integration of quality control, inventory management, and advanced production information systems is necessary to ensure good production management.

Monitoring and supervision of the production process is carried out periodically to assess whether production is running according to the set plan and schedule. This process makes it possible to spot problems or adjustments that may be needed to achieve production targets. With careful monitoring, the risk of bottlenecks and failures can be minimized, production efficiency can be improved, and products can meet existing standards and specifications. Thus, the processing process in the production management of the Self-Propelled Mortar Carrier System is carried out meticulously to consistently meet the established defense and security standards.

It is also important for production management to make risk planning. This planning involves the identification, assessment, and management strategies of risks that may affect the production of the self-propelled mortar carrier system. Once risks such as changes in regulations, supply of raw materials and components, or damage to production equipment are identified, PMs can create strategies to address or mitigate risks including creating tangible mitigation plans, such as scheduling consistent supply of raw materials or performing regular maintenance of production equipment to avoid failures.

5. Technical Factors

PT SAS Aero Sishan requires production management in the Engineering factor in the form of providing and designing appropriate and modern machinery and equipment. This must be supported by the transfer of knowledge to employees in terms of operation, maintenance and repair. Employees can improve their skills by utilizing technological developments through the facilities provided.

The processing process in the production management of the Self-Propelled Mortar Carrier System is carried out carefully and meticulously to ensure that defense and security standards are met. The processing process includes product design, selection of high-quality raw materials, component manufacturing, assembly, and quality testing. Critical decisions such as the choice of materials and technologies used, the flow of the production process, and the layout of equipment all affect the final outcome of products and services. The importance of a successful processing process is indispensable to ensure that the Self-Propelled Mortar Carrier System meets the set technical specifications and can operate optimally on the battlefield.

6. Financial Factors

In terms of finance, PT SAS Aero Sishan can carry out proper working capital management supported by regular and comprehensive financial planning and control, thus helping the smooth production process. In addition, the company can open investment opportunities to ensure the availability of working capital. However, it is important to ensure the source of funds, loan interest, profit sharing system and repayment of funds so as not to become a problem in the future. In this case, it is important to have careful planning in the form of budgeting, including costs for raw materials, labor, overhead, and investment in research and development to ensure smooth operations and sustainability of innovation. Production cost management emphasizes identifying and controlling costs at every stage of the process. It is important to constantly evaluate the use of finances by keeping a detailed record of financial cash flow. To adapt to changes in industrial policies and market changes, it is important to closely monitor budget realization, find potential savings, and adjust financial plans.

CONCLUSION

PT SAS Aero Sishan strives to develop Alutsista in accordance with the needs of national defense and security by considering the independence of the domestic defense industry. The production process of self-propelled mortar carrier system at PT SAS Aero Sishan involves various elements such as input, organization, transformation, control, and output which overall reflect the complexity and challenges in producing quality military products. The production of the Self-Propelled Mortar Carrier System faces challenges such as the availability of raw materials, limited labor and production facilities, as well as communication and work duties. The need for self-propelled mortar carrier system products is not matched by domestic procurement policies, which makes the production of 81 mm Self-Propelled Mortar Carrier System experience constraints in demand and distribution.

To overcome these problems, PT SAS Aero Sishan implemented a careful and planned self-propelled mortar carrier system production management strategy. Through a holistic approach, the company considers various factors that are vital in the production process. The employee factor is the main focus, where employee selection and training are scientifically conducted to ensure optimal expertise and productivity. In addition, management factors such as proper division of labor and the principle of unity of command help avoid ambiguity and improve efficiency. A clear organization with a strong vision supports the overall production strategy, while special attention is paid to engineering factors through the procurement of modern equipment and knowledge transfer to employees. Financial aspects are also carefully managed to ensure smooth operations and sustainability of innovation. Thus, PT SAS Aero Sishan carries out comprehensive production management to achieve the desired self-reliance of the defense industry.

SAS Aero Sishan demonstrates a strong commitment to continuous innovation by implementing the latest technologies. This step is taken to meet current needs and in response to the changing dynamics in defense needs. PT SAS Aero Sishan's Self-Propelled Mortar Carrier System production not only produces products that meet technical standards, but also helps the defense industry remain independent by incorporating all important aspects of production management. But of course, there are still some aspects that need to be improved. Here are some recommendations for improving the production management of the Self-Propelled Mortar Carrier System at PT SAS Aero Sishan, including:

1. Supply chain optimization, the independence of the defense industry cannot be achieved if it is not supported by other domestic industries. Raw materials and materials that are

difficult to find in Indonesia identify the unpreparedness of the domestic industry so a series of efforts are needed to improve it.

2. Researchers also suggest continuing to innovate through further research and development activities on the latest technology to increase efficiency, reduce production time, and optimize the use of resources.

Conduct comparative studies of national and international defense industry companies to continuously improve company management

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