14th Annual International Conference on Industrial Engineering and Operations Management Dubai United Arab Emirates (UAE), February 12-14, 2024

Publisher: IEOM Society International, USA DOI: 10.46254/AN14.20240565
Published: February 12, 2024

The Readiness of PT XYZ Supporting the Indonesian Army Logistics Transportation

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Abstract

The Indonesian Army has a logistics function that requires transportation to support logistical distribution such as materials, facilities, and maintenance in its units. Types of transportation logistics that can be used consist of motorized transportation, trains, pipes, and horses. PT XYZ is one of the railroad companies that provides rail products for passenger and freight transport. Even that, PT XYZ has not contributed to providing transportation facilities for the logistics transportation of the Indonesian Army. This research was conducted to assess the manufacturing readiness level (MRL) of PT XYZ in providing Indonesian Army logistics transportation. This research is qualitative method which involves the collection and analysis of descriptive data. PT XYZ's manufacturing readiness level (MRL) assessment was carried out through the MRL meter. The results of the assessment were also validated directly by observation at PT XYZ workshops and interviews with the Heads of Fields. The results showed that PT XYZ's manufacturing readiness level (MRL) was at eight levels, which means it was ready to start initial production. Thus, it is still necessary to improve PT XYZ's efforts to increase its manufacturing readiness level (MRL) to support the Indonesian Army's logistics transportation. The strategies that should implemented by PT XYZ in supporting the Indonesian Army logistics transportation are market development, product development, innovation, joint ventures, and backward integration. In supporting Indonesian army logistics transportation, PT XYZ needs to collaborate with the government. PT XYZ could provide multipurpose trains through orders from the Indonesian Army and approval from the government.

Keywords
Indonesian Army, Logistics, MRL, Transportation

1. Introduction
Based on Law No. 3 of 2002 point 1 paragraph 2, the national defense system is a universal defense system that involves all citizens, territories, and other national resources and is prepared early by the government and implemented in a total, integrated, directed, and continues to uphold state sovereignty, territorial integrity, and the safety of the entire nation from all threats. The Indonesian National Army is part of the main component of national defense as stated in Law no. 34 of 2004 concerning the TNI, in article 3 it is stated that the main task of the TNI is to uphold state sovereignty, maintain the territorial integrity of the Unitary State of the Republic of Indonesia based on the five

principle *(Pancasila)* and the 1945 Constitution of the Republic of Indonesia, and protect the whole nation and all of Indonesia's bloodshed from threats. and disruption to the integrity of the nation and state.

Following the Army Doctrine "Kartika Eka Paksi", the Army together with other defense force components of the Unitary State of the Republic of Indonesia must be able to empower and utilize existing resources so that they are ready to be used and mobilized under applicable laws and regulations to realize universality in the State Unity of the Republic of Indonesia. In carrying out its duties, the Indonesian Army has a logistics function that requires transportation to support logistical distribution such as materials, facilities, and services in its units among to Attachment to the Decree of the Indonesian National Army Commander Number Kep/1080/XII/ 2016. Types of Army transportation logistics distribution consist of motorized transportation, trains, pipes, and horses.

Railway transportation consists of passenger trains, freight wagons, and locomotives. PT XYZ is one of the railroad companies that provides rail products for passenger and freight transport. PT XYZ has mastered car body technology, bogie technology as well, and an integrator. Some of PT XYZ's products are already present at home and abroad, such as locomotives, electric railroads, diesel railcars, passenger trains, and freight cars. This condition makes PT XYZ got many profits through the commercialization of its products. In 2018, PT XYZ had sales of 3.25 trillion an increase of 32.81% from the previous year in 2017 which was only 2.58 trillion. This also increase the company profits by 35.93%. This profit was obtained through operational projects carried out by PT XYZ in 2018. Even though, PT XYZ has not contributed to providing transportation facilities for the distribution of Indonesian Army logistics (PT XYZ 2018).

1.1 Objectives

This research was conducted to assess the manufacturing readiness level (MRL) of PT XYZ in providing multipurpose trains as the Indonesian Army logistics transportation. The analysis was also carried out formulating strategies of PT XYZ to support its involvement in logistics transportation for the Indonesian Army.

2. Literature Review

2.1 Organizational Theory

Organizational Theory is a conception, view, review, teaching, opinion, or approach regarding solving organizational problems so that they can be more successful so that the organization can achieve the set targets. Organizational theory in principle discusses the relationship between internal and external organizational factors and organizational effectiveness (Katz and Kahn 1978).

By understanding the organization, the strategy that must be carried out by the organization can be determined. Strategy is a tool to achieve company goals with long-term goals, follow-up programs, and priorities resource allocation. Strategy is a plan that has a scale large, focuses on future achievements is useful for specific goals, and are obtained from interactions with competitive conditions. The management strategy includes strategies that can be implemented by management with a strategy development orientation macro. For example, product development strategy, pricing strategy, acquisition strategy, and so on (Rangkuti 2016). In this research, organizational theory is used to determine the industrial development strategy that must be carried out by PT XYZ.

2.2 Transportation

Transportation is the process of moving goods using a tool to do the work or it can also mean a process of moving people or goods from one place to another using a vehicle land, sea, and air, both public and private by use of a machine or not using a machine. Transportation can also be interpreted as an activity of transporting and moving cargo (goods and people/humans) from one place (place of origin) to another place (place of destination) (Adisasmita 2012).

Transportation as a basis for economic development and development of society and the growth of industrialization. As is transportation causes specialization or division of work according to expertise by the culture, customs, and culture of a nation or area. An item or commodity has value according to place and time if the goods are moved from one place to another. In this case, By using transportation you can create goods or commodities that are useful according to time and place. In transportation, there are two categories, the first is the transfer of materials and production results using means of transportation, and the second transporting passengers from one place to another (Adisasmita 2012).

Transportation has a very important role, namely determining development success. The economy is defined as a condition that includes various activities grouped into production activities, transactions, distribution, and consumption. Economic conditions consist of several stages, namely traditional economy, and transition economy. Economic development according to its stages reflects conditions the transportation. In the modern economic stage, transportation conditions experienced great progress. Conditions for the development of transportation and development show the same direction or a very positive relationship (Adisasmita 2012).

2.3 Logistics

Logistics is the management of the flow of movement of goods from a point of origin ending at the point of consumption to meet certain demands, for example, aimed at consumers or end users of the product. Logistics also relates to order processing, transportation, inventory, goods handling, facility structure, and information and communication systems. Logistics aims to send goods in the right quantity and at the required time to the destination location at the lowest cost. There is a difference between logistics and distribution. Logistics focuses on creating strategic plans to move goods, while distribution carries out the transportation of those goods using wise strategies (Zhang 2014).

According to the United States Department of Navy, military logistics is the science of planning and budgeting the movement and maintenance of an object's strength. This strategy is related to determining how to achieve its logistics according to the creation and implementation of continuous support to combat units and tactical units. The availability of defense and security equipment influences a means of strategy and tactics for carrying out military operations (Zecevic, et al 2015).

Based on the Defense and Security Doctrine of Indonesia, the military logistics system consists of defense logistics and regional logistics. Defense logistics has a functions as a bridge between the front line and the back line, and the process of Logistics is an economic element in military operations. According to the Regulations Minister of Defense Number 25 of 2008, national defense logistics are everything related to various fulfillment and regulatory efforts material needs, facilities, and services to support defense implementation country. TNI logistics is everything related to efforts fulfillment and arrangement of various material needs, facilities, and utility services to support the implementation of the main tasks of the TNI (BPPI 2015).

3. Methods

This research uses a qualitative method which involves the collection and analysis of descriptive data. Through this method, research will gain an in-depth understanding of PT's readiness. XYZ in supporting logistics transportation for the Indonesian Army. Qualitative research was used to analyze the logistics distribution process carried out by the Indonesian Army. To describe data, the measurement of PT XYZ's manufacturing readiness level (MRL) in providing trains as an Indonesian Army logistics transportation was done. In the end, the analysis was also carried out to analyze the strategy of PT XYZ as a railway industry in supporting the Indonesian Army's logistics transportation. Data analysis is carried out interactively by data collection, data condensation, data presentation, and conclusion. All the processing data is interconnected before, during, and after data collection (Miles and Huberman, 2014).

4. Data Collection

This research collected data carried out by interviews, questionnaire measurements, observation, and literature study. Interviews are a communication or interaction process to collect information using questions and answers between researchers and informants or research subjects (Sugiono 2018). In this research, interviews were conducted with informants who were considered experts and masters of the research field in question. There are the production development manager, Engineering Manager Information Mechanic, production technology manager, electrical design manager, mechanical design manager, interior design manager, production planning manager, and material control manager.

A questionnaire is a data collection method by provides sheets of paper containing questions that are then answered by the respondent according to the actual situation (Sugiono 2018). In this study, a questionnaire was used to measure PT XYZ's manufacturing readiness level (MRL) using indicators on the MRL meter. Observation is the act of observing and recording in an orderly manner the elements that appear in an event on the research object. This approach is used to gain a deep understanding of the research object (Sugiono 2018). Observations of this research were made by visiting the PT XYZ factory directly. In this research, a literature study was carried out by reviewing

documents, notes, files, and other matters related to the logistics distribution of the Indonesian army and the level of manufacturing readiness of PT XYZ.

5. Results and Discussion

5.1 The regulation of Indonesian Army logistics transportation

The Attachment Decree of the Indonesian Army Commander Number Kep/1080/XII/2016 CHAPTER III concerning the Implementation of the Indonesian Army logistics support system, which is intended to support the shifting of troops and supplies & materials, both in the context of operations and training. Army logistics support is carried out through the operation of transportation facilities, regulation and control of transportation activities, and preparation of terminal facilities. The use of logistics in supporting Army tasks is carried out before, during, and after operations for both War Military Operations and Military Operations Other than War**.**

Logistical support before the operation is intended to fulfill the need for unit preparation and pre-assignment training for the Indonesian Army Units which will carry out to the area of operation by the needs and type of operation. Among this support is through provision, namely the existence of logistical support before the operation, to complete the need for provisions, material, and unit facilities so that the unit is in good condition and ready for operation. Provision support is based on strength, mileage, timeframe, and specifications. Provision needs are served by organic elements or by regional service installations that provide supply points. Furthermore, the implementation of the material treasury is based on several material groupings, including groupings in the class of supplies that are tailored to the needs for carrying out supply functions. The classification of logistics Indonesian Army is shown in the following Table 1.

Table 1. The Classification of Logistics Indonesian Army

Classification	Definition	Example
Class I	All supplies that are used up with a relatively fixed amount under all such circumstances food ingredients	Rice, side dishes, noodles, and cereal
Class II	All supplies given at the start of debriefing to individuals/ units according to command or other allocation lists	Clothing, shoes, weapons, and vehicles
Class III	All petroleum supplies	Materials fuel, oil, and lubricants
Class IV	All supplies that are not included in other classes are issued in a special way	Tools terrain reinforcement, tank, and construction tools
Class V	Provisions	Munitions, gunpowder, and propellant

The table above shows the classification of Indonesian Army logistics materials. This research discusses PT XYZ's readiness to provide trains that can transport the five types of logistics material classifications. So that one type of train can be modified to transport different types of material, which is called multipurpose transportation.

5.2 The existing condition of Indonesian Army logistics transportation

Transportation plays an important role in the process of moving goods between parties in the supply chain, which will affect inventory, facilities, efficiency levels, and response organization to meet consumer needs. In determination, The transportation considered is the mode of transportation, scheduling, and delivery size (consolidation) Those things are considered with consideration of economies of scale, the best price, intermodal transit time, and or parties involved in the supply chain. The choice of transportation must also pay attention to transportation costs, route selection (product flow during delivery), and network (combined from location, route, and consideration of own production or purchase) (Martono, 2018).

The Indonesian Army's logistics transportation is influenced by the system that connects producers to the Indonesian Army as consumers. The transport mode is a grouping of transport types according to traffic, equipment, or energy. The five means of conveyance that can be used as logistics transportation are train, truck, ship, airplane, and pipes. The implementation of logistics transportation should be carried out in an orderly, safe, and smooth need paying attention to goals, objectives, physical, role, organization, duties and responsibilities, personnel requirements, tactics and techniques, equipment, and related factors that influence it. The train consists of trains passenger, goods, and service trains (Mazda and Apriyanto 2020). The comparison of transportation rail and road transport is as follows (Zulzizar 2018) (Table 2.):

Table 2. The Advantages of Rail Transportation Over Road Mode

Characteristics	Train Mode	Road Mode
Service	Requires feeder mode (feeder) low mobility	Door to door tall mobility
Speed	Relatively faster because the side bridge is free	It depends on the volume of traffic and the conditions road
Types of traffic Transport	Only for various trains	starting from walkers to trucks
High Reliability	Schedule bound Depends on external factors	Flexible
Technology	High	Medium and adjust circumstances
Dexterity of the route	Less flexible	Bound track flexible
Usage energy	Low	High
Use of space	More efficient	Less Efficient
Economical Cost	The economic cost for the distance near, medium, or away because with volume away with passenger volume /goods transported tall	More profitable for distance operations short with volume passengers/goods little is transported
Pollution Degree	Low	High
Maintenance	Tall	Low
Capacity	Large capacity	Small capacity

5.3 The Manufacturing Readiness Level (MRL) of PT XYZ

The Manufacturing Readiness Level (MRL) is a tool to measure the level of technology readiness on productivity capabilities associated with the risk of fulfillment and manufacturing times. The measurement of MRL can be used parameters filled with questionnaires (DOD 2018). The MRL parameter is set as the default generally used to assess the manufacturing maturity of product technology and products for future readiness, as well as to understand the existing manufacturing risks. MRL was measured using the following parameters (Table 3):

Table 3. The Parameter of Manufacturing Readiness Level (MRL)

Level	Indicator
MRL 1	Identify the initial intent of manufacturing
MRL 2	Identify the manufacturing concept
MRL 3	Proof of concept developed
MRL 4	Ability to produce technology in the environment laboratory
MRL 5	Ability to produce prototype components in the relevant production environment
MRL 6	Ability to manufacture a system or sub-prototype system in a relevant production environment
MRL 7	Ability to produce systems, subsystems, or components in a representative production environment
MRL 8	Ready to start initial production
MRL 9	Ability to produce in full
MRL 10	Full production

The assessment of the PT XYZ Manufacturing Readiness Level (MRL) was conducted give the result as following Table 4:

Table 4. The assessment of PT XYZ Manufacturing Readiness Level (MRL)

Level	Indicator	Score (%)	Decision
MRL 1	Identify the initial intent of manufacturing	87,6	valid
MRL 2	Identify the manufacturing concept	85,5	valid
MRL 3	Proof of concept developed	83,3	valid
MRL 4	Ability to produce technology in the environment laboratory	84,1	valid
MRL 5	Ability to produce prototype components in the relevant production environment	84,3	valid
MRL 6	Ability to manufacture a system or sub-prototype system in a relevant production environment	84,7	valid
MRL 7	Ability to produce systems, subsystems, or components in a representative production environment	84,6	valid
MRL 8	Ready to start initial production	83,7	valid
MRL 9	Ability to produce in full	78,4	invalid
MRL 10	Full production	68,8	invalid

In the Manufacturing Readiness Level (MRL), if the score is more than 80%, then the indicator in the MRL level is done and valid. But if the score is less than 80%, then the indicator is not done or invalid. From the table above the manufacturing readiness level of PT XYZ is on MRL level 8 that is means ready to start initial production.

5.4 The strategy of PT XYZ to support Indonesian Army logistics transportation

To support the main tasks of the Indonesian Army, it is necessary to distribute logistics according to class supplies that can reach all defense areas. In times of peace, the mode of transportation used by the Indonesian Army is a product of the Defense Industry, such as cargo ships and cargo trucks to carry out logistics distribution. Currently, the use of trains as a means of transportation for logistics distribution is not used because logistics distribution needs have been implemented using facilities owned by the Force. To provide a redundancy and communality effect, when problems

occur with existing transportation facilities, there must be an alternative. Trains are a mode of transportation that can be used to support Army logistics distribution. Both for personnel and goods so it is called multipurpose transportation.

PT XYZ is part of a supporting component in the form of a national resource that has the opportunity to contribute by providing a multipurpose transportation function for trains. PT XYZ can become a Train Manufacturing Industry and service and retail service provider both at home and abroad. To foreign countries, PT XYZ demonstrated its industrial capability in fulfilling 250 units of Bangladeshi ordered trains of which 50 units had been fulfilled. As for domestically, XYZ has shown its existence with the establishment of several projects from consumers.

PT XYZ has many factors to support their production system. There are mastery of manufacturing technology trains, starting from bogies, car bodies, and wagons to the locomotive; PT XYZ already has various designs train carriages that can be used as a benchmark in further design development; PT XYZ has 43 years production experiences and also skilled and qualified workforce; PT XYZ has a development division which is specifically carrying out railway product innovation. In other ways, PT XYZ has opportunity such as government policy in adding train lines fire and reactivation of fixed rails as a railroad crossing and PT XYZ has suppliers from abroad for supports the train production process. PT XYZ also has the construction of a new workshop in east java region to increase productivity. The government plays a role in developing PT XYZ's business. This is because the government is the axis of development, so public policies have a significant impact on PT XYZ's industry. An example is the Light Rail Transit (LRT) development policy which resulted in orders for LRT trains produced by PT XYZ. The government continues to improve equitable infrastructure development without the gaps. This development is also intended to expand employment opportunities, distribute state income sources evenly, expand transportation networks, and social protection, and encourage the people's economy (Merina and Mazda 2022).

In supporting Indonesian army logistics transportation, PT XYZ needs to collaborate with the government. The Triple Helix is said to be a concept of synergistic collaboration between the Government, Universities, and Industry where the Government is the policy maker, the University is the center for research development, and the industry is the product provider to achieve common goals (Mazda et al. 2022). PT XYZ could provide multipurpose trains for Indonesian Army logistics transportation through orders from the Indonesian Army and approval from the government. The strategies that should implemented by PT XYZ in supporting the Indonesian Army logistics transportation are:

1. Market development
   Export market development (local partners and cooperation with international markets with more advanced similar industries). New local government both to the government and local government as well as operators new trains with the support of both old and new products and improved customer service and funding support.

2. Product development
   Product development for railway facilities/infrastructure and transportation, as well as in system development of new transportation to support the system of urban transportation.
3. Innovation
   Stimulate research and development activities to produce new product innovations and develop new business schemes.
4. Joint ventures
   Develop business capabilities and size business venture by opening up through business collaboration/ joint venture, and establishment of a subsidiary.
5. Backward integration
   Improving the ability of subsidiaries to support and create a strong industrial pyramid

6. Conclusion

The Indonesian Army's logistics support is carried out through the operation of transportation facilities, regulation and control of transportation activities, and preparation of terminal facilities. The Indonesian Army's logistics transportation is influenced by the system that connects producers to the Indonesian Army as consumers. The transport mode is a grouping of transport types according to traffic, equipment, or energy. The five means of conveyance that can be used as logistics transportation are train, truck, ship, airplane, and pipes.

PT XYZ's manufacturing readiness level (MRL) was at eight levels, which means it was ready to start initial production. Thus, it is still necessary to improve PT XYZ's efforts to increase its production capability so that its

manufacturing readiness level (MRL) is at the level and able to support the logistics distribution of the Indonesian Army. The strategy for developing multipurpose trains is to optimize the men, machines, materials, methods, money, and environment. The business strategy that could be done by PT XYZ is market development, product development, innovation, joint ventures, and backward integration. The most appropriate strategy by PT XYZ the first step is to innovate product development according to needs customer or user requirements and conduct a consortium with the domestic raw material supply industry providing raw materials for railway needs with a lead time or waiting time not too long.

As a recommendation, in supporting Indonesian Army logistics transportation, PT XYZ needs to collaborate with the government. PT XYZ could provide multipurpose trains for Indonesian Army logistics transportation through orders from the Indonesian Army and approval from the government.

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