

# The Effect of Monitoring and Employee Coordination on Procurement of Main Engine Spare Part for Operational Continuity of Vessels

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**Abstract:-** Main engine constitutes an essential part of a vessel; otherwise, in the event of poorly tended main engine breakdown, it will cause the vessel to cease operation. Therefore, some efforts are necessary to improve optimal maintenance of main engine, one of which is the procurement of main engine spare parts for vessel maintenance and repair. Inventory and good coordination between vessel crews and office staffs are mandatory to ensure the continuation of vessel operation. The correct procurement of spare part main engine, added with monitoring and employee coordination developed by the company, proved able to improve a vessel's operation, therefore the procurement of main engine spare part as intervening variable can be concluded to enforce the influence of monitoring and employee coordination towards vessel operation. The research method uses a quantitative method approach.

**Keywords:-** Monitoring, Employee Coordination, Main Engine Spare Part Procurement, Vessel Optimization.

## I. INTRODUCTION

Procurement of goods and services is a work plan activity that aims to meet the needs of goods and service users. Planning needs, establishing procurement implementation plans, calculating procurement budgets, selecting providers, signing contracts, implementing and regulating contracts, and obtaining products and services by users are all steps in the procurement process. When factors such as quality, quantity, and delivery time are compared, this method ensures that customers receive the best price for goods, services, or works. PT. Pertamina (Persero) Shipping, in particular, strives to improve its quality on a regular basis in order to stay ahead of the competition. As a result, the organization attempts to continually improve service quality. One of them is quality service, which can be gained through the smooth operation that has been established.

Ships, as a mode of transportation, will face a variety of challenges in their operations, including those caused by natural factors, environmental conditions, and the time factor of utilization. This can result in damage to the ship's propulsion engine and other supporting equipment, which serve as support items in the ship's operation. Ship maintenance is something that must be considered in order for the ship to remain operationally ready and meet the intended schedule on time. Maintenance seeks to preserve the consistency of the ship's performance; it is required to undertake planned maintenance and repairs so that the ship's

operational process is not disrupted. The main engine is one of the ship's essential components, and it plays a critical part in the ship's operational process as the only source of energy for propelling the hull. It also necessitates routine maintenance and repairs. It is required to acquire spare parts (spare parts) optimally and at the proper time, according to needs, when preparing planned maintenance. If spare parts procurement is not completed on time and in a satisfactory manner, the ship and the firm may suffer damages.

PT Pertamina Shipping, a world-class shipping and maritime service company with international standards, has 80 ships, mostly oil and gas carriers, that are managed by several fleet departments that are very concerned about main engine maintenance and repair, because the main engines used are generally not manufactured in Indonesia, and the spare parts needed for maintenance and repair are imported commodities from the country where the main engine is produced. In terms of planning the procurement of spare components for the main engine in ship maintenance and repair, this will be a daunting challenge. Furthermore, the required spare parts typically require fabrication time following the purchase agreement, resulting in a wait time for spare parts that must be delivered. To manage with the aforementioned circumstances, good monitoring and coordination between employees on ship duty (ship crew) and those on office duty is critical to ensure the ship's smooth functioning.

## II. RESEARCH PROBLEM

This study tries to answer the following questions:

- Is there a direct effect of monitoring ship operations on the procurement of spare parts for the main engine of PT. Pertamina (Persero) Shipping?
- Is there a direct influence of employee coordination on the procurement of spare parts for the main engine of PT. Pertamina (Persero) Shipping?
- Is there a direct effect of monitoring ship operations on the smooth operation of PT. Pertamina (Persero) Shipping?
- Is there a direct influence of employee coordination on the operational continuity of vessels of PT. Pertamina (Persero) Shipping?
- Is there a direct influence on the procurement of spare parts for the main engine on the operational continuity of vessels of PT. Pertamina (Persero) Shipping?
- Is there an indirect effect of monitoring on the operational continuity of vessels of PT. Pertamina (Persero) Shipping through the procurement of spare parts for the main engine?

- Is there an indirect effect of employee coordination on the operational continuity of vessels of PT. Pertamina (Persero) Shipping through the procurement of spare parts for the main engine.?

### III. LITERATURE REVIEW

#### ➤ *Monitoring*

According to the Big Indonesian Dictionary, a person or an instrument that can monitor, observe, or inspect thoroughly and can be used to achieve particular aims or objectives is known as monitoring or monitoring. Monitoring is defined as a series of tasks that include gathering, reviewing, reporting, and acting on data from a running process. Essentially, monitoring has two primary functions: compliance monitoring and performance monitoring (Mercy, 2005). Supervision, according to the journal cited (M. BasriI Kamal, 2015), is a process of setting performance metrics and implementing steps to promote the accomplishment of expected results in accordance with specified performance. Sule (2008). "Supervision essentially implies preserving stability and equilibrium," writes Handoko (2003), as quoted in the journal (M. BasriI Kamal, 2015). Managers must, however, continually adapt what they do or adjust the performance standards that are now used to gauge success in order to achieve a balance. And, rather than being employed in isolation, monitoring approaches and processes should be used together.

Every activity made by the organization requires supervision, which will instruct personnel so that they can complete job properly and in accordance with the plan. But it is also human nature to want to be free, to be unrestricted and unconstrained by any rules. Employees will be more or less accustomed to following work discipline if they are under such monitoring. Perhaps supervision isn't necessary for some employees who understand the idea of discipline, but for others, discipline must be enforced a little more forcefully so that they don't do everything in the company.

The synthesis of monitoring, according to the above description, is an effort to carefully monitor, observe, or inspect running operations in order to reach the aims and targets to be achieved. Because something could happen in operations, whether foreseen or not, monitoring is important so that whatever happens can be quickly identified and the appropriate action taken.

#### ➤ *Employee Coordination*

According to Yohannes Yahya, coordination is the process of merging goals and actions among various units within an organization in order to achieve organizational goals efficiently (2006: 95). Coordination, according to George R. Terry in Hasibuan (2007: 85), is a synchronized and regular effort to provide the appropriate amount and time, as well as direct the execution, to achieve a uniform and harmonic action on a set aim. Meanwhile, according to E.F.L. Brech in Hasibuan (2007:85), coordination is the process of balancing and moving a team by providing an appropriate location for each member's work activities and ensuring that they are carried out in proper harmony among the members. According

to Stoner (1994: 321), who was quoted in the journal (Monicca, 2013), successful coordination by Dishubkominfo, Satlantas, and Organda can be accomplished using fundamental management strategies, such as determining whether there is a managerial hierarchy in the coordination process. Make regulations and procedures to deal with common occurrences linked to this problem, as well as coordinating measures to combat the growing number of illegal travelers, such as imposing strong penalties on unlawful travel drivers and owners. Improving coordination potential entails looking at a vertical information system and seeing how it coordinates, as well as whether it occurs vertically. Lateral relationships look at how a relationship works together.

According to Hasibuan, in Manulang, 2002, are those who sell "mind or energy" services for a fixed fee. Employees are residents of working age "aged 15-64 years" or the entire population of a country that produces goods and services provided there is a need for their labor and if they wish to participate in these activities, according to Subri, in Manulang, 2002.

The synthesis of employee coordination, according to the definition above, is a partnership developed across organizational units to generate a uniform and harmonious action in the pursuit of common goals.

#### ➤ *Procurement Spare Part Main Engine*

According to Burt in Siahaya (2013: 2), procurement is a systematic process that determines what, when, and how much to buy, purchasing activities, and ensures that the processes required are delivered on time and in a set amount and quality. Acquisition is a part of Supply Chain Management, according to Siahaya (2008:4), which methodically and strategically processes the procurement of goods and services from the source to the destination based on quality, quantity, price, time, source, and location to meet customer needs. As a conclusion, procurement may be defined as an effort to obtain products and services that is based on logical and systematic thinking and adheres to the rules and ethics that apply to conventional procedures and processes for acquiring goods and services.

Spare components, or spare parts, are tools that support the demands of equipment employed in the manufacturing process, according to Indrajit and Djokopranoto (2013: 69). An item, according to Suwiryo (2011), is made up of multiple components that work together to produce a single unit with a specified function. Each machine is made up of numerous components, but we'll focus on the ones that are frequently broken and replaced. Ship spare parts, according to (Hengki, 2017), are ship commodities made up of multiple components that form a single unit and serve a specific purpose for each piece of heavy equipment. As a result, spare parts can be defined as items or instruments that assist in the procurement of goods made up of numerous components that constitute a single unit and are employed in the production process.

The diesel engine is an aircraft that converts heat potential energy directly into mechanical energy, or also known as the Combustion Engine System, according to

Handoyo (2015) in the book Diesel engine the principal propulsion of the ship.

The synthesis of the main engine spare part procurement is a systematic process to decide what, when and how much to buy, the act of purchasing main engine spare parts and ensuring what processes are needed so that they can be received on time in a predetermined quantity and quality.

➤ *Operational Continuity of Vessels*

According to Fogarty, Hoffman, and Stonebroker (2009:1), Operations is an activity that tries to carry out activities or implement decisions based on the existence of a work order, a system, or a decision. Operations can be defined as the process of carrying out activities. The existence of operational management is very much needed in the environment because with operational management, the company can improve in providing services, and can manage all ship operational activities in accordance with planned work plans and procedures. As a result, operational management is required in the environment since it performs a critical function. Parties can determine the structure of persons, groups, sections, sectors, or departments in an organizational environment, in this case the environment, using operational management in the environment. Operational management can be seen of as a directing / actuating function that include guiding, overseeing, and inspiring people / crews to complete their tasks. Operational management can also serve as a control mechanism by establishing the necessary standards and communication networks to ensure that the work plan proceeds as intended.

The synthesis of a operational continuity of vessels is the smooth operation connected to the aims of carrying out the tasks and functions of the implementation elements aboard the company's ships, as described above.

➤ *Research Method*

This research uses the quantitative method. The quantitative approach is a research procedure that produces data in numbers and is generally analyzed using descriptive or inferential statistics (Silaen, 2018). The numbers obtained are processed and sought to determine their effect on the formulation of the research problem that has been determined. Do the survey results prove the proposed hypothesis? Do the numbers show that we are right about the problem under study? Etc.

The target population in this study were employees of PT. Pertamina (Persero) Shipping. The author determines that the population is karyawan yang bekerja di salah satu fungsi management fleet PT. Pertamina (Persero) Shipping, yang menanggung 14 kapal Milik Pertamina. Karyawan yang memiliki tanggungjawab sebagai Technical Superintendent kapal sebanyak 14 pekerja, Karyawan yang memiliki tanggungjawab sebagai Plan Maintenance Officer sebanyak 18 pekerja, divisi procurement sebanyak 5 pekerja.. From the total population of 37 employees, all of them were taken as research samples.

**IV. RESULT**

➤ *Validity Test*

The value of the critical limit of validity is 0.361. If the correlation value or r count is less than or less than 0.361, the questionnaire item is invalid. On the other hand, if the calculated r-value is greater than 0.361, then the items on the questionnaire are declared valid. Test the validity of the research instrument (questionnaire) for each of the variables studied can be seen in Table 1 below.

Table 1. Validity Test Result

Statement	Result				Status
	Monitoring (X1)	Employee Coordination (X2)	Procurement of Spare Part Main Engine (Y)	Operational Continuity of Vessels (Z)	
No. 1	0.834	0.702	0.640	0.617	Valid
No. 2	0.676	0.628	0.816	0.866	Valid
No. 3	0.581	0.780	0.899	0.901	Valid
No. 4	0.659	0.596	0.831	0.727	Valid
No. 5	0.911	0.876	0.874	0.859	Valid
No. 6	0.582	0.796	0.879	0.634	Valid
No. 7	0.834	0.934	0.554	0.920	Valid
No. 8	-	0.895	-	0.808	Valid
No. 9	-	0.731	-	-	Valid

Source: Primary data, processed by Statistical Package for the Social Sciences version 25.

Table 1 shows that each item of each variable statement of Monitoring, Employee Coordination, Procurement of Spare Part Main Engine, and Operational Continuity of Vessels are declared valid.

➤ *Reliability Test*

Table 2. Reliability Test Result

Variable	Alpha Value	Limit Value	Status
Monitoring (X1)	0.849	0.70	Reliable
Employee Coordination (X2)	0.915	0.70	Reliable
Procurement of Spare Part Main Engine(Y)	0.899	0.70	Reliable
Operational Continuity of Vessels (Z)	0.906	0.70	Reliable

Source: Primary data, processed by Statistical Package for the Social Sciences version 25

Table 2 shows that the overall alpha value is reliable (reliable) because the Cronbach Alpha coefficient is 0.70, or it can be said to be greater than 0.70. In accordance with the results of the validity and reliability analysis mentioned above, the statement items prepared from each variable can be used and distributed to all 37 employees who have been targeted as respondents. Therefore, it can be seen that the items show valid and reliable results. From these results, further analysis can be carried out.

➤ *Partial Test*

Table 3. Partial Test Structure 1

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.546	5.865		.775	.444
	Monitoring	.393	.173	.350	2.277	.029
	Koordinasi Karyawan	.489	.203	.371	2.416	.021

a. Dependent Variable: Pengadaan Spare Part Main Engine

Source: primary data, processed by Statistical Package for the Social Sciences version 25

- Monitoring has a direct effect on the Procurement of Spare Part Main Engine. Table 3 shows the results of the t-test. The Sig value is  $0.029 < 0.05$ , so the path analysis coefficient is significant. Thus, Monitoring has a positive and significant impact on the Procurement of Spare Part Main Engine. The direct influence of the Monitoring on the Procurement of Spare Part Main Engine is indicated by the Beta value of 0.350.
- Employee Coordination has a direct effect on Procurement of Spare Part Main Engine. Table 3 shows that the t-test obtained a Sig value of 0.021, which is smaller than 0.05 or  $[0.021 < 0.05]$ , then the path analysis coefficient is significant. Thus, Employee Coordination has a positive and significant effect on Procurement of Spare Part Main Engine. The large influence of Employee Coordination on the Procurement of Spare Part Main Engine is indicated by the Beta value of 0.371.

Table 4. Partial Test Structure 2

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.265	3.631		.348	.730
	Monitoring	.342	.114	.346	3.003	.005
	Koordinasi Karyawan	.317	.135	.274	2.357	.025
	Pengadaan Spare Part Main Engine	.349	.105	.398	3.318	.002

a. Dependent Variable: Kelancaran Operasional Kapal

Source: primary data, processed by Statistical Package for the Social Sciences version 25

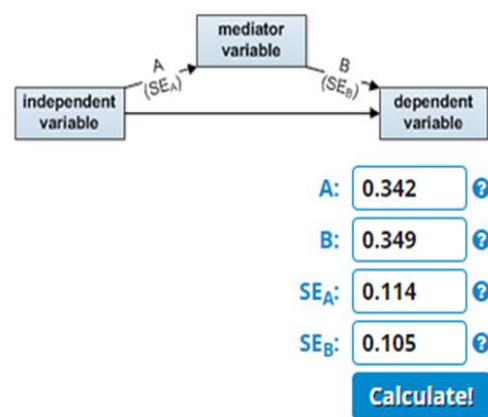
- From table 4 shows that the t-test obtained a Sig value of  $0.006 < 0.05$ , so the path analysis coefficient is significant. Thus, using the Monitoring has a positive and significant impact on the Operational Continuity of Vessels. The direct influence of Monitoring on Operational Continuity of Vessels is indicated by the Beta value of 0.346.
- Employee Coordination has a direct effect on Operational Continuity of Vessels. Table 4 shows the t-test obtained Sig 0.025  $< 0.05$ , then the path analysis coefficient is significant. Thus, Employee Coordination has a positive and significant effect on Operational Continuity of Vessels. The considerable influence of Employee Coordination on Operational Continuity of Vessels is indicated by the Beta value of 0.274.
- Procurement of Spare Part Main Engine has a direct effect on Operational Continuity of Vessels. Table 4 shows the t-test. The Sig value of 0.002 is smaller than 0.05 or  $[0.002 < 0.05]$ , so the path analysis coefficient is significant. Thus,

the Procurement of Spare Part Main Engine has a positive and significant effect on the Operational Continuity of Vessels. The considerable influence of Procurement of Spare Part Main Engine on Operational Continuity of Vessels is indicated by a Beta value of 0.398.

➤ Sobel Test

The Sobel test was conducted to test whether the relationship through a mediating variable could function as a significant mediator in the relationship. The calculation of the z value of the Sobel test can use the danielsoper online link via [www.danielsoper.com](http://www.danielsoper.com) with the Statistical Calculator → MediationModels → Sobel Test Calculator for Significance of Mediation feature, with the following results:

- Mediation Test of Monitoring on Operational Continuity of Vessels through Procurement of Spare Part Main Engine.



Sobel test statistic: 2.22702452  
 One-tailed probability: 0.01297282  
 Two-tailed probability: 0.02594563

Fig 1 Sobel test model 1

Based on Figure 1 the one-tailed probability result is  $0.01297282 < 0.05$ , so it can be concluded that the Procurement of Spare Part Main Engine variable can function as a mediator or is able to mediate the indirect effect of Monitoring on Operational Continuity of Vessels.

- If Mediation Employee Coordination on Operational Continuity of Vessels through Procurement of Spare Part Main Engine.



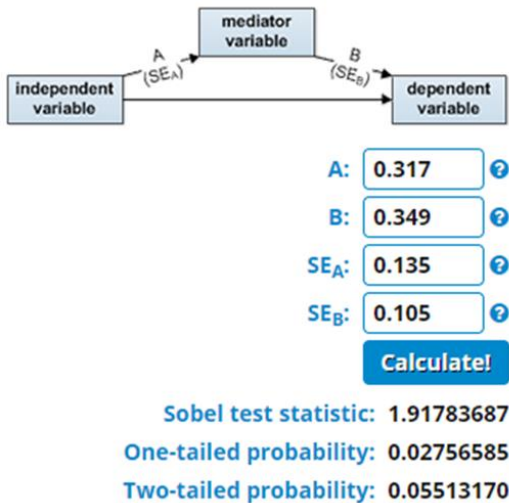


Fig 2. Sobel test model 2

Based on Figure 2, the one-tailed probability result is  $0.02756585 < 0.05$ , so it can be concluded that the Procurement of Spare Part Main Engine variable can function as a mediator or be able to mediate the indirect effect of Employee Coordination on Operational Continuity of Vessels through Procurement of Spare Part Main Engine.

➤ *Goodness of Fittest Test*

**Table 6. R Square Sub Structure 1**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.622 <sup>a</sup>	.387	.351	1.146

a. Predictors: (Constant), Koordinasi Karyawan, Monitoring

Source: primary data, processed by Statistical Package for the Social Sciences version 25

**Table 7. R Square Sub Structure 2**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.842 <sup>a</sup>	.710	.683	.704

a. Predictors: (Constant), Pengadaan Spare Part Main Engine, Monitoring, Koordinasi Karyawan

Source: primary data, processed by Statistical Package for the Social Sciences version 25

Then the total diversity of data that can explain by the model is measured by:

$$R^2_m = 1 - (1 - R^2_1) \cdot (1 - R^2_2) \cdot (1 - R^2_p) \quad (1) \quad R^2_m$$

$$= 1 - (1 - R^2_1) \cdot (1 - R^2_2) \cdot (1 - R^2_p) \quad (2)$$

$$= 1 - (0,387) \times (1 - 0,710) \quad (3)$$

$$R^2_m = 0,8196$$

The  $R^2_m$  value of 0.8196 means that the diversity of data explained by the model is 81,96 percent, while the remaining 18,04 percent is explained by other variables outside the

model. Thus the research model has a high predictive ability on the behavior of the dependent variable, which is characterized by a high coefficient of determination above 50 percent.

**V. DISCUSSION**

- H1, Monitoring has a positive and significant effect on the procurement of spare parts for the main engine. Based on the results of the analysis, the path coefficient of the Monitoring variable on the main engine spare part procurement variable is 0.350 or 35.00 percent with a significance of 0.029. This means that the more effective and efficient Monitoring is, the more effective and timely procurement of spare parts for the main engine will be. That way the main engine spare parts needed by the ship can be accepted according to the quantity, quality and time required.
- H2, Coordination of employees has a positive and significant effect on the procurement of spare parts for the main engine. Based on the results of the analysis, the path coefficient of the employee coordination variable on the main engine spare part procurement variable is 0.371 or 37.10 percent with a significance of 0.021. This means that the more effective and efficient the coordination of employees, the more effective and timely procurement of spare parts for the main engine will be. That way the main engine spare parts needed by the ship can be accepted according to the quantity, quality and time required.
- □ H3, Monitoring has a positive and significant effect on the smooth operation of the ship. Based on the results of the analysis, the path coefficient of the Monitoring variable on the ship's operational smoothness variable is 0.346 or 34.60 percent with a significance of 0.005. This means that the more effective and efficient Monitoring is, the more consistent the smooth operation of the ship will be and can be improved. In this way, the smooth operation of the ship, which PT. Pertamina (Persero) Shipping can be achieved well.
- H4, Employee coordination has a positive and significant effect on the smooth operation of the ship. Based on the results of the analysis, the path coefficient of the employee coordination variable on the ship's operational smoothness variable is 0.274 or 27.40 percent with a significance of 0.025. This means that the more effective and efficient the coordination of employees, the smoother the ship's operations will be more consistent and can be improved. In this way, the smooth operation of the ship demanded by PT. Pertamina (Persero) Shipping can be achieved well.
- H5, Procurement of main engine spare parts has a positive and significant effect on the smooth operation of the ship. Based on the results of the analysis, the path coefficient of the main engine spare part procurement variable on the ship's operational smoothness variable is 0.398 or 39.80 percent with a significance of 0.002. This means that the more effective and efficient the procurement of spare parts for the main engine, the smoother the ship's operations will be more consistent and can be improved. In this way, the smooth operation of the ship demanded by PT. Pertamina (Persero) Shipping can be achieved well.

- H6, Procurement of spare parts for the main engine is able to function as a mediator or mediate the effect of monitoring on the smooth operation of the ship. This means that the procurement of spare parts for the main engine that is in accordance with the monitoring built by the company is able to improve the smooth operation of the ship, so that the procurement of spare parts for the main engine as an intervening variable is proven to function to strengthen the influence of monitoring on the smooth operation of the ship.
- H7, Procurement of spare parts for the main engine is able to function as a mediator or mediate the effect of employee coordination on the smooth operation of the ship. This means that the procurement of spare parts for the main engine that is appropriate for the coordination of employees built by the company is able to improve the smooth operation of the ship, so that the procurement of spare parts for the main engine as an intervening variable is proven to function to strengthen the effect of employee coordination on the smooth operation of the ship.

## VI. CONCLUSION

From the results of research and overall analysis, some conclusions can be drawn as follows:

- Monitoring has a positive and significant effect on the procurement of spare parts for the main engine of PT. Pertamina (Persero) Shipping.
- Coordination of employees has a positive and significant effect on the procurement of spare parts for the main engine of PT. Pertamina (Persero) Shipping.
- Monitoring has a positive and significant effect on the smooth operation of PT. Pertamina (Persero) Shipping.
- Employee coordination has a positive and significant effect on the smooth operation of PT. Pertamina (Persero) Shipping.
- The procurement of spare parts for the main engine has a positive and significant effect on the smooth operation of PT. Pertamina (Persero) Shipping.
- Procurement of spare parts for main engine capable of functioning as a mediator or mediating the indirect effect of monitoring on the smooth operation of PT. Pertamina (Persero) Shipping.
- Procurement of spare parts for the main engine is able to function as a mediator or mediate the indirect effect of employee coordination on the smooth operation of PT. Pertamina (Persero) Shipping

## VII. RECOMMENDATION

Based on the conclusions above, the authors provide suggestions and recommendations as follows:

- The corporation will undertake many policy and organizational adjustments in order to preserve the smooth operating performance of ships and build an effective and efficient ship management. This should be properly planned and executed so that things like personnel monitoring and coordination continue to run well and do not obstruct the primary engine spare part purchase process. As a result, the company must develop an

effective system or tool that can track the procurement process from the ship's party's request to its delivery to the ship, as well as assist in the coordination of related parties in the procurement process and be simple to operate despite frequent changes in policies and organizational structure company.

- Other researchers conducting research on monitoring, personnel coordination, procurement of main engine spare parts, and ship operational smoothness could look into other aspects that have a substantial impact. As a result, it is envisaged that these studies would be valuable in offering feedback and recommendations to businesses and academic institutions.

## VIII. IMPLICATION

The implications of the research findings and the recommendations described above are that employee monitoring and coordination in the procurement process for main engine spare parts is improving, formal and non-formal communication can run according to the purpose, and the use of several communication media has been used to facilitate the flow of information quickly and accurately. Although issues in each procurement process cannot be avoided, delays and errors in acquiring main engine spare parts can be minimized. With good monitoring and coordination, any problems that develop will be addressed quickly to avoid disrupting ship operations.

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