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Risk management of logistic department of electricity company

Erdiyan Krisnadi Hasda[1], Erman Sumirat[2]
School of Business and Management Institut Teknologi Bandung, Indonesia
[1]Email: 1erdiyan.krisnadi@sbm-itb.ac.id
[2]Email: erman.sumirat@sbm-itb.ac.id

Abstract

This study is conducted to carry out the risk management process in the logistics department of the electricity company unit, which has the main duties in managing electricity transmission assets, controlling investment and logistics transmission, and maintaining transmission assets. The risk management process in this study was prepared as a step in shaping the risk profile of business processes in the logistics field to avoid the failure of business processes that resulted in unavailbility of logistics material, which could impact the electricity transmission. This study uses the AS/NZS ISO 31000:2009 Risk Management Standard framework. Calculation of risk priorities is using Analytical Hierarchy Process, based on a questionnaire to experts in the field of company logistics. From the calculation using AHP, Work Accident (HR2) has been identified as the most vulnerable risk among others risk factors.

Keywords: risk management; logistic management; analytical hierarchy process

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INTRODUCTION

Risk Management in Indonesia State Owned Enterprise, is conducted to prevent the decline in investor confidence, and also to prevent the company from entangled in legal cases. Requirements Regarding Risk Management applicable to SOEs is set forth in the Regulation of the Minister of State-Owned Enterprises Number: Per-01/MBU/2011 on the Implementation of Good Corporate Governance (Madjidi, 2013).

Various professional organizations and practitioners in the field of risk management, then issued various standards to improve and improve the quality of risk management implementation, such as COSO (Committee of sponsoring Organization of the Treadway Commission), AS NZS which adopted by ISO for ISO 31000, RIMS, etc (Ansori, 2016).

The implementation of Risk Management in SOEs began in the early 2000s, which began with major state-owned companies such as Pertamina, Bank Mandiri, BRI, PLN, after which almost all SOEs implemented risk management as management awareness and stakeholder awareness increased.

In the internal of the Company, already has Management Risk Division, to implement Risk Management, in which assess business risks on the internal business process, and also for every project held by corporation. In terms of logistic department, its business risks haven't been assessed spesifically. Implementation of risk management in Company supporting units, is done as a risk assessment for work projects only, they have not specifically assessed the risk of business processes as a whole. Level of risks in each activity does not take into account of the preparation of the work manual (Standard Operating Procedure).

In carrying out its main task, logistics management is carried out by the logistics department; with the scope of work monitoring and evaluating the implementation of material management policies and logistics management to maintain the availability of materials and logistics, in order to create reliability and efficiency in the transmission of electricity power.

In practice, logistic department faces various operational challenges, including:

Coordination of materials supply with related department,

Distribution of materials to user,

Work safety related logistic,

Safeguarding the company's assets (materials inventory and spare material, and not operating fixed assets).

The role of logistics functions in the provision of materials is the recipient of goods in accordance with contract documents that received from the procurement department, as well as preparing the necessary facilities and infrastructure, plan the schedule and resources required for the receipt of the goods. In the process of receiving the goods, its also conducted a physical examination (visual) and completeness of documents that accompany the arrival of goods. Whereas, in case of quality inspection of goods, will be conducted by the Quality Product Examining Team which stated in the Minutes of Examination.

There were few events that create loss for the company from logistic process, such as loss of material, and material damage caused by failure in material handling. Such conditions, leading to unavailability of materials, which become business issue in this study, that may hold up other business processes, such as power electrical transmission interruptions handling, and transmission construction projects.

From the FGD process with logistic department, we found that unavailability of materials is caused by three factors, shown by table below.

Table 1. Unavailability of Materials Factors

No	Factors	Description
1	Loss of materials	Loss off materials can occur due to low security, human fraud, loss on shipping
2	Materials Damage	Materials damage can occur due to damage in shipping, damage in storage, and obsolete materials
3	Procurement Issue	Improper material planning could lead to failure on material specification, and also unclear project location could lead to failure on material shipping destination, these failures lead to procurement issue, as well as the length of time required due to procurement process delays

Source: Analysis from FGD

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Factors and causes identified in the FGD, are some risks arising from logistic business process which has not been prepared for its risks mitigation yet. Logistic department hasn't been conducted a risk assesment to its business process, hence there are no initial identification of events that may pose a business risk to the company. Therefore, any event that could cause loss to the company has not been prepared for mitigation.

Logistic department faces several potential risks that must be mitigated by, such as financial risks that resulted in additional costs and loss of revenue, and operational risks that arising from management logistics operations if cannot be done properly. The risk of material loss, material damage, labor fraud and workplace accidents are some examples of possible risks in logistic department.

Therefore, in carrying out its duties to maintain the availability of materials and logistics, logistic department needs to do a risk management process to identify and evaluate the risks that may occur.

METHOD

This study will use International Risk Management Standard AS/NZS ISO 31000:2009, to assess the risk on Logistic Department. Risk is defined as the 'effect of uncertainty on objectives' (AS/NZS ISO 31000:2009). The objectives can be financial, health and safety, environmental and so on. The risk management process involves the following steps, as given in ISO 31000:2009:

setting objectives and establishing the context of the risk assessment;
identifying the risks;
analysing the risks to determine the level of risk, which is defined as the combination of the consequences and likelihood of the risk;
evaluating the risk, to decide if a risk is acceptable, tolerable or intolerable / unacceptable;
treating the risks, focusing on those risks which are intolerable; and
monitoring and review, to continuously refine and improve the assessment and risk treatments (Rollason, 2010).

The central spine of the risk management process is concerned with preparing for and then conducting risk assessment leading, as necessary, to risk treatment. The process starts through defining what the organization wants to achieve and the external and internal factors that may influence success in achieving those objectives. This step is called establishing the context and is an essential precursor to risk identification (Purdy, 2010).

This research uses FGD method to explore the business issue, risk identification, risk treatment, and implementation plan. Focus grup discussion is frequently used used as a qualitative approach to gain an in-depth understanding of social issues. The method aims to obtain data from a purposely selected group of individuals rather than from a statistically representative sample of a broader population (Tobias O.Nyumba, 2017).

According to (Casey, 2000), focus group provides "a more natural environment than that of individual interview because participants are influencing and influenced by others-just as they are in real life". Focus group interview aims at collecting high-quality data in a social context (Patton, 2002), which primarily help understand a specific problem from the viewpoint of the participants of research (Khan, 1992).

To explore the business issue, this study conducted five focus grups discussion, which involved six participants from logistic department and accounting department. The FGD session starts from discussed work flow on logistic department and defining SWOT analysis base on practical experience and work process. Next session of FGD is to identified common issues and problems happened in logistic process.

Entering the risk assessment stage of this study, again conducted FGDs to collect identified risks from business processes undertaken by the logistics department, which resulted the risk identification. At the next step of risk assesment process, the FGD was conducted to give judgement on the identified risks by its impact and likelihood according to the panelists experience and opinions. This FGD was resulted on collecting data to calculate risk priority by the AHP process.

Treatment of risks to be taken was determined from the FGD with the panelists, hence the panelists in which they are the practioners of the business process in logistic, could develop treatment

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options which are suitable to the company conditions. And the implementation plan developed from the risk treatments stage, were constructed in the next FGD.

Analysis of business situation on logistic deparment, will be explored by using business process analysis and SWOT analysis, to determine the strengths, weakdesses, opportunities and threats from logistic department, to be further examine risk management.

The Risk Management Process will refer to International Risk Management Standard AS/NZS ISO 31000:2009, which provide set of principles and guidelines to implement risk management. Based on ISO 31000, Risk Management process is an systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, and identifying, analyzing, evaluating, treating, monitoring and reviewing risk, that shown in figure 1, which will be used in this study to develop risk management for logistic department.

This study will use The Analytic Hierarchy Proses (AHP) developed by Saaty, which is a robust and flexible multi criteria decision analysis methodology. Analytic hierarchy process (AHP) is a powerful method to solve complex decision problems. Any complex problem can be decomposed into several sub-problems using AHP in terms of hierarchical levels where each level represents a set of criteria or attributes relative to each sub-problem (Saaty, 2008).

Through AHP, the importance of several attributes is obtained from a process of paired comparison. Once the hierarchy has been constructed, begins the prioritization procedure to determine the relative importance of the element in each level of hierarchy. Pairwise comparison data obtained from questionner of interview in the department and supporting unit.

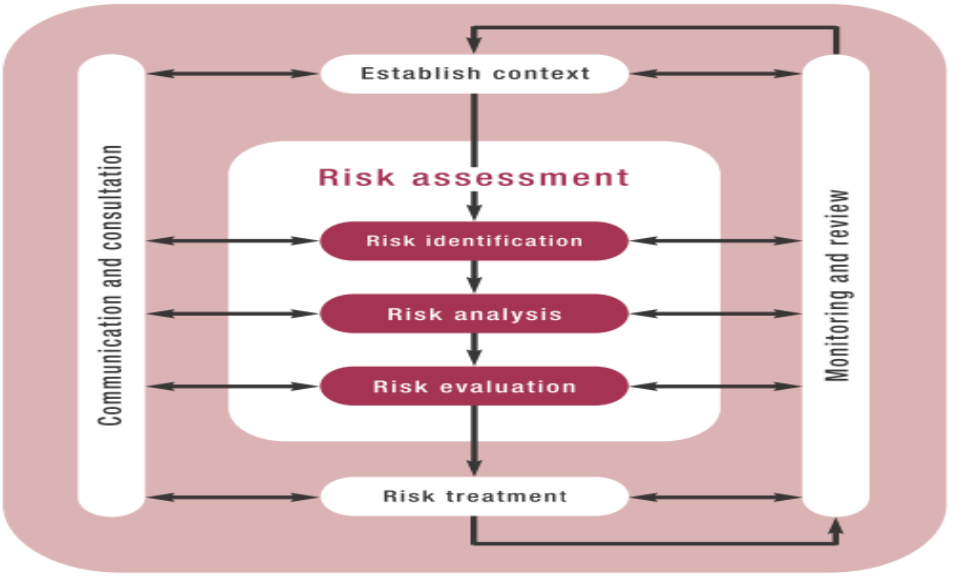

Figure 1. Risk Management Process ISO 31000:2009

(Source: Literature Review (AIRMIC, ALARM, & IRM, 2010; ISO, 2009; Purdy, 2010

Final stage would be the implemantation which consist of monitoring and review stage. The implementation stage is carried out to ensure that risk planning and mitigation have been carried out and monitored, so that company would be ready to face future challenge in the business.

Analysis of Business Proses in Logistic Departement

The logistics department is involved in the following corporate activities:

Procurement department

Contract review and administration

Product and services quality approval team

Accounting department

Construction department

Supplier materials

Transmission maintenance department

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Supporting unit
Warehouse PIC

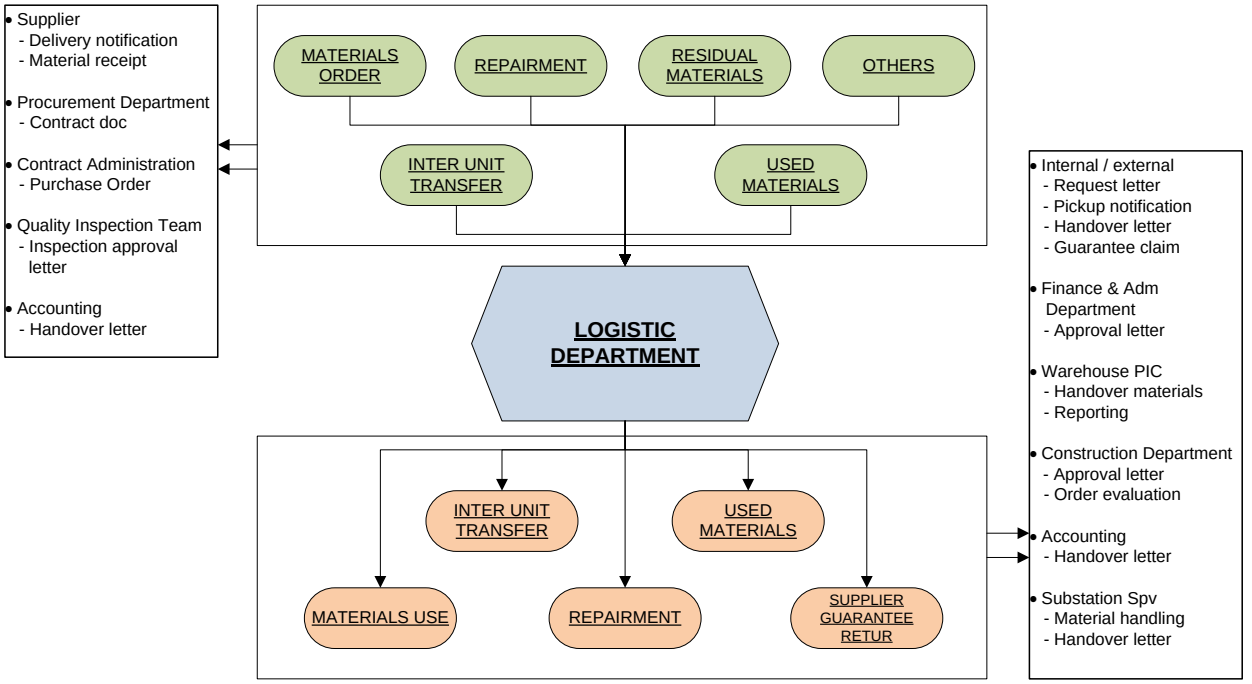

Figure 2. Logistic Department Business Process

(Source : Internal Operation Manual)

Logistic department carry out tasks in acceptance and disbursement of materials. Materials coming to logistic department and stored in the warehouse located on each supporting unit, which could come from several sources, that are:

Material Orders from supplier, processed by procurement department
Repairment of broken asset (materials)
Residual materials
Used materials
Inter unit transfers of materials

Other sources, such as: grant from other company, residual material from construction project division.

And disbursement of matrials should be requested and sent to:

Inter unit transfers
Inter unit outside company
Repairment
Not operating fix asset
Return to supplier in case of guarantee claim
Materials to be use by others department

Materials acceptance process, should involve Quality Assurance Team that refers to the project contract, with the task of ensuring:

Quantity and quality of materials
Operational test
System test
Doccument completeness

Business process analysis using SWOT

Based on the business processes of logistic department, we do a SWOT analysis to analyze the business situation, and as a guide in identifying risks, because this method involves an assessment of

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the Strengths, Weaknesses, Opportunities and Threats of the business process, as shown on figure 3 below.

S	• Each supporting unit has its own warehouse up to the sub-unit level • Most of the warehouse employees are highly experienced seniors • Already has a warehouse guidance set forth in TUG
W	• Warehouse capacity, often does not meet to accommodate inventory • Warehouse management is still not well implemented • There is a void or excess stock of inventory materials • Spatial arrangement and location of warehouse not yet optimal • There is no notification of inventory amount to user • Lack of warehouse staff • Inaccurate entry and exit material entry system
O	• Implementation of logistic and warehouse management integrated with SCM, can ensure the supply of inventory required, so that business processes can run faster • Preparation of integrated applications between warehouses, users of the materials, procurement planning
T	• Occurrence of work accident • material void could prevents the handling of transmission interruptions • Material damage causes asset loss • Delay in material procurement

Figure 3. SWOT Analysis of Logistic Department

(Source :Analysis from FGD)

Business Issues Analysis

The business issues that will be the object of this study are :

Materials damage in the warehouse storage

Loss of assets (materials)

These issues are cause of Unavailibility of materials (material out-of stock), which is the main issue in logistic department. And by doing root cause analysis of the main issue, we discover another business issue which is ‘procurement issues’.

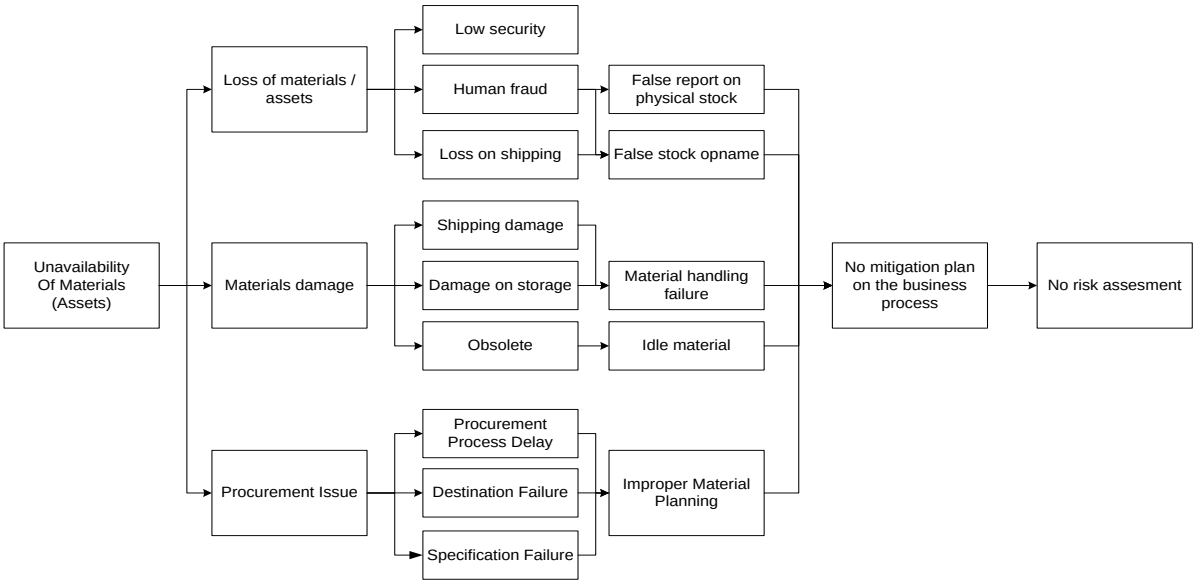

Figure 4. Cause Mapping from Logistic department main business issue

(Source : Analysis from FGD)

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Figure 4. shown the Cause Mapping from logistic department, with the main issue Unavailability of materials (assets/materials out of stocks), which caused by loss of materials/assets, materials damage, procurement issues. The symptoms shown, can be mitigated if there is risk mitigation plan in the business process. Therefore, it is necessary to conduct risk management for logistic department business process.

Cause mapping is a structured approach to solving problems base on facts and data with supporting evidence. When the process doesn't produce the desired results, start the Cause Mapping process. Find and define a problem using process map, solve it with Cause map, and use those solutions (Mark, 2005).

Risk Management Process

Establish The context

Context of risk management process in this study is to assess the risk in logistic department of to solve business issue discovered, and also to give comprehensive identification of risk in logistic business prosess.

Risk Assessment

Risk assesment is an overall process of risk identification, risk analysis and risk evaluation (ISO, 2009). The risk assessment process is well suited to a structured and systematic approach (Legal & Branch).

Risk Identification

Process of finding, recognizing and describing risks (ISO, 2009). Risk identification involves the identification of risk sources, events, their causes and their potential consequences (ISO, 2009).

Risk identification in this study, was obtained from several resources:

Business process analysis and SWOT analysis

Risk from another similar research

The identified risk indicators are arranged into risk variables within the scope of the logistic operation, finance, disaster, and human resource. The result of risk identification can be seen in the following table.

Table 2. Risk Identification

Categories	Factors	Description	Impacts
Operational (O)	Delivery condition (O1)	Supplier failure in deadline and/or quality, wrong destination	Materials out of stock
	Out of stock (O2)	Shortage of materials while needed, wrong specification, wrong order	Delayed activities for others department
	Storage condition (O3)	Unorganized materials storage	Delayed in withdrawal material, obsolete material
	Under capacity (O4)	Inadequate materials storage, causing relocation materials outside warehouse	Materials damage
	Warehouse condition (O5)	Poor building and its facilities conditions	Materials damage, flow of materials inhibited, work accident
	Security (O6)	Low environment safety at the warehouse	Loss of materials, material damage, warehouse damage
	Damage shipment (O7)	Risk of damaged shipment due to non-optimal preparation, unsecured transport	Materials damage and loss
	Overstock (O8)	Risk of stock excess related	Materials obsolete
	Compliance breach (O9)	Unlicensed forklift driver	Materials and warehouse damage, work accident
	Receipt error (O10)	Number of items approved does not match the quantity shown in purchase order, quality test failed	Material return to supplier, delayed in material acceptance
	Poor handling (O11)	Material handling doesn't comply with its requirement	Material damage
	Material record	Material record is not accordance	Discrepancy on inventory

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	(O12)	to physical stock	report, failure at costs accounting
	Safety (O13)	Safety devices support do not available in the warehouse	Damage to warehouse and materials
	Stock control (O14)	Low frequency on stock control	Discrepancy on inventory report
Finance (F)	Audit risks (F1)	Potential finding on audit report	Deduction on company performance indicator
	Overstock Costs (F2)	Potential costs over idle stock	High opportunity cost
	Financial performance (F3)	How far materials management influence financial ratio	Decrease on ITO ratio
	Extra Costs (F4)	Replacement cost for missing material	Increasing extra replacement costs
	Idle assets (F5)	Idle assets caused by bad planning on material purchase and wrong spesification	High depreciation costs for idle assets
	Receipt delay (F6)	Late receipt document processing, include quality assurance check	Delayed in playment, low budget disbursement
	Financial Statement (F7)	Failure in reporting physical stocks	Low accountability of financial statement
Disaster (D)	Fireworks (D1)	Warehouse building burn	Warehouse damage
	Natural disaster (D2)	Warehouse building damage	Warehouse damage
Human Resources (HR)	Qualified employees (HR1)	Difficulty in obtaining qualified employee	Failed HR regeneration
	Work accident (HR2)	Work accidents caused by human error	Endanger the safety of the patients or employees
	Performance measurement (HR3)	Improper employee performance measurement	The quality of employee performane cannot be known
	Labor Fraud (HR4)	Fraud caused by employee	Loss of material, extra costs
	Number of employee (HR5)	Lack of employee in warehouse handling	Delayed material order request, unmanaged warehouse

Source**:** Analysis from FGD

From the identification of risks, this study categorized the risks into four categories, operational risks, financial risks, disaster risks, human resource risks, as follows:

Operational risks are risks associated with business process in department, these risks figured event that could happen to stop or prevent the continuity of business process. Conditions related to ship, storage and use of material are factors that arises the operational risks.

Financial risks are risks associated with flow of money, financial statement, accounting systems and financial performance indicator.

Disaster risks are risks associated with damage in the warehouse that could happen from natural disaster and fireworks.

Human resource risks are associated with employee performance, work accident and labour fraud.

Risk Analysis

Risk analysis can be undertaken with varying degrees of detail, depending on the risk, the purpose of the analysis, and the information, data, and resources available. Analysis can be qualitative, semiquantitative, quantitative, or a combination of these, depending on the circumstances (Purdy, 2010).

This study will use The Analytic Hierarchy Proses (AHP) developed by Saaty, Through AHP, the importance of several attributes is obtained from a process of paired comparison. Once the hierarchy has been constructed, begins the prioritization procedure to determine the relative importance of the element in each level of hierarchy.

The Hierarchy of business issue

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The hierarchy tree is developed from risk analysis goal to solve the business issue, which is Risk Assesment of logistic department. From the identification of risk in business process, we found there are four categories, which are operational risks (O), financial risks (F), disaster risks (D), human resource risks (HR).

RESULT AND ANALYSIS

Risk Analysis Result

At this stage weighting is done on criteria in risk factor assessment on logistic department of this electricity company, the AHP process in this level, which is 1st level of the hierarchy, generate the weight or coefficient importance of each risk, which obtained from pairwised comparison questionnaire from FGD panel and processed with Expert Choice software.

Table 3. AHP Result for level 1 Hierarchy

Risk Factor	Risk Criteria	Weight
HR	Human Resources	0,394
O	Operational	0,294
F	Financial	0,178
D	Disaster	0,135

Source**:** Analysis

On the basis of this result shown in tabel 3., the expert panel concluded that Human Resources is the major factor for unavailability of materials, this result may come up as result of their experiences in logistic department.

The next stage is the weighting of the 28 sub-criteria in the assessment of risk factors identified. Pairwised comparison of the sub-criteria is done in the scope of each risk criteria and generating Local Percentage (LP). Measuring weight of each sub-criteria in order to determine rank of all sub-criteria is shown by Global Percentage (GP) which generated from weighting each sub-criterias across all criteria. Table 4. below, shown weighted summary of each sub-criteria with respect to the overall goal.

Table 4. AHP Result for Level 2 Hierarchy

Risk Criteria	Weight	Risk Sub-Criteria	Weight		Rank	
			LP	GP	LR	GR
Human Resources [HR]	0,394	Work accident	0,374	0.147	1	1
		Qualified employees	0,216	0.085	2	3
		Labor Fraud	0,214	0.084	3	4
		Performance measurement	0,115	0.045	4	7
		Number of employee	0,081	0.032	5	9
Operational [O]	0,294	Safety	0,209	0.061	1	5
		Poor handling	0,089	0.026	2	11
		Out of stock	0,088	0,026	3	12
		Compliance breach	0,088	0,026	4	13
		Receipt error	0,073	0,021	5	15
		Stock control	0,067	0,020	6	18
		Security	0,065	0,019	7	19
		Damage shipment	0,062	0,018	8	20
		Material record	0,056	0,016	9	22
		Storage condition	0,049	0,014	10	23
		Delivery Condition	0,043	0,013	11	25
		Overstock	0,041	0,012	12	21
		Under capacity	0,035	0,010	13	27
		Warehouse condition	0,035	0,010	14	28
Financial	0,178	Financial	0,264	0,047	1	6

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		Performance Financial Statement	0,203	0,036	2	8
		Receipt delay	0,14	0,025	3	14
		Audit risks	0,115	0,020	4	16
		Idle Assets	0,113	0,020	5	17
		Overstock Costs	0,093	0,017	6	21
		Extra Costs	0,073	0,013	7	24
Disaster	0,135	Fireworks	0,787	0,106	1	2
		Natural Disasters	0,213	0,029	2	10

Source**:** Analysis

From Table 4. above, the expert panel concluded that Work accident and Safety, are major sub-criteria in risk assesment of logistic department. Those sub-criterias also have importants role in company performance, which also stated in Company Key Performance Indicator, that categorized as a minus point (negative impact) to overall score of KPI, therefore they became most important risk factors to be assessed.

Risk Assessment Matrix

Risk assessment matrix is a tool to analyze risk and identify the risk size, alos measure how the risk can be controlled or not. This matrix has two dimension, which combining potential impact of the event of risk and the likelihood of the event happen in the such condition. Risk matrix describes the position of each risk factor in accordance with their impact and likelihood.

In this study, level of risks are categorized to: low risk, very low risk, moderate risk, high risk, very high risk; which adjusted to the dimension of risk matrix (likelihood and impact). These parameters generated from the likelihood and impact judgmented by the panel, as outlined in the questionnaire.

Table 5. Risk level for impact

Level	Numeric	Description
Very low impact	1	not significant to project
low impact	2	can be managed without mitigation
Medium impact	3	may require mitigation
High impact	4	significant impact on cost / schedule.
Very High impact	5	The most adverse risks that lead to high amount of losses

Source: Analysis from FGD

Table 6. Risk level for likelihood

Level	Numeric	Description
Very low probability	1	not worth considering
Low probability	2	Unlikely to occur
Medium probability	3	realistic chance of occurrence
High probability	4	likely to occur
Very high proability	5	almost certain to occur

Source: Analysis from FGD

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Table 7. AHP Result for Risk Factor Impact Level

Factors	Global percentage	Sub-factors	Global percentage	Level of risk (impact)				
				Very Low	Low	Medium	High	Very High
Operational	0.294	Delivery condition (O1)	0.013	0.001	0.002	0.002	0.005	0.004
		Out of stock (O2)	0.026	0.002	0.003	0.005	0.010	0.006
		Storage condition (O3)	0.014	0.002	0.001	0.004	0.005	0.003
		Over capacity (O4)	0.010	0.001	0.001	0.002	0.005	0.002
		Warehouse condition (O5)	0.010	0.001	0.002	0.002	0.004	0.002
		Security (O6)	0.019	0.001	0.003	0.003	0.009	0.003
		Damage shipment (O7)	0.018	0.001	0.002	0.003	0.009	0.003
		Overstock (O8)	0.012	0.001	0.001	0.002	0.006	0.002
		Compliance breach (O9)	0.026	0.002	0.002	0.007	0.012	0.004
		Receipt error (O10)	0.021	0.001	0.002	0.005	0.010	0.003
		Poor handling (O11)	0.026	0.001	0.003	0.003	0.015	0.004
		Material record (O12)	0.016	0.001	0.001	0.004	0.008	0.003
		Safety (O13)	0.061	0.004	0.005	0.016	0.023	0.014
		Stock control (O14)	0.020	0.001	0.002	0.005	0.009	0.003
Financial	0.178	Audit risks (F1)	0.020	0.001	0.004	0.004	0.008	0.003
		Overstock Costs (F2)	0.017	0.001	0.002	0.004	0.006	0.003
		Financial performance (F3)	0.047	0.005	0.007	0.012	0.011	0.013
		Extra Costs (F4)	0.013	0.001	0.004	0.002	0.004	0.002
		Idle Assets (F5)	0.020	0.001	0.002	0.005	0.009	0.003
		Receipt delay (F6)	0.025	0.003	0.002	0.005	0.010	0.006
		Financial Statement (F7)	0.036	0.003	0.005	0.009	0.010	0.009
Disaster	0.135	Fireworks (D1)	0.106	0.007	0.020	0.012	0.023	0.044
		Natural disaster (D2)	0.029	0.002	0.004	0.005	0.006	0.012
Human Resource	0.394	Qualified employees (HR1)	0.085	0.005	0.010	0.014	0.041	0.014
		Work accident (HR2)	0.147	0.016	0.012	0.027	0.058	0.035
		Performance measurement (HR3)	0.045	0.003	0.004	0.016	0.016	0.008
		Labor Fraud (HR4)	0.084	0.009	0.016	0.010	0.033	0.016
		Number of employee (HR5)	0.032	0.003	0.003	0.011	0.006	0.008
Impact level of risk				0.079	0.126	0.196	0.366	0.233

Source: AHP Calculation

The impact of each risk factors which shown in table 7. given the outcome of the subfactors with respect to the overall goal, shown in columns 5-9. The results of the AHP process show judgments from panelists that risks in logistic departmement business process give high impact to the company risk with impact level of 0.366.

From the AHP Result for impact level of risk, Work Accident [HR2] is a subfactor that has the greatest impact on the risk of business processes in logistic department, with a high level of impact 0.058, followed by Fireworks [D1] 0.044 which give very high level on impact of company risk.

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Table 8. AHP Result for Risk Factor Likelihood Level

Factors	Global percenta	Sub-factors	Level of risk (likelihood)				
			Very Low	Low	Medium	High	Very High
Operational	0.294	Delivery condition (O1)	0.001	0.002	0.002	0.005	0.003
		Out of stock (O2)	0.002	0.003	0.012	0.005	0.005
		Storage condition (O3)	0.002	0.001	0.005	0.004	0.003
		Over capacity (O4)	0.001	0.001	0.001	0.005	0.003
		Warehouse condition (O5)	0.001	0.003	0.002	0.002	0.003
		Security (O6)	0.001	0.006	0.004	0.004	0.004
		Damage shipment (O7)	0.002	0.006	0.004	0.003	0.004
		Overstock (O8)	0.001	0.003	0.001	0.004	0.002
		Compliance breach (O9)	0.003	0.002	0.004	0.012	0.004
		Receipt error (O10)	0.003	0.005	0.005	0.005	0.004
		Poor handling (O11)	0.002	0.003	0.012	0.005	0.004
		Material record (O12)	0.001	0.002	0.004	0.006	0.003
		Safety (O13)	0.004	0.012	0.020	0.011	0.014
		Stock control (O14)	0.003	0.002	0.008	0.003	0.004
Financial	0.178	Audit risks (F1)	0.001	0.004	0.005	0.004	0.005
		Overstock Costs (F2)	0.001	0.003	0.005	0.003	0.003
		Financial performance (F3)	0.005	0.007	0.012	0.014	0.009
		Extra Costs (F4)	0.001	0.007	0.001	0.002	0.002
		Idle Assets (F5)	0.001	0.004	0.008	0.003	0.004
		Receipt delay (F6)	0.002	0.002	0.014	0.003	0.004
		Financial Statement (F7)	0.002	0.004	0.020	0.004	0.006
Disaster	0.135	Fireworks (D1)	0.058	0.006	0.012	0.013	0.017
		Natural disaster (D2)	0.005	0.006	0.006	0.005	0.006
Human Resource	0.394	Qualified employees (HR1)	0.005	0.008	0.025	0.034	0.012
		Work accident (HR2)	0.028	0.020	0.036	0.032	0.031
		Performance measurement (HR3)	0.003	0.006	0.020	0.008	0.008
		Labor Fraud (HR4)	0.016	0.025	0.012	0.013	0.018
		Number of employee (HR5)	0.003	0.002	0.003	0.019	0.005
Likelihood level of risk			0.158	0.156	0.267	0.232	0.189

Source: AHP Calculation

From table 8. above, the risk factor Work Accident (HR2) has been identified as the most vulnerable for the logistic department business process as it has high probability of occurrence among risk sub-factors, with very high level of likelihood at 0.031.

Based on above result of impact and likelihood level, the next step is to form the risk matrix. Score for each sub-factor in the matrix, obtained from calculation of its likelihood and impact level at its highest point, which generated from combination data of the panel (expert judgement).

Table 9. Impact and Likelihood Level of Risks

Sub-factors	Level of Risk	
	Impact	Likelihood
Delivery condition (O1)	High	High
Out of stock / Unordered material (O2)	High	Medium
Storage condition (O3)	High	Medium
Under capacity (O4)	High	High
Warehouse condition (O5)	High	Very High
Security (O6)	High	Low
Damage shipment (O7)	High	Low
Overstock (O8)	High	High
Compliance breach (O9)	High	High
Receipt error (O10)	High	Medium
Poor handling (O11)	High	Medium

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Material record (O12)	High	High
Safety (O13)	High	Medium
Stock control (O14)	High	Medium
Audit risks (F1)	High	Medium
Overstock Costs (F2)	High	Medium
Financial performance (F3)	Very High	High
Extra Costs (F4)	High	Low
Idle Assets (F5)	High	Medium
Receipt delay (F6)	High	Medium
Financial Statement (F7)	High	Medium
Fireworks (D1)	Very High	Very Low
Natural disaster (D2)	Very High	Low
Qualified employees (HR1)	High	High
Work accident (HR2)	High	Medium
Performance measurement (HR3)	High	Medium
Labor Fraud (HR4)	High	Low
Number of employee (HR5)	Medium	High

Source**:** Research Analysis

CONCLUSION

Table 10. shown summary of impact and likelihood level of risk, which will be mapped on the risk matrix below.

Table 10. Risk Matrix

	IMPACT				
LIKELIHOOD	Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Very Low (1)	Low	Low	Low	Low	D1
Low (2)	Low	Low	Low	O6; O7; F4; HR4	D2
Medium (3)	Low	Low	Medium	O2; O3; O10; O11; O13; O14; F1; F2; F5; F6; F7; HR2; HR3	Medium
High (4)	Low	Medium	HR5	O1; O4; O8; O9; O12; HR1	F3
Very High(5)	Low	Medium	Medium	O5	Extreme

Source**:** Research Analysis

Table 11. Definition of Risk Levels

Risk Level	Definition
Low	The risk categorized as negligible, but it must be under review and control.
Medium	The risk need to be eliminated and controlled, even its not necessary to do so.
High	The risk could endanger the company, therefore action plan to control and eliminate the risk need to be taken immediately.

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Extreme	The risk is about to happen and any activities indicate the symptoms of its, have to be stopped, until the risk has been fully controlled.

From the table 10. and 11., we can concluded that there are some risks need to be controlled and eliminate immediately:
Operational Risks: O1 (Delivery Condition), O4 (Over Capacity), O8 (Overstock), O9 (Compliance Breach), O12 (Material Record), O5 (Warehouse Condition),
Financial Risk: F3 (Financial Performance)
Human Resource Risk: HR1 (Qualified Employee)

Risk Treatment

According to ISO 31000:2009, risk treatment is the activity of selecting and implementing appropriate control measures to modify the risk. Risk treatment includes as its major element, risk control (or mitigation), but extends further to, for example, risk avoidance, risk transfer and risk financing.

Options for treating risk may involve one or more of the following:

avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
taking or increasing the risk in order to pursue an opportunity;
removing the risk source;
changing the likelihood;
changing the consequences;
sharing the risk (e.g. through contracts, buying insurance);
retaining the risk by informed decision.

When selecting risk treatment options, the organization should consider the values, perceptions and potential involvement of stakeholders and the most appropriate ways to communicate and consult with them. Risk treatments, even if carefully designed and implemented might not produce the expected outcomes and could produce unintended consequences. Monitoring and review need to be an integral part of the risk treatment implementation to give assurance that the different forms of treatment become and remain effective.

Table 12. Risk Treatment Options for Logistic Department

Risk Category	Risk Factor	Risk Level	Treatment Option
Operational	Delivery Condition [O1]	High	Sharing the risk
	Under Capacity [O4]	High	Change the probability
	Overstock [O8]	High	Change the probability
	Compliance Breach [O9]	High	Removing the risk source
	Material Record [O12]	High	Change the probability
	Warehouse Condition [O5]	Very High	Removing the risk source
Financial	Financial Performance [F3]	High	Change the probability
Human Resource	Qualified Employee [HR1]	High	Change the probability

Source**:** Research Analysis

From the FGD with the panel, treatment options for High and Extreme risks mapped in risk matrix, are shown in the table 11. above, the options choosen are sharing the risk, removing the risk source, and change the probability.

REFERENCES

Ansori, M. (2016). Increasing the Value and Sustainability of BUMN through the Implementation of Enterprise Risk Management (ERM) at the Corporate and Super Holding Levels of the Ministry of BUMN.

Casey, M. &. (2000). Focus groups: A practical guide for applied research. SAGE Publications.

ISO. (2009). ISO 31000:2009, Risk Management—Principles and Guidelines. Geneva: International Standards Organisation.

Khan, M. E. (1992). Focus groups in tropical diseases. In Research Health Policy and Planning (pp. 56-66). Oxford University Press.

 ISSN Print: 0216-7786 - ISSN Online: 2528-1097

Legal, & Branch, R. (n.d.). Risk Management Handbook. The University of Adelaide.

Madjidi, I. (2013, February 25). Persyaratan Manajemen Risiko Badan Usaha Milik Negara. Retrieved June 23, 2018, from Persyaratan Manajemen Risiko Badan Usaha Milik Negara: https://idrismadjidi.wordpress.com/2013/02/25/persyaratan-manajemen-risiko-badan-usaha-milik-negara/

Mark, G. (2005). Cause Mapping 101. In Fabricating & Metalworking (p. 68). ABI/INFORM Collection.

Patton, M. (2002). Qualitative Research & Evaluation Methods. SAGE, 2002.

Purdy, G. (2010). ISO 31000:2009—Setting a New Standard for Risk Management. Risk Analysis.

Rollason, V. (2010). Applying The ISO 31000 Risk Assessment Framework to Coastal Zone Management. Coastal Conference.

Saaty, T. L. (2008). Decision Making With The Analytic Hierarchy Process.

Tobias O.Nyumba, K. W. (2017). The use of focus group discussion methodology: Insights from two decades of application in conservation. Methods in Ecology and Evolution.

AUTHOR PROFILE

Erdiyan Krisnadi Hasda

Education
2016-2018 Master of Business Administration, Sekolah Bisnis dan Manajemen, Institut Teknologi Bandung, GPA 3.76.
1999-2004 Bachelor of Economics, Economic Faculty Parahyangan Catholic University Bandung.

Majoring Management, GPA 2.93
1996-1999 SMU Negeri 3 Bandung.
1993-1996 SMP Negeri 5 Bandung.
1987-1993 SD BPI Bandung.

Proffesional Experience
2007-2018 PT. PLN (Persero).
2004-2007 PT. Bank Syariah Mandiri.

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