Design of Risk Management Based on Iso 31000 in PDAM Tirta Meulaboh

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Abstract

Regional Water Company (PDAM) Tirta Meulaboh is the only state- ownedof West Aceh district that provides clean water for the residents of West Aceh, especially the residents of the city of Meulaboh and its surroundings. But in its operation the company has not yet to have a risk management system, so it has the impact on the company's survival and not optimal service to its customers. The study aims to identify risk, risk analysis and risk evaluation, in order to do prevention and mitigation of the impact of risk on each section in PDAM Tirta Meulaboh using risk management system standard ISO 31000. The process steps of risk management based on ISO 31000, starting from risk identification to methods Risk Breakdown Structure (RBS), risk analysis using matrix risk quantification and Risk Priority Number (RPN), and the evaluation of risks by using risk map. The results showed that in PDAM Tirta Meulaboh there were 43 risk events that have the potential business problems, which if they were not solved immediately it could affect the performance of the company, even the survival of the company. Of the 43 potential risks that were logged to the red zone, there were 5 potential risks which occupies the first rank is on productions departement: the defective of production water meter, the defective of distribution water meter and retrieval water by tank car without through the water meter. Branch Kaway XVI: customers are reluctant to pay the water bill and in IKK Rantau Panjang: water meter of raw water was damaged. The Efforts to mitigate against the risk of those 43 events which were logged in the red zone has not been planned and done yet by the management of PDAM Tirta Meulaboh.

Keywords: *ISO 31000, PDAM Tirta Meulaboh, Risk Management*

1. INTRODUCTION

Risk is everywhere, can come at any time and are difficult to avoid. If such risks overwrite the organization, then the organization could experience significant losses. In some situations, the risk could lead to the destruction of the organization. So it is important risk to manage the risk. Risk management organization aims to create a system or mechanism within the organization so that the risks that could harm the organization can be anticipated and managed for the purpose of increasing the company's value (Hanafi, 2014: 8).

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Risk management in an enterprise will be very helpful in several ways, namely: (a). Foreseeing the base, the magnitude and frequency of potential losses suffered when an event occurred that could not previously suspected, (b). Creating a basis for reducing or limiting the emergence of a risk, (c). Provide a basis for a decision to estimate the risks that may arise. So risk management is an executive decision which aims at managing the risks that would be faced by the company, which can result in losses for the company (Harimurti in Abisay and Nurhadi, 2013).

Companies will always face an uncertain work environment, so that every company faces risks. PDAM Tirta Meulaboh is the only state- owned West Aceh district that provides clean water for the residents of West Aceh, especially the residents of the city of Meulaboh and its surroundings.

In this case, PDAM Tirta Meulaboh have not been able to provide optimum service to the community. This is evidenced by the frequent customer complaints were reported in the local media about murky water, salty water, muddy water, and the water was not drain.

From the author's observation, it was also known that the company does not yet have adequate risk management systems. This was reflected due to the time of the study, PDAM Tirta Meulaboh has not yet to have a risk management document.

Supposedly every company must establish adequate risk management systems in order to ensure the survival of the company and can provide optimal service to the customers.

Therefore, it is necessary to study to design a risk management system in PDAM Tirta Meulaboh with reference to international standards.

The study aims to identify risk, risk analysis, risk evaluation to be carried out as prevention and mitigation of the impact of risk on each section in PDAM Tirta Meulaboh by using the risk management system of international standard.

With this research, the benefits of a good understanding of risk management based on ISO 31000 standards and able to develop the design of prevention and risk control system.

Previous research related to this topic has been done by Febriyanti and Hidayanto (2012), with the title of the study of risk management for data management in the data processing section of PT Petro Kimia Gresik. Dewi (2012), examines the implementation of a risk management system for the national industry as input for nuclear power programs.

Abisay and Nurhadi (2013), examines the risk management at Soekarno Hatta Airport based on ISO 31000. Nurochman (2014), examines the risk management library information system (a case study in the library of University of Gajah Mada). Li Guo (2015), examines the implementation of a risk management plan in operating room of Peking University Third Hospital.

We can claim that is this study differs from previous studies, due to the characteristics of different companies, so that the results of research and discussion differ from the previous research.

2. LITERATURE STUDY

Understanding Risks and Risk Management

Tugiman (2009), defines risk as an adverse event or not achieving the expected goals. Risks associated with uncertainty. This uncertainty happens due to the lack or unavailability of information about what is going to happen. For organizations, especially companies unpredictability can be detrimental or beneficial impact. If uncertainty profitable then it is called opportunity. While uncertainty is detrimental then known as risk.

CPPR MEP UGM (2012: 2) define risk as an opportunity or possibility of danger, loss, injury, or other unintended consequences. According to Dewi (2012), the risk is the possibility of adverse events. The same thing was said by Hanafi (2014: 1), which defines risk as an adverse event. Another defined that is often used for investment analysis, is the possibility of the results obtained deviates from the expected. Risk is the uncertainty that may be a positive or negative expectation

Meanwhile, the organization's risk management according to Mamduh in Tugiman (2009), is an organization's risk control system faced by organizations in a comprehensive manner for the purpose of increasing the company's value. Also SBC Warburg in Tugiman (2009) said that risk management is a set of policies, procedures complete, that belong to organizations to manage, monitor and control the organization's exposure to risk. Gibson in Nurochman (2014), defines risk management as a practical activity on the identification, assessment, control and mitigation of risk. Likewise Hanafi (2014: 9), said risk management is how an organization can manage the risks it faces. Basically, risk management is done through a process of risk identification, evaluation, risk measurement and risk management.

Each organization must be able to manage the risks. If organizations fail to manage risk, the consequences could be serious enough and certainly detrimental to the company. According to Hanafi (2014: 11), there were six ways to manage organizational risk, namely avoidance, detained, diversification, risk transfer, risk control and risk financing.

ISO 31000 and Risk Management Process

With the various risk management standards and global consensus in risk management, the International Standards Organization (ISO), started to draw up a risk management standards. After going through the voting process and the revision of all the members of ISO, the standard was launched as an international standard (Susilo and Kaho, 2010: 6). By stating that ISO 31000 is a generic risk management standard, this standard does not negate the risk management standards created for specific. Both can co-exist and complement each other. One thing that distinguishes the ISO 31000 with other risk management standard that ISO 31000 is broader and more conceptual than others.

The risk management process includes five activities, namely communication and consultation, determine the context, risk assessment, risk treatment and monitoring as well as the Review. For the risk assessment it self includes three parts in it: risk identification, risk analysis and risk evaluation.

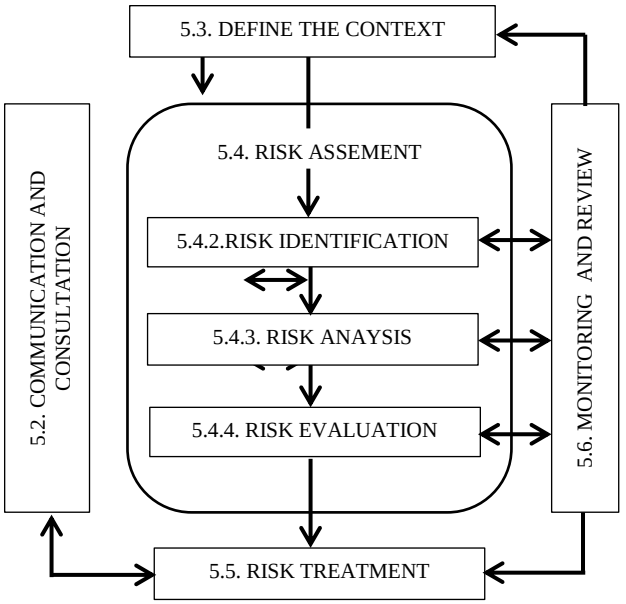

Figure 1 Process Risk Management According to ISO 31000
Source: Susilo, L.J. and Kaho, V.R. (2010: 78).

Meanwhile, according to Peltier (2004), there are six stages in the process of risk analysis, namely the definition of an asset, threat identification, determine the probability of occurrence, determine the impact of threats, recommendations and documentation control.

Risk mitigation is a systematic methodology that is used by senior management to reduce the risk of the organization. There are five methods in mitigating risk, the acceptance of risk (risk assumption), the reduction of risk (risk Alleviation), risk aversion (risk avoidance), the limitation of risk (risk limitation) and planning risk (risk planning) (Peltier, 2004).

3. RESEARCH METHODOLOGY

The research method of risk management was done based on ISO 31000. The phases starting from risk identification, risk analysis and risk evaluation.

Risk identification aims to identify risks that must be managed by the organization through a systematic and structured process. This process is very important because the risks are not identified in this process will not be dealt with in the production process. Risk identification target is to develop a list of sources of risk and a comprehensive events as well as having an impact on the achievement of the goals and targets identified from the context. The main document that is generated in this process is a list of risk

Risk identification was done by the method of Risk Breakdown Structure (RBS), followed by brainstorming with the employee responsible for each section, including the top leaders.

Risk analysis is an attempt to more deeply understand the risks, including ways and strategies in treating those risks. The purpose of risk analysis is to analyze

the impact and possibilities of all the risks that may impede the achievement of the organization's objectives. Event risk is analyzed using matrix quantification of risk, then the risk is classified in the red, yellow or green, according to its level. Risk quantification matrix can be seen in Table 1.

The purpose of risk assessment is to help the decision-making process based on the results of risk analysis. Risk evaluation process will determine which risks need treatment and how to treat priority over those risks.

Treatment risks include efforts to select the options that can reduce or negate the impact and likelihood of risk occurrence, then apply the selection.

Tabel 1 – Risk Quantification Matrix

Likelihood		Consequence				
		Insignificant	**Minor**	**Moderate**	**Major**	**Extreme**
		1	**2**	**3**	**4**	**5**
Almost Certain	5	5	10	15	20	25
Likely	4	4	8	12	16	20
Possible	3	3	6	9	12	15
Unlikely	2	2	4	6	8	10
Remote	1	1	2	3	4	5

Source: Li Guo (2015)

Low *Medium* *High*

4. RESULTS AND DISCUSSION

Organization Overview

PDAM Tirta Meulaboh is a business entity owned by the Government of West Aceh which was founded in 1983 under the name Water Management Agency (BPAM). The Company began operations in 1984. Based on Regional Regulation No. 11 of 1993, it renamed to became PDAM Tirta Meulaboh. The company has the mission of "Excellent Service, Healthy and Independent".

Based on data as of February 2016, the service of the company covered three districts:

a. Johan Pahlawan sub-district: the number of customers 4,668 house connections (SR).
b. Kawai XVI Subdistrict: the number of customers 1,546 house connections (SR).
c. Meureubo Subdistrict: customer number 246 house connections (SR).

PDAM Tirta Meulaboh has three water treatment facilities (Water Treatment Plant / WTP), located in the lapang village, Johan Pahlawan subdistrict, in IKK Rantau Panjang, Meureubo subdistrict and in Beureugang village, Kaway XVI subdistrict.

The company located at Jalan Purnama Meulaboh No. 01, has an installed production capacity of 6.14952 million m3, with the volume of water produced

reaches 2.1024 million m3. The company has 51 permanent employees and assisted by 19 contract employees.

Risk Identification

Risk identification in this study is done by testing the document by using Risk Breakdown Structure (RBS) method, conducting interviews and brainstorming with the stakeholders related. From the document test results, obtained the information that there were as many as 9 units under PDAM Tirta Meulaboh have potential risk, namely the financial, administrative and general, IKK Rantau Panjang, Branch of Kaway XVI, part of customer relations and account, planning section and supervision, production and transmission and distribution units. The risk is described in figure 1. Based on interviews and brainstorming with related stakeholders, can be identified as many as 54 risks.

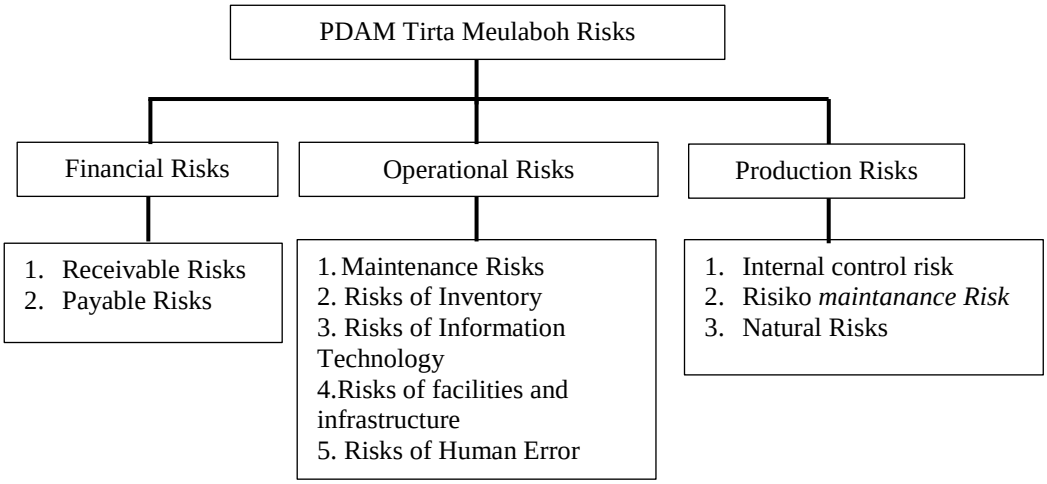

Figure 1 RBS PDAM Tirta Meulaboh

Risk Analysis

In this study, the risk analysis process was done using quantitative methods with qualitative parameters. Assessment was done by distributing questionnaires to get answers from the respondents.The respondents were 12 people whowere related risk stakeholders of PDAM Tirta Meulaboh. The questionnaire was divided into two parts, the possible risks and impacts.

The questionnaire has been tested by using normality test, validity and reliability test of SPSS software. Normality test was done by using Kolmogorov-Smirnov methods. The resalt indikacted that the data were normally distributed, both variable and variable risk of impact, as shown in figure 2 and figure 3.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Risk	0,138	12	0,200*	0,962	12	0,815

Figure 2 Result of Nornality Test for The Risk Variable

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Impact	0,169	12	0,200*	0,961	12	0,791

Figure 3 Results Of Normality Test For The Impact Variable

From Figure 2 and Figure 3 above, indicated that each number Kolmogorov-Smirnov test of significance Sig. = 0.200> α = 0.05, which means that the data distributed normally. Validity test results show that all the items in the questionnaire were valid question. Furthermore, the reliability test gave risk variables Cronbach's Alpha value of 0.917. While the impact of variable reliability test gives Cronbach's Alpha value of 0.897. Each value of Cronbach's Alpha, both impact variable and risk variable were more than 0.60, which means that the questionnaire of risk variables and impact variables were reliable.

Event risk that had been analyzed, then be put on the red, yellow or green zone. All the risks in the red zone became priority to receive special treatment in the form of further treatment, so-called Risk Priority Numbers (RPN), as presented in Table 2.

Table 2 Risk RPN for events in the Red Zone

Kode R/D*	Unit	Risks	KK*	D*	RPN*	Rangking
1	Financial department	Arrears of customer accounts (accounts receivable).	4	5	20	2
3	Financial department	Water from reservoir be put in the water tank car, so it was not recorded in a water meter.	4	5	20	2
4	Financial department	The company's long-term debt from the Ministry of Finance since 1996-2015.	4	4	16	3
5	Financial department	Debt of chemicals alum from supplier.	4	4	16	3
6	Financial department	Debt of employee's pension fund at Dapenmapamsi.	4	5	20	2
7	Financial department	Debt of electricity from PLN	4	5	20	2
8	Financial department	Company debt of the social security contribution on BPJS.	4	5	20	2
9	Financial department	Debt of salary of supervisory board.	4	4	16	3
10	Financial department	Debt of employee meal	4	5	20	2
11	Adm Section and General	Late order of alum.	4	5	20	2

Kode R/D*	Unit	Risks	KK*	D*	RPN*	Rangking
15	IKK Rantau Panjang	Less stable of electric current from PLN	4	5	20	2
17	IKK Rantau Panjang	Leaks in distribution pipes.	4	4	16	3
18	IKK Rantau Panjang	Turbid water.	4	4	16	3
19	IKK Rantau Panjang	Delays of alum delivery	4	5	20	2
20	IKK Rantau Panjang	Shortage of maintenance funds.	4	4	16	3
21	IKK Rantau Panjang	Distribution pumps only 1 unit being used of 3 units available.	4	4	16	3
22	IKK Rantau Panjang	4 units of alum mixer machines and 3 units of alum dozing machines that have been installed by a partner since 2015 were not working.	4	4	16	3
23	IKK Rantau Panjang	Water meters was damaged.	5	5	25	1
24	IKK Rantau Panjang	office furniture were unusable.	4	4	16	3
26	Branch of Kaway XVI	Turbid water.	4	4	16	3
27	Branch of Kaway XVI	unstable electric current (often fails).	4	4	16	3
28	Branch of Kaway XVI	Most customers in Blang Beurandang were no not get water supply.	4	5	20	2
29	Branch of Kaway XVI	Distribution pumps could not be used continuously.	4	5	20	2
30	Branch of Kaway XVI	Customers reluctant to pay their water bill.	5	5	25	1
31	Branch of Kaway XVI	Complaints from customers presented directly to the head of the branch.	4	5	20	2
32	Part of Customer Relationship and Account	Error record water meter at the customer's home.	4	4	16	3
33	Part of Customer Relationship and Account	Water meter was lost.	4	4	16	3
34	Part of Customer Relationship and Account	Complained by customers	4	5	20	2
35	Part of Customer Relationship and Account	Customer's home were not be able to be identified	4	5	20	2
36	The Planning and Control	Data base of transmission and distribution pipelines inaccurate.	4	5	20	2

Kode R/D*	Unit	Risks	KK*	D*	RPN*	Rangking
37	The Planning and Control	Installation of transmission and distribution pipelines by the contractor did not comply with the specification.	4	5	20	2
38	The Planning and Control	Monitoring software for water pressure was not yet available	4	5	20	2
41	Warehousing Dept.	Flood	4	4	16	
42	Production Dept.	Turbid water.	4	5	20	2
43	Production Dept.	Burning of the intake pump	4	5	20	2
46	Production Dept.	Red colored water.	4	4	16	3
48	Production Dept.	Laboratory equipment incomplete and laboratory reagents have been expired.	4	4	16	3
49	Production Dept.	Water meter production was damaged	5	5	25	1
50	Production Dept.	Water meter distribution was damaged.	5	5	25	1
51	Production Dept.	There is no water meter for water tank car.	5	5	25	1
52	Transmission and Distribution Section	Leaks in the p transmission and distribution pipelines.	4	4	16	3
53	Transmission and Distribution Section	The occurrence of illegal connections	4	5	20	2
54	Transmission and Distribution Section	The water supply to the customer was stop	4	5	20	2

Note: *KK = Kemungkinan Kejadian, *D = Dampak, *R/D = Risiko/Dampak

Risk Evaluation

The purpose of the risk evaluation process is to determine the priority of risk management in order to know any risks that require attention and further treatment. This phase was conducted to determine how much risk was extreme, major, moderate, minor or insignificant. The risk classification can be seen on a map of risk presented in Table 3.

From a total of 55 potential risks identified, 43 potential risks (78.18%) were included in the red zone, consist of 9 potential risk from finance department, one from administration and the public department, , 9 potential risks from IKK Rantau Panjang, 6 from Kaway XVI Branch, 4 from customer relations and account

department, 3 from planning and supervision, 1 from warehousing, 7 from production department and 3 potential risk from transmission and distribution.

Furthermore, the potential risks that fall into the red zone were ranked in accordance with the value of the RPN. The objective was to facilitate in determining the priority of risk mitigation. From table 1 above, there are 5 potential risks which occupies the first rank, in the second rank there were 21 potential risks and the remaining 17 potential risks logged in third rank. Potential risks were included in the red zone should receive serious attention from the management to be handled immediately.

Table 3 Risk Map of PDAM Tirta Meulaboh

Likelihood		**Consequence**				
		Insignificant	**Minor**	**Moderate**	**Major**	**Extreme**
		1	**2**	**3**	**4**	**5**
Almost Certain	5					R23, R30, R49, R50, R51
Likely	4				R4, R5, R9, R17, R18, R20, R21, R22, R24, R26, R27, R32, R33, R41, R46, R48, R52	R1, R3, R6, R7, R8, R10, R11, R15, R19, R28, R29, R31, R34, R35, R36, R37, R38, R42, R43, R53, R54
Possible	3				R2, R13, R16, R25, R45, R47	R14, R39, R44, R55
Unlikely	2			R12	R40	
Remote	1					
		Low		*Medium*		*High*

Treatment Risks

Risk treatment system was designed to assist managers in making decisions. Because in general the potential risks were identified based on events that happened before, then the election strategy of risk treatment performed in this study was to mitigate risk, as presented in Table 4.

Table 4 Risk Mitigation Strategy Loggof ed in Red Zone

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
1	Financial department	Arrears of customer accounts (accounts receivable).	(A). Customers are reluctant to pay the bills, and (b) Customer less satisfied with the services	Constrained in the implementation of the company's operations	(A) To form billing team and (b) To stop water connections.
3	Financial department	Water from reservoir be put in the water tank car, so it was not recorded in a water meter.	Mains water meter was damaged	The potential occurrence of fraud that may harm the company's finances.	Supply and installation of water meters for water collection by water tank car
4	Financial department	The company's long-term debt from the Ministry of Finance since 1996-2015.	Installment repayment had never been done	Financial burden on the company.	Grant from central government to local government through APBK 2017
5	Financial department	Debt of chemicals alum from supplier.	The lack of payment of water bills by customers, thus constrained in covering the operating costs of the company.	Financial burden on the company and delay of procurement of alum for the next period.	Intensifying water accounts receivable billing to the customer or a financial subsidy from the government.
6	Financial department	Debt of employee's pension fund at Dapenmapamsi.	The lack of payment of water bills by customers	Financial burden on the company and the company's employees in danger of not receive a pension.	Intensifying water accounts receivable billing to customers.
7	Financial department	Debt of electricity from PLN	The lack of payment of water bills by customers	Financial burden on the company and threatened disconnection of the electricity to the company.	Intensifying water accounts receivable billing to customers.
8	Financial department	Company debt of the social security contribution on BPJS.	The lack of payment of water bills by customers	Financial burden on companies and potential employees do not receive Social	Intensifying water accounts receivable billing to customers.

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
				Security services by BPJS.	
9	Financial department	Debt of salary of supervisory board.	The lack of payment of water bills by customers	Financial burden on the company.	Intensifying water accounts receivable billing to customers.
10	Financial department	Debt of employee meal	The lack of payment of water bills by customers	Financial burden on the company and potentially complied by employees.	Intensifying water accounts receivable billing to customers.
11	Adm Section and General	Late order of alum.	Constrained transport from Medan, North Sumatra.	Operational cessation in Kaway XVI and Ranto Panyang.	Borrow alum from nearby counties.
15	IKK Rantau Panjang	Less stable of electric current from PLN	Disruption in electricity generation	Pump intake could not be functioned.	Provision of a backup generator to overcome temporary blackouts PLN.
17	IKK Rantau Panjang	Leaks in distribution pipes.	a). Excavation on the road that affect the pipelines b). Very old distribution pipe.	Lack of water pressure, so that water could not reach the customers	a). Improvements of the leaking pipe. (B) To do coordination and communication with the road contractor
18	IKK Rantau Panjang	Turbid water.	A). Clogged / damage to the pump dozing. (B). Shortage mixture of chemicals alum. (C) .Kerusakan on WTP, but do not care.	Complied by.	(A). Do back wash in tubs and tubs WTP reservoir. (B). Repair / maintenance WTP.
19	IKK Rantau Panjang	Delays of alum delivery	Transport delays from Medan, North Sumatra.	Unable to make raw water treatment / cessation of operations.	Borrowing while alum in nearby counties taps (Nagan Raya).
20	IKK Rantau Panjang	Shortage of maintenance funds.	The company's revenues had not been optimal.	Implementation of the treatment could not be done optimally.	Proposed government funding.

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
21	IKK Rantau Panjang	Distribution pumps only 1 unit being used of 3 units available.	Damage to the second and third distribution pump yet there have been no improvement.	When the main distribution pump damage no backup distribution pumps.	Restoration 2 distribution pumps.
22	IKK Rantau Panjang	4 units of alum mixer machines and 3 units of alum dozing machines that have been installed by a partner since 2015 were not working.	The unit have not been connected to the electricity yet	a. Mixing of alum was still done manually. b. Injection of alum into the raw water and WTP were still using the old dozing machine	PDAM Tirta Meulaboh trying to reach back through Satker contractor concerned.
23	IKK Rantau Panjang	Water meters was damaged.	Water meters are old.	The amount of water that would be treated at the WTP tub could not be known	The new water meter procurement of raw water.
24	IKK Rantau Panjang	office furniture were unusable.	Quite old office furniture	Customers who came to the office could not be served well.	New procurement of offices furniture (desks and chairs).
26	Branch of Kaway XVI	Turbid water.	(A). Heavy rain which causes the river water as a source of raw water becomes cloudy. (B) Dozing pump damaged.	Complained by customers	Doing back wash in the WTP and reservoir tub
27	Branch of Kaway XVI	Unstable electric current (often fails).	Installation of underground electricity work by PLN contractor	Cease operation of the machine, so that water could not be distributed to the customers	Contacting PLN to redo the work

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
28	Branch of Kaway XVI	Most customers in Blang Beurandang were no not get water supply.	The installation of water pipelines by the NGO Caritas in 2007 did not coordinate with the PDAM Tirta Meulaboh so they could able to not identify water pipelines in that area	Most customers in Blang Beurandang were no not get water supply.	PDAM Tirta Meulaboh need to identify the existing gate valve at each intersection in the housing complex of Blang Beurandang.
29	Branch of Kaway XVI	Distribution pumps could not be used continuously.	Water pipelines installed is not in accordance with the technical specifications, so it easy to leak when the water pumped continuously.	Most customers in the area Blang Beurandang not get clean water supply.	Water distribution to customers using gravity.
30	Branch of Kaway XVI	Customers reluctant to pay their water bill.	The water supply could not reach the customer and murky water.	The emergence of customer receivables.	(a). Ask payment from customers (b) Dispensation installments in arrears, (c) Disscount to customers who pay their debts at once, and (d). Improve the service to customers.
31	Branch of Kaway XVI	Complaints from customers presented directly to the head of the branch.	There were no employee in charge to response the problems.	All complaints could not be able to response properly	Need to develop job descriptions as needed.
32	Part of Customer Relationship and Account	Error record water meter at the customer's home.	(A). By the time officer arrived to the customer's home to record water meter, they found the gate was locked and nobody at home (b) Blurr water meter mark and (c) Inaccurate record by officers	Inputting the wrong data into customer's water bill, so it swells to bill customers.	The calculation of the amount of water usage was conducted by cubication.

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
33	Part of Customer Relationship and Account	Water meter was lost.	Theft of water meters by unknown persons.	Losses for the company and the use of water could not be known	Installation of the iron box at the customers water meter
34	Part of Customer Relationship and Account	Complained by customers	(a)murky water and (b) Swell of customers water bill	Officers can suffer from work stress.	Improve service to customers.
35	Part of Customer Relationship and Account	Customer's home were not be able to be identified	Initial information about customer data less accurate.	Could not be able to do the billing to the customer's account.	Collecting data on the customers
36	The Planning and Control	Data base of transmission and distribution pipelines inaccurate.	When new pipelines added, not the preliminary information related to existing pipelines available	(A). No work efficiency when conducting repair leaking pipes and house connections, and (b) Difficult to detect the position of gate valve and the mains water meter when it leakage	Redo the mapping existing pipelines network
37	The Planning and Control	Installation of transmission and distribution pipelines by the contractor did not comply with the specification.	Did it on purpose by contractors	Easy leak in the transmission and distribution pipelines.	Conduct parallel surveillance by PDAM Tirta Meulaboh at the time of installation of the pipeline by the contractor.
38	The Planning and Control	Monitoring software for water pressure was not yet available	Lack of funds.	Decision-making in the management of water could not be done on time.	Proposed support from the government, both local and central government
41	Warehousing Dept.	Flood	Rain and low warehouse building foundation	Caused the items store in the warehouse damage, such as: water meter, water meter accessories and other items.	Renovation of the warehouse

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
42	Production Dept.	Turbid water.	(A). Due to heavy rain (b). Because of the hot weather, (c). Damage of dozing pump (d) Lack of focus of officers who preparing chemicals for injection to the WTP.	Complained by customers	(A). Chcek the water condition periodically (every 2 hours) (b) .When the source of raw water turbid, then the operator must be alert in adjusting the dozing pump engines and increase the use of alum, and (c) Operator should able to read nature signs to be ready of heavy rain.
43	Production Dept.	Burning of the intake pump	(A). Sedimentation of mud and garbage enter to vacuum machine (well pump), (b) unstable PLN electricity	Cease operation of intake pump	(A) Do the cleaning the intake structure for at least 6 months to 1 year, (B) Operator obliged to check the sludge sediment intake structure, (c) Contact PLN to stabilize the electric current.
46	Production Dept.	Red colored water.	(A). Due to natural factors, such as rain, and (b) Red Leuhan river water enter to the intake due to the rainy season.	Complied by customer.	(A). Relocating the intake structure passed through / over the mouth of the river Leuhan, and B). Adding raw water suction pipe length.

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
48	Production Dept.	Laboratory equipment incomplete and laboratory reagents have been expired.	Companies are constrained in financial terms.	The company could not conduct examination of biological and chemical water so that the water supplied to customers did not meet the conditions required by the Minister of Health.	Proposed funding support from local government, provincial government and central government
49	Production Dept.	Water meter production was damaged	Rubbish is often caught in the propeller water meter, thereby disrupting the supply of water from the intake to the WTP.	Not be able to measure the amount of water produced in the WTP.	Procurement of digital production water meter
50	Production Dept.	Water meter distribution was damaged.	Rubbish is often caught in the propeller water meter that disrupts water supply from the reservoir basin to customers.	Not be able to measure the amount of water distributed to customers	Procurement of digital distribution water meter
51	Production Dept.	There is no water meter for water tank car.	Procurement has not been done yet	The potential occurrence of fraud and potential loss of water.	Procurement of water meters for water collection by tank car.

Code R/D*	Unit	Risks	Causes	Impact	Mitigation Strategy
52	Transmission and Distribution Section	Leaks in the transmission and distribution pipelines.	(A) Pipelines were already old, (b) excavation of road and (c) installment of underground Telkom cable network.	(A) .Distrupt water supply to customers, (b). The water pressure is reduced, and (c) create loss to the company.	(A). Fixing leaky pipes, (b). Coordinate with the Department of Public Works and Telkom during the excavation of the road to avoid pipe leaking in the future.
53	Transmission and Distribution Section	The occurrence of illegal connections	Lack of supervision from internal of the company	Detrimental to the company.	(a).Improve the supervision, (b).Stop the connection (c).Fine up to Rp2 mil/month)
54	Transmission and Distribution Section	The water supply to the customer was stop	(a). Leaking pipelines (b). Distribution pipe to the customers was not flow smoothly (c). Murky water.	Complained by customers.	(a). Repair and clean the leak pipe. (b). Install new pipelines.

5. CONCLUSION

At PDAM Tirta Meulaboh there were 43 risk events that have the potential dangers, which if not be handled immediately may affect the company's performance and even survival of the company. Of the 43 potential risks that logged to the red zone, there were 5 potential risks in the first rank, 21 potential risks in the second rank and the remaining 17 potential risks were in the third rank.

As for the 5 potential risks in the first rank were in the production department: the defective of production water meter, the defective of distribution water meter wate and water meter of tank car was not functioning . In branch of Kaway XVI: customers were reluctant to pay the water bill and in the IKK Rantau Panjang: water meter of raw water damaged.

Efforts to mitigate against the 43 risks logged in the red zone have not been planned and done by the management of PDAM Tirta Meulaboh yet.

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