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Editor: Arinto Nugroho, Sarmini

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The Spring Response of Gunung Sewu Karst to Rain in Catchment Area

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***Abstract*—Groundwater pollution triggered by the vulnerability of karst is one of the problems in the karst region. The soluble rocks of karst constituent form many holes into which water-concentrated infiltration from the surface into subsurface hydrological systems. This condition causes pollutants on the surface can be easily carried into the groundwater karst. Analysis of karst spring response is based on the relation of fluctuation pattern of water quality parameter values from karst springs with the fluctuation of rainfall intensity. The rainfall data was collected from the rain station in Gunungsewu karst area and analyzed using isohyet. Water quality parameters measured were pH, TDS, temperature, Nitrate, turbidity, and DO. Sample measurement was conducted ten times with a span of two days. Water quality parameters were measured in the rainy season, so there were several days of rain and not rain. The results of the analysis showed the variation of karst spring response to rain in the catchment area. This response variation was indicated by the difference of water quality parameter which has a strong correlation with rain intensity and the time of the strong correlation. This condition indicated a difference in vulnerability level of the nine springs. In line with the concept of cross-time and analysis results, it is concluded that most of the karst springs in the study area have high levels of vulnerability. The springs of Sanglor 2, Puring, Selonjono, Kalicacahan, Mudal, and Ngobaran have high levels of vulnerability. Single and Cerme Poker springs have moderate levels of vulnerability and Slulu spring has low level of vulnerability.**

Keywords—: karst groundwater vulnerability, springs response, pollutant croostime

I. INTRODUCTION

A karst spring is a basic source of water for residents in the karst area. However, water from karst springs is very susceptible to contamination in line with the characteristics of the karst landscape. This groundwater contamination is a form of problems that often arise in the karst area[1][2][3][4][5]. Based on this, the protection and conservation of this groundwater to be one important thing, because the water in this area is a vital resource.

The information on karst spring vulnerability is very important in the protection of karst groundwater. This information becomes the basis for determining the method and location of karst groundwater protection [2][3][6]. In line with the concept of pollutant cross-time, karst spring response to rain can be a hint of karst spring vulnerability.

Karst is a landscape formed by soluble rocks to form a field vulnerable to various disorders [7][8]. The surface karst feature has a very large role as a karst underground water vulnerability control factor [9][10]. The existence of missing holes such as ponor, sinkhole and cave mouth can make the site has a very high vulnerability to karst underground water pollution [11][6][12][13][14]. The missing holes form a karst basin that triggers concentrated infiltration. The role of the soil as a media reducing the concentration of contaminants will be lost when in the karst field there is a hole that allows the concentration of surface flow into the karst surface sub-hydrologic system [13]. The concentration of surface streams entering the subsurface through the missing holes can carry various pollutants quickly. Therefore, locations, where there are missing holes such as ponor, sinkhole and cave mouth are assessed as places with very high vulnerability.

Surface karst rocks exposed either by advanced karstification processes on epikarst or by human activity can shorten the pollutant cross-time entering the karst aquifer. The absence of a protective layer above the karst rocks such as soil and vegetation facilitates the pollutants to enter the aquifer through fractures or holes in karst rocks. A strongly exposed karst surface will have a high vulnerability to karst underground water pollution.

The filtration capability of the above groundwater karst layer is essential for the protection of groundwater karst against the pollution. The process of reducing the concentration of pollutants originating from the karst surface is played by the cover soil permeability. The process of reducing the concentration of pollutants will be better with the smaller permeability of karst rock cover soil. Soil permeability conditions can be affected by the clay content conditions in the cover soil.

Vegetation has the earliest role in the process of retarding or preventing the entry of pollutants into the karst aquifer. Close vegetation cover either small or large vegetation is very helpful for the filtration process that plays by cover soil factor. Therefore, karst field that has a close vegetation is considered as a place that has a low vulnerability to karst groundwater pollution. Based on this, this study aims to determine the response of karst springs to the rain that

occurred in catchment area as a basic assessment of the vulnerability level of the spring catchment area.

II. Research Method

A. *Study Area*

This study was conducted on nine karst springs namely Mudal, Cerme, Kalicacahan, Sanglor 2, Ngobaran, Pok Tunggal, Puring, Slulu, and Selonjono. Nine karst springs are scattered in the karst area of Gunungsewu west, south and east. Mudal, Cerme, Kalicacahan, and Sanglor 2 are karst springs located in the western part of Gunungsewu karst. Ngobaran, Pok Tunggal and Puring spring are located in the south and extend eastwards. Slulu and Selonjono spring are located in the north east of Gunungsewu karst area. The nine springs are flowing throughout the year and have the smallest discharge of 1 m3/sec

B. *Data and Analysis*

The data used in this study was rainfall and water quality parameter data. Rainfall data is collected from the rainfall station in all rain stations in Gunungsewu karst area owned by the Department of Holticulture and Food Crops, Ministry of Agriculture of Gunungkidul Regency. Rainfall data collected was rainfall data in December 2015 for thirty days. The intensity of rainfall in the spring catchment area is based on isohyet analysis of rainfall data from the rain station. Rainfall intensity values are sorted by date during data collection. Graph of rainfall intensity is depicted based on the data that has been sorted.

Water quality data was measured from karst spring samples taken in the same month with a span of two days. Parameters of pH, TDS, DO, and the temperature was measured directly in the field. The pH and temperature were measured using pH meter Ohaus ST20. The temperature was measured using the unit oC. TDS was measured using Hanna's TDS meter with mg/L unit. DO was measured using DO meter Lutron DO-5509 with units of mg/L. turbidity and nitrate parameters were measured at the BBTKL Laboratory of MOHRI The turbidity was measured using the unit NTU and nitrate was measured using the unit mg / L.

The correlation between fluctuation patterns of water quality parameters with rainfall was measured using correlation analysis. The analysis was done by correlating a series of data of each water quality parameter with rainfall data on the same day as the rain event. The analysis was also conducted with a correlation of water quality parameters with rainfall data series daily up to seven days after the first measured rainy day. This analysis was aimed to know the correlation and time span of similarity pattern fluctuation of water quality with rainfall. A high correlation value indicates a strong correlation between the fluctuations of water quality parameters with fluctuations in rainfall intensity. The time span of strong correlation indicates the length of time of the water quality parameter. The shorter the time span there is a strong correlation, indicating the faster the cross-time of polluters in the catchment area.

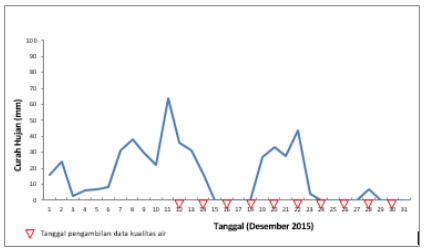
III. Result and Discussion

A. *Result*

1) *Rainfall pattern*

Rainfall variation is shown in Fig 1

(a)



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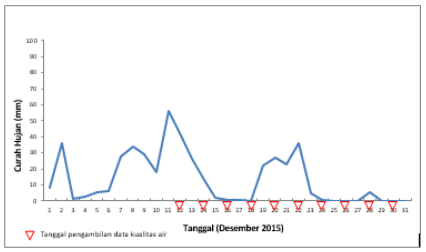

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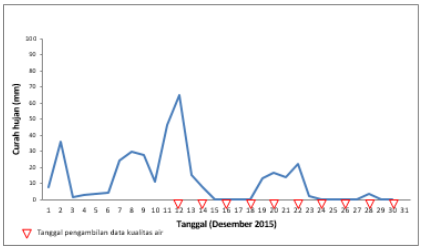

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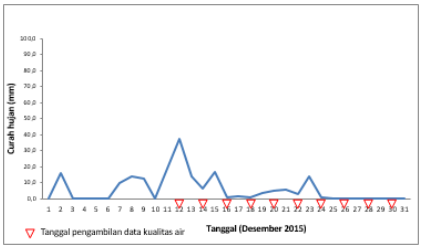

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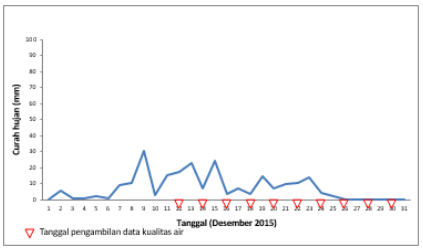

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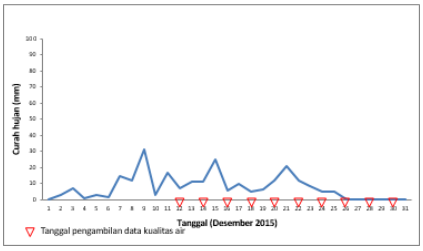
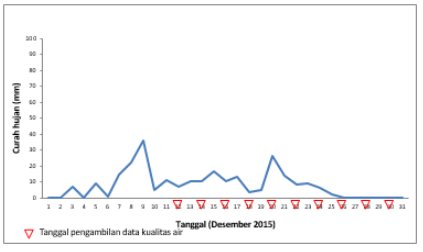
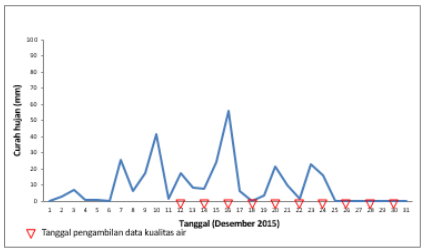


(g)



(h)



(i)

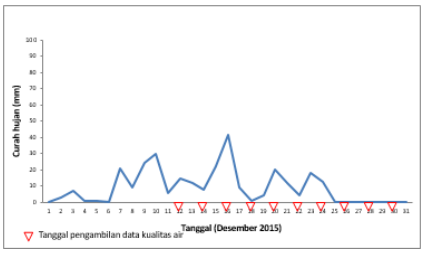


Fig 1. The pattern of rainfall fluctuation in the catchment area of the study area

Fig 1 shows the pattern of rainfall fluctuations in the catchment area of the nine karst springs namely a. Mudal, b. Cerme, c. Kalicacahan, d. Sanglor 2, e. Ngobaran, f. Pok Single, g, Puring, h, Slulu, and i. Selonjono. Based on the picture, there was a spatial differenceof fluctuationpattern . However, in general in all spring catchment area there was rain with a higher intensity compared to the beginning and end of the month. The high intensity of rainfall in the mid-moon days occurred in the Mudal, Cerme, Kalicacahan and Slulu springs. The relatively low rain intensity occurred in the catchment area located in south of the study area, that are Ngobaran, Pok Tunggal, and Puring spring.

1) Fluktuasi Parameter Kualitas Air

The measurementresult of water quality parameter showed fluctuation of water quality parameter value from each karst spring. Fluctuations of water quality parameters in most springs are influenced by the rain that occurred in the catchment area. pH parameter had fluctuations ranged from 7.29 to 8.58pH of Ngobaran, Cerme and Puring spring. The highest mean of pH value was found in Puring spring and the lowest in Pok Tunggal spring. TDS parameter ranged from 226 mg / L found in Puring spring up to 722 mg / L which occurred in Ngobaran spring. The highest mean values of these parameters were found in Pok Tunggalspring and the lowest in Puring spring.The value deviation appears occurred at two measurements occurring in Pok Tunggal springs made possible by the influence of the tides. TDS value of this measurement reached a value of more than 1000 mg / L. Water temperature was ranged between 25.6 °C to 29.8 °C. The distribution of water temperature values showed that water from the springs located in the southern part of the study area had a relatively higher temperature. The highest mean of water temperature occurred in Ngobaran spring and the lowest occurred at Selonjono spring. Nitrate parameter values ranged from 0.04 mg / L in Cerme springs to 35.97 mg / L occurring in Puring spring. This spring had the highest mean value of nitrate parameters. The highest turbidity parameters also occurred in Puring spring that reached 247 NTU, while the smallest was Pok Tunggal spring. DO parameters ranged from 1.1 mg / L to 4.8 mg / L occurring in Selonjono spring. The highest mean value of the DO parameters was found in Cerme spring and the lowest was found in Sanglor 2 spring.

2) The Spring Response to rainfall

The measurement result of the water quality parameter showed the variation of response from each spring. The spring response was indicated by strongly correlated parameters and the time span of the correlation. Fluctuations of water quality parameters from each spring are as follows.

a) Mudal Spring

Turbidity parameter was the fastest parameter indicating the response to the occurrence of rain in this catchment area. This fluctuation of parameter value had a correlation of 0.84 with rainfall fluctuation. The similarity of this fluctuation occurredafter one day after the rain. Other parameters that showed weaker correlation were DO and TDS that was equal to 0.76 and 0.68.

b) Cerme Spring

The correlation of fluctuation of water quality parameters with the strongest rain intensity at this spring was TDS parameter that was 0.70 which occurred on the fourth day after the rain. Other parameters did not show fluctuations that have a correlation with fluctuations of rainfall intensity in the catchment area.

c) KalicacahanSpring

Kalicacahan spring response to rain was indicated by a strong correlation on turbidity parameter with value 0.80. This correlation occurred on the first day after the rain. Next correlation was also indicated by pH parameter occurring on the third day after the rain. The correlation of pH parameter was negative, which means with the addition of rainwater to this spring, it decreases the water pH value of the spring.

d) Sanglor 2 Spring

There was more than one parameter whose fluctuations of parameter values were strongly correlated with rainfall intensity fluctuations. Nitrate and temperature had a strong correlation with rainfall intensity. Both parameters appeared on the same day as the rain. Nitrate and temperature correlation values were -0.97 and -0.81, respectively. The correlation value of both parameters was negative which means there was a decrease in the value of water quality parameters with the addition of rainwater in the spring. Turbidity also showed a strong correlation of 0.90 and occurred on the fourth day after the rain. Another parameter that comes with a weaker correlation was TDS.

e) Ngobaran Spring

Parameters that appeared with a strong correlation in Ngobaran spring were Nitrate parameter with value -80. This correlation appeared on the second day after the rain. This correlation value was negative. Other parameters did not show a strong correlation to rain intensity.

f) Pok Tunggal Spring

Water quality parameter that showed the strongest correlation with the fluctuation of rain intensity was Nitrate parameter with value -0.78. The correlation occurred on the fourth day after the rain occurred in the catchment area. Another parameter with a weaker correlation was the turbidity with value 0.73 that appeared on the fifth day after the rain.

g) PuringSpring

Parameters that showed strong correlation on Puring spring were turbidity parameters and pH of 0.86 and -0.84, respectively. The turbidity parameter appeared on the second day after the rain, while the pH parameter appeared on the first day after the rain. Nitrate parameter appeared with weaker correlations on the first day one after the rain with a value of 0.73.

h) Slulu Spring

TDS parameter appearedwith the largest correlation on Slulu springs with a value 0.69 which appeared on the sixth day after the rain. Fluctuations in other parameter values did not show a strong correlation to fluctuations in rainfall intensity in this catchment area.

i) Selonjono Spring

Parameters that most showed a strong correlation on Selonjo spring wass TDS parameter with value 0.85 which appeared on the first day after the rain. Temperature parameter showed a strong correlation that was -0.79 but its appearance occurred long after the rain. Other parameters did not show a strong correlation to fluctuations in rain intensity.

Based on the calculation of correlation fluctuation of water quality parameters with fluctuation in rain intensity above, can be summarized in Table 1.

Table 1. shows the response of observation karst springs to the rain clearly. The response of each spring to rain was indicated by the color and range of days of the strongest correlation. Red color indicates a strong correlation, while the green color indicates a weak correlation. The level of vulnerability of the catchment area was higher with more strong correlation with rainfall with more shorterthe day range. Based on these conditions, the catchment area of Sanglor 2 was the most vulnerable spring. Sequentially the level of vulnerability of the spring catchment area was Sanglor 2, Puring, Selonjono, Kalicacahan, Mudal, Ngobaran, Pok Tunggal, Cerme, and Slulu

Table 1. The response of water quality parameter of each spring

No	Spring	Days after ... after the rain								Information
		0	*+1*	*+2*	*+3*	*+4*	*+5*	*+6*	*+7*	
1	SANGLOR 2									High vulnerability
2	PURING									High vulnerability
3	SELONJONO									High vulnerability
4	KALICACAHAN									High vulnerability
5	MUDAL									High vulnerability
6	NGOBARAN									High vulnerability
7	POK TUNGGAL									High vulnerability
8	CERME									High vulnerability
9	SLULU									High vulnerability

Source : Analysis result, 2016.

Information:

: very strong correlation (>0.8) by more than 1 parameter

: very strong correlation(>0.8) by 1 parameter

: strong correlation (0.7 – 0.8) by 1 parameter

: weak correlation (0.6 - 0.7) by 1 parameter

B. DISCUSSION

The response of spring to rain in the catchment area can be used to identify the vulnerability level of karst spring catchment area. This study used the basis of the assumptions to assess the vulnerability level of observation spring catchment area. This is in line with the opinions stated by [11][6]. The previous study conducted by [13] provided high vulnerability values to areas that had evidence of direct linkage and time rapidly cross-time pollutant.

This study showed the relationship between rain intensity with the fluctuation of water quality parameters with varying day span. Based on analysis of spring response to rain conducted in this study, showed that most of the catchment areas had a high vulnerability. The vulnerability of karst spring catchment area to the majority in the study area was in line with previous study findings such as [7][8] associated with karst field vulnerability to thepollution.

The appearance of water quality parameters showed the effect of cover and land use in the catchment area of each karst spring. This condition was in line with the statement[4] that intrinsic vulnerability assessment is an assessment of groundwater vulnerability caused by various human activities including geological, hydrological and hydrogeological conditions. References [15][16][17] also clearly gave weight to human activity which can be a source of the pollutant of karst groundwater. Forms of activity that can result in pollution of the heaviest weightssequentially are mining, industry and dense settlements, high-intensity agriculture and infrequent settlements, and low-intensity agriculture. This activity form in reference [15] was identified from the land cover analysis. The turbidity was the parameter most often had a strong correlation with the occurrence of rain. This is possible by a large number of outcrops in most areas of the study. Land cover in some observation catchment area wasthe shrubs and agricultural vegetation with a rare density. Agricultural activity in some places was identified by the appearance of nitrate parameters.

IV. CONCLUSION

Based on the results and discussion above can be taken some conclusions in this study are:

1. Most of the observationkarst spring of catchment areas in this study had high levels of vulnerability to pollution, as evidenced by the strong linkages of fluctuations in water quality parameters with the intensity of rainfall occurring in the catchment area and the timing of the correlation.
2. The spring that had a high level of vulnerability that was Sanglor 2, Puring, Selonjono, Kalicacahan, Mudal and Ngobaran. The spring with moderate vulnerability were Pok Tunggal and Cerme spring. Springs with low vulnerability was Slulu springs.

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The Relationship of Soil Properties with Soil Carbon Dioxide (CO_2) Respiration in Karst Hill Toposequen,Gunung Sewu Gunungkidul

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***Abstract*— The activity and concentration of carbon dioxide (CO_2) in the top layer of soil is determined by the process of root respiration and organic decomposition. While the existence of the material as a respiration medium and decomposition is determined by the slope variation of topographic position. This study aimed to find out the relationship of soil properties with the respiration of soil carbon dioxide (CO_2) based on karst hill toposequence. The study was conducted in karst hill, the upper of Gilap cave Kenteng village Ponjong district Gunungkidul Regency. The location of the sample point was taken on a slope profile from the top of the hill, the central slope, and the foot of the slope. The results showed the correlation between respirations with the soil properties only on the upper slope. A strong positive correlation relationship was found among the content, organic matter, organic carbon, and specific density with the CO_2 respiration yield on the upper slope. On the contrary, there was a strong negative correlation between moisture with CO_2 respiration on the upper slope. The positive correlation among organic matter, organic carbon, and specific density variables with the rate of CO_2 respiration on the upper slopes due to sampling in Shafts. And the negative correlation of moisture was caused by low carbon dioxide content in rainwater as recharge.**

Keywords*— *CO2 respiration, soil properties, toposequence

I. INTRODUCTION

Soil toposequences an approach concept to understanding the diversity of soil properties due to the differences of relief positions. This toposequence assessment accentuated the reliefs as determinants of the morphogenesis. Morphogenesis or soil development is the compilation of soil material into the soil body with certain morphology and organization resulting in the horizonization. According to [1] topography changed the soil profile in three ways. First, absorb and hold water precipitation in soil then affect moisture. Secondly by affecting the velocity of the soil displacement by erosion, and the third determining the motion direction of materials in suspension or solution from one place to another.

The karst landform is a limestone field characterized by rare surface drainage, thin and only local solum, the presence of doline-covered basins, and more dominant underground drainage systems than the surface flow system [2]. The definition of karst landforms has indicated the growing of specific soil properties. A karst hill can be distinguished between the tops, the backs of the slopes, and the foot slopes [3]. The next section at the bottom is the valley. Conceptually the peak is the source of the material, the back is the transport area, and the slope foot is the deposition area. The most maximum deposition is in the valley.

The formation of karst landform is dominated by a dissolving process or karstification. In karstification, carbon dioxide (CO_2) and water (H_2O) act as reactants dissolving carbonate rocks. The karst ecosystem itself is suspected has a strong role in the storage of carbon dioxide (CO_2) [4]. The study of karst landform can help to understand the carbon cycle, which will also be able to understand climate change as the result of global warming caused by green house gas emissions which is driven by carbon dioxide gas.

The dissolution rate of carbonate rock is more influenced by CO_2 activity in the soil [5]. CO_2 variation activities are also influenced by CO_2 concentration on soil. The activity and concentration of carbon dioxide (CO_2) in the top layer of soil is determined by the process of root respiration and organic decomposition [6].

The problem is the relationship of soil properties with CO_2 respiration rate which is associated with the topographic position. This is concerning that karstification requires the role of carbon dioxide (CO_2) and water to dissolve carbonate rocks. While the activity and concentration of carbon dioxide (CO_2) in the top layer of soil is determined by the process of root respiration and organic decomposition. While the existence of the material as a respiration medium and decomposition is determined by the topographic position that has a variation of the slope. The object of this study is entisols soil that develops in karst hill on polygonal karst landform [7] [8]. According to the formula, this study aimed to find out the relationship of soil properties with the respiration of soil carbon dioxide (CO_2) based on karst hill toposequence.

II. RESEARCH METHOD

The study was conducted in karst hill, the upper of Gilap cave Kenteng village Ponjong district Gunungkidul Regency. Research location on polygonal karst landform is characterized by relief of conical hills limited by a narrow valley. The object studied in this research is the soil. Because the soil in the karst area is a vast expanse, so in this research, we limited the assessment to the pedon based on the toposequence of a karst hill.

The location of the sample point was taken on a slope profile from the top of the hill, the central slope, and the foot of the slope. Each location of the sample point was connected by an apparent flow path of erosion from top to foot slope. Each point of the sample location is made a mini pit hole, the hole of soil observation spacing used was approximately 50 x 50 cm with a depth of 80 cm.

The soil samples identified in the field and analyzed in the laboratory were taken at depths of 0 cm, 15 cm, 30 cm, 45 cm, and 60 cm, respectively. The research variables were soil properties including CO_2 respiration, moisture, organic matter, organic carbon, bulk density, specific density, and cation exchange capacity.

The analysis conducted was to show the relationship between CO_2 respiration and other soil properties. The level of relationship is based on the value of the correlation coefficient (R2), and the data obtained were analyzed with Excel software. Strong correlation values ranged from 0.61 to 0.80, while very strong 0.81 - 1.00 [9] [10]. A correlation value less than that value is ignored because there is no correlation.

III. Result and Discussion

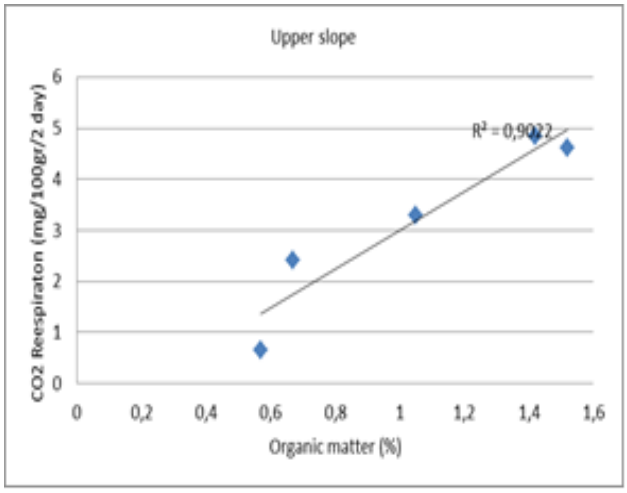
The results showed the correlation between CO_2 respiration with soil properties only on the upper slope. The weak correlation between all soil properties with CO_2 respiration results occurred at the central and lower slopes. However, the cation exchanges capacity and bulk density on the upper slopes there was no correlation with CO_2 respiration.

There was no correlation on the central and lower slopes were strongly suspected because the content of organic matter and soil moisture was very limited. This is due to the position on the general slope 58◦ slope with a regularly regulated slope surface. In consequence, the rate of surface erosion when the rain of splatter and sheet erosion is very influential.

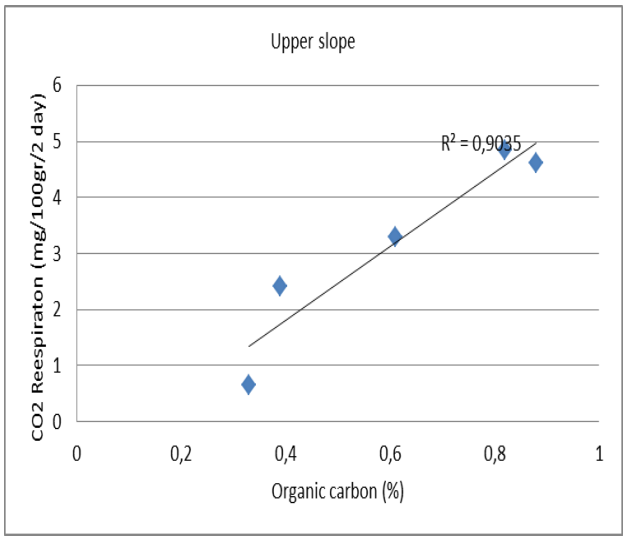
A correlation between some soil properties with the CO_2 rate of respiration on the upper slope was suspected because the location of the observation of the upper slopes occupies on a Shafts. Shafts is a morphology of limestone basin resulted from dissolution process by hydro power. On the upper slopes of the karst hill, the possible location to develop its soil layers for further excavation for soil sampling found in the Shafts basin. Shafts that develop on the upper slopes are generally flattered, because the dominance of hydro-power dissolves vertically [11]. This condition causes some vegetation can hold the organic matter to stay in a flat position.

A strong positive correlation relationship occurred between the content, organic matter (R2 = 0.9022), organic carbon (R2 = 0.9035), and specific density (R2 = 0.8062) with CO_2 respiration yield on the upper slope. On the contrary, there was a strong negative correlation between moisture (R2 = 0.7427) with CO_2 respiration on the upper slope. The results of strong and very strong correlations are presented in Fig 1

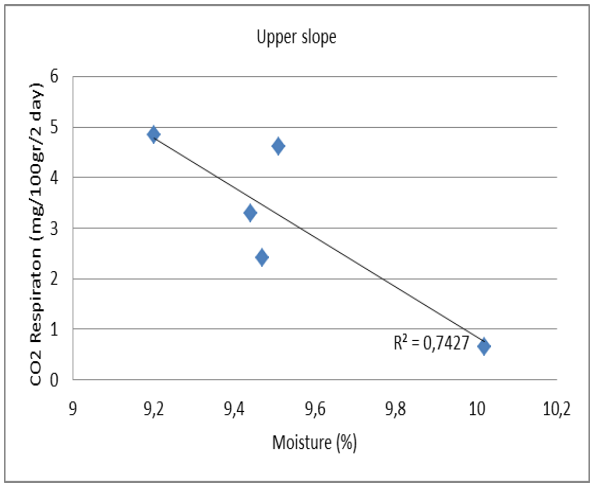
a



b



c



d

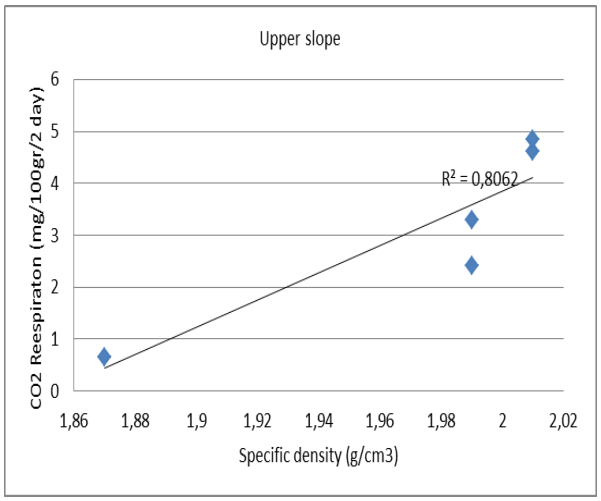


Fig 1. Strong correlation between organic matter (a), organic carbon (b), moisture (c), and Specific density (d) with CO_2 Respiration

The existence of organic matter on the flat upper slope due to the shaft valley, cause the decomposition process of organic matter. This process of decomposition results in an increase in organic carbon in the soil. This is what causes the correlation among the variables of organic matter, organic carbon, and specific density with CO_2 respiration.

[12] and [13] stated that the availability of organic matter will spur the decomposition process of organic matter by microorganisms. This situation must be supported by the appropriate specific density conditions. Specific density is the ratio between absolute dry soil weight to the volume of soil particles, particles density of organic matter with non-organic matter. The activity of microorganisms performed the decomposition process on the environment or the appropriate medium will increase the organic matter content [14] [15]. Organic carbon is the amount of carbon derived from the organic matter decomposition. These conditions make the rate of CO_2 respiration increased. For moisture level, there was a negative correlation. The results showed that the increase in moisture content on the upper slopes resulted in the decreasing CO_2 respiration. This situation was in contrast to the theory that has been there.

Suspected negative correlation between moisture with CO_2 respiration caused by carbon content in limited moisture. thus the soil moisture source is rainwater, then it is estimated that the amount of carbon dioxide in rainwater is small. This is understandable because soil sampling was carried out at the end of the dry season. In general, the content of carbon dioxide in rainwater in a large enough amount at the beginning of the rainy season as well as at the beginning of the rain [16].

IV. Conclusion

The correlation between CO_2 respirations with the soil properties only on the upper slope. A strong positive correlation relationship was found among the content, organic matter, organic carbon, and specific density with the CO_2 respiration yield on the upper slope. On the contrary, there was a strong negative correlation between moisture with CO_2 respiration on the upper slope. The positive correlation among organic matter, organic carbon, and specific density variables with the rate of CO_2 respiration on the upper slopes due to sampling in Shafts. And the negative correlation of moisture was caused by low carbon dioxide content in rainwater as recharge.

Acknowledgment

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Modelling of Decision Support System to Choose Airline Cargo in Delivery of Goods (Case Study in Fin Logistics) Bali

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Abstract*--Currently in the computerized world, decision support systems are developing very rapidly. Decision support system (DSS) is part of computer-based information system, with this system humans can obtain information in support of the decision to be taken. Decision support system has several stages of defining the problem, data collection, data processing into information, and determine alternative solutions. In Indonesia import export business is growing very rapidly. Exports process is an action to remove goods or commodities from within the country to include it to other countries. Import is the process of transporting goods or commodities from one country to another legally. Moving goods from one place to another certainly requires a fleet of transport either by air, sea, or land. Usually most of the export importers are more likely to use air transportation services because they have advantages in terms of time efficiency, although in the achievement is required a much greater cost than other transportation services. However, customers often choose maskapay flights as a means for delivery of their goods based only on cheap and instinctive prices, whereas in a business decision-making must be based on data and information. The decision to determine the flight suited to the customer's needs should meet several criteria that meet the customer's needs. It is balanced by several things from the point of view. The required criteria must also be in accordance with the customer's situation. So this requires a logistics company to have a decision support system. The process of airline selection at PT. Fajar Insan Nusantara (FIN) Logistics has not been done optimally, because the process is still done using traditional calculations that are supported by the decision-making instinct in this case the company leader. The calculation process is done manually. With this method promethee researchers create a prototype decision support system for the selection of airlines that later can be made based computer that is expected to later be able to help PT. Fajar Insan Nusantara (FIN) Logistics and customer in deciding the best alternatives in airline selection.

Keywords: DSS, Promethee, Creteria, alternative, cargo, business

I. INTRODUCTION

International trade is commonly referred to as interstate trade, which is an activity of exchanging (transactions) of goods and services between two or more countries. Just as humans need other human beings in social relations, a country also needs other countries in international community relations. Transactions of goods are of course not done directly by the State but carried out by residents of each country. The activity of sending goods abroad or entering goods into the country commonly called import export activities

Export-import activities are based on the condition that there is no country that is truly independent because one another needs and fills each other[1]. Each country has different characteristics, both natural resources, climate, geography, demography, economic structure and social structure. These differences lead to differences in the commodities produced, the composition of the costs required, the quality and quantity of products. Directly or indirectly requires the implementation of the exchange of goods and or services between one country and another. Therefore between countries in the world need to establish a trade relationship to meet the needs of each country[2].

Movement of goods from one place to another involves all types of transportation, some tend to choose land, sea or air transportation. Delivery of goods by land usually uses transportation of cars, trucks and containers for domestic and international reach. Marine fleet to transport goods of course using ships with various types of ships, shipping by sea is most often used by export entrepreneurs because it can contain a lot of goods and the price is not too expensive. Air transportation is usually chosen by considering speed / efficiency and range (many cities that can be reached) in the delivery of goods.

Movement of goods from one place to another involves all types of transportation, some tend to choose land, sea or air transportation. Delivery of goods by land usually uses transportation of cars, trucks and containers for domestic and international reach. Marine fleet to transport goods of course using ships with various types of ships, shipping by sea is most often used by export entrepreneurs because it can contain a lot

of goods and the price is not too expensive. Air transportation is usually chosen by considering speed / efficiency and range (many cities that can be reached) in the delivery of goods[4].

Most users of air cargo transportation services are users who have an interest in the speed of the arrival time of the goods to the buyer. The high consumer demand for the delivery of certain quantities of goods and the high frequency of shipping, opens up opportunities for cargo services to develop its business sectors[4]. Many customers do not understand how to determine what airlines or airlines they use to suit customer needs. Then in FIN Logistics an explanation of the airline that will be used manually, this process requires a lot of time, considering not all customers have the time to face to face directly to listen to an explanation of the selection of the airline, especially the items to be sent will be Dangerous goods.

The decision to determine the airline that suits the customer's needs should meet several criteria that are appropriate to the customer's situation [3][4]. Considered by several things from the point of view. The required criteria must also be in accordance with the shipping requirements. Efforts to help and facilitate customers in choosing the airline according to customer needs regarding airline selection is a serious problem for the future, so we need a system that can process data to support the decision in choosing the right airline[4]. Given the large number of customers who do not know the information and how to choose the airline and often the customer chooses the airline to only submit to the sending company while in a business process a decision must be based on data and information, so this becomes a strong foundation for researchers to conduct research and implement one method of decision making that involves multicreteria and multi alternatives, namely the promethee method in this case. The promethee method has more value because it is able to consider the advantages and disadvantages of each alternative involved [5]

Based on the background understanding above, it can be formulated the problem of how the Modeling Support System for Decision Making to Select Cargo Airlines in Goods Delivery (Case Study in Fin Logistics) Bali is used according to customer needs priorities and formulates the model into a statement. This problem includes determining the criteria and alternatives involved in the selection of airlines by customers.

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II. RESEARCH METHODOLOGY

This research was carried out following the system development model that is the system life cycle or more commonly known as the system development life circle (SDLC) with steps of planning, analysts, design, implementation, maintenance and systems with work steps such as the following:

a. Data Collection / Planning

Data collection was carried out by collecting data related to the process of determining the selection of airlines in the delivery of goods carried out by the object of research in this case the FIN Logistics Bali In this process also carried out a review of the literature related to the process of stages of checking documents and parts that have the right to validate. This data collection process will be used as a basis for system analysis in order to provide a strong foundation for the interests of drafting design so that it can meet the needs of the business processes needed when implemented

b. System Analysis and Planning

At this stage the process of analyzing system requirements will be carried out by compiling:

- Entity Relationship Diagram (ERD); This diagram will illustrate the degree of relationship between each entity involved in the model to be built.
- Data Flow Diagrams (DFD); This diagram is made to explain the process flow and data flow in the model that will be proposed
- Normalization; This stage is the process of designing tables that will be used in the model
- Data Dictionary; Data dictionary is a description of the data structure to map the metadata of systems to be managed in application development.

c. Design and Implementation

At this stage the system implementation process will be carried out with the following stages:

- Modeling System At this stage the implementation was carried out by implementing the promethee method into case illustrations designed for the selection of airlines based on the alternatives involved by calculating the value of each selected criteria.
- Testing; At this stage, the formulation test is carried out to find out whether the DSS formulation design that has been made can meet the expected aspects of data requirements and control objectives.

d. Maintenance Maintenance Method

At this stage the program was tested, both in white box and black box. This stage is to ensure that the designs designed based on existing problems are able to complete the calculation by considering the differences in criteria emphasized by each user.

III. RESULT AND DISCUSSIONS

Activities carried out in this study include data and information collection, data processing up to the design of a system model that can process data to support decision making in the selection of the right airlines. For the time being, the customer selects airlines in import or export activities manually or conventionally, the customer must come directly to the company to obtain information about airlines that are partnering with the company, this is certainly not efficient because it requires extra time in obtaining information and choosing airlines, other than that there is no fixed procedure so often the customers in choosing airlines are only based on cheap airline instincts and prices, for that we need a system modeling that can help customers in choosing airlines. This system, designed to help and facilitate customers in choosing

airlines that can be taken into consideration in accordance with customer needs and in accordance with shipping requirements.

The next stage is data collection, in the process of collecting data researchers use several methods of data collection, namely literature studies, observations), field studies, and interviews

An intelligent decision support system (IDSS) is a decision support system that makes extensive use of artificial intelligence (AI) techniques. Use of AI techniques in management information systems has a long history – indeed terms such as "Knowledge-based systems" (KBS) and "intelligent systems" have been used since the early 1980s to describe components of management systems, but the term "Intelligent decision support system" is thought to originate with Clyde Holsapple and Andrew Whinston[6][7] in the late 1970s. Examples of specialized intelligent decision support systems include Flexible manufacturing systems (FMS),[8] intelligent marketing decision support systems[9] and medical diagnosis systems.

The PROMETHEE method is a multi-criteria decision aid system that permits the building of an outranking between different alternatives [5]. Promethee method in solving multicriteria problems by determining the order (priority). The main problem is simplicity, clarity, and stability. The assumption of the dominance of the criteria used in promethee is the use of values in the outranking relationship. This is a fairly simple ranking method in concepts and applications compared to other methods for multicriteria analysis

Following are the steps to calculate the Promethee method

a. Identifying alternatives; in this study 4 names of airline companies were symbolized by A1, A2, A3, A4

b. Identify criteria;

Aspect Price consists of four factors: Cost, Speed, Image and Volume. Costs are all the sacrifices that need to be made for a production process, which are stated in units of money according to the prevailing market prices, both those that have happened and what will happen. Costs are divided into two, namely explicit costs and implicit costs. Explicit costs are costs that are seen physically, for example in the form of money. Meanwhile, what is meant by implicit costs are costs that are not seen directly, such as opportunity costs and depreciation of capital goods. Speed; Delivery speed, the faster the duration of delivery of goods, the greater the price paid. Image is a psychological impression and an overview of various activities of a company in the eyes of its public audience based on the knowledge, responses and experiences it has received. The image of airlines is directly proportional to the price offered. Volume or also called capacity is the calculation of how much space can be occupied in an object. the heavier and more space occupied by an object or item the higher the price to pay.

The time aspect has four factors: Delivery accuracy, Packaging speed, Shipping preparation process, Unloading process

Delivery accuracy; the accuracy of the delivery of goods is a very important factor for customers, because there are several items that have a fast expiration period. for example shipping fish, if it's too late to eat the fish will die. so that the customer loses. Packaging speed; Packaging speed is the time needed to pack goods before the shipping process is carried out. Shipping preparation process

The process of preparing the shipment is the time needed to prepare the supporting documents for shipping the goods. Unloading process

The loading and unloading process is the time required for the loading and unloading of the aircraft.

a. Comfort Aspect consists of three factors: Document management, Hospitality service and Service speed. Document management, The shipping process required several documents, so that the easy and difficult management of documents would be an added value and a factor to be considered in the selection of airlines. Hospitality service; Business transactions require servant hospitality, this is very important because it will create a positive impression for the customer. . Service speed; The speed of service can be interpreted as an alert officer in providing services to customers.
b. Security aspects consist of three factors, namely: integrity of goods, insurance, physical condition of goods. Integrity of goods; Integrity of goods is very important and must be considered by the airlines in the shipping process, because this is very influential for customer satisfaction. Insurance (loss, damage and exchange); Insurance is a guarantee given by airlines to customers as the responsibility of airlines to lose, damage and exchange goods. Physical condition of goods; Customers definitely want the items they receive are the same as the goods sent, there is no change in terms of volume, color, physical form of the goods, to ensure the certainty of the usefulness of the goods. The data processing process will be carried out by providing an assessment in each sub-criteria.

The calculation process using the promethee method can be described as a picture 1. Flowchart [5].

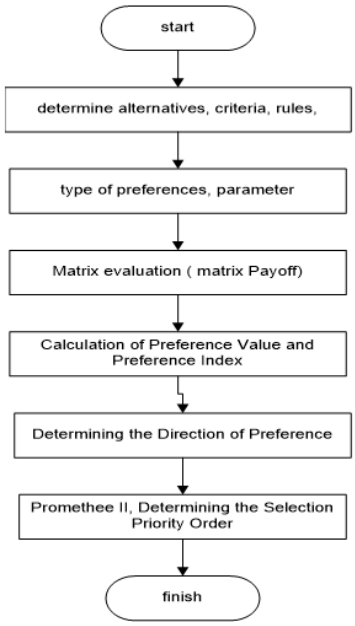

Fig. 1 Flowchart Promethee Process

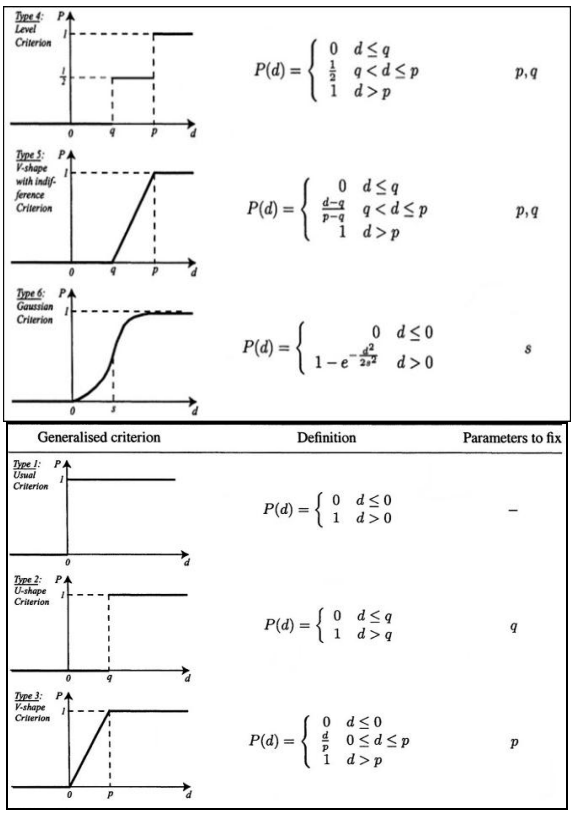

Fig. 2 Type Preferency

This Promethee data processing process is based on judgment judgment and quantitative data on each alternative against each sub criteria. Each subcriteria has weight according to the results of the entrophy method. In Promethee there are several criteria of preference criteria[5],as like Fig 2, which include criteria type, maximum approach or minimization, and parameter determination.

Table 1 shows an example of table preparation for the Promethee process. In the rules column there are fields for max and min.

TABLE 1. PREPARATION TABLE

ALTERNATIVE / CRITERIA	A1	A2	A3	A4	RULE
Cost	12.563,00	15.350,00	25.000,00	12.000,00	MIN
Security	6,50	5,00	8,30	7,00	MAX
Time	7,00	7,30	9,00	8,00	MIN
Comfort	7,50	6,00	8,56	7,20	MAX

In table 2 for the price and time criteria, in the decision-making process consumers must have a goal to get the minimum price and delivery of goods in the shortest possible time. Pay attention to the price criteria that have a min rule meaning that the lower the price values, the airline will dominate the other airlines. Then Kreteria Kemanan, and Comfort are oriented to the maximal rules which means, for the delivery of security and comfort items must obtain the maximal value, that the more comfortable Alternative 1 will dominate other alternatives.

The next step is to recommend preference functions for application purposes. In PROMETHEE there are 6 criteria function forms (preference types), in this case of course not absolute, but good enough in some cases. Of the six functions in Figure 2 that are recommended, the recommendations used in this study are used in table 3

TABLE 3. MATRIX WITH TYPE PREPERENCES

ALTERNATIVE / CRITERIA	A1	A2	A3	A4	RULE	TYPE	PARAMETER		
							p	q	r
Cost	12.563,00	15.350,00	25.000,00	12.000,00	MIN	III	50	0	0
Safety	8,20	5,00	8,30	7,00	MAX	V	10	3	
Time	6,00	7,30	9,00	8,00	MIN	V	5	2,5	
Comfort	7,50	6,00	8,56	7,20	MAX	III	5		

Table 3 shows below for the criteria of price and convenience using preference type III, preference type III according to the calculation will give preference direction 0 or 1 which requires parameter p which is given a value of 50. Security and time uses preference type V, which requires p parameters and q with p value is 10 and the value of q is 2.5. Furthermore, the calculation of paired matrices for each criteria will be carried out. P (A1, A2) Is a paired matrix for alternative 1 (A1) compared to alternative 2 (A2) as shown in table 4

TABLE 4. PREFERENSI ALTERNATIF 1 (A1) WITH ALTERNATIF 2 (A2)

ALTERNATIVE / CRITERIA	A1	A2	RULE	TYPE	parameter			d(A1,A2)	d(A2,A1)
					p	q	r		
Cost	12.563,00	15.350,00	MIN	III	50	0	0	- 2.787	2.787
Security	8,20	5,00	MAX	V	10	3	0	3,20	- 3,20
Time	6,00	7,30	MIN	V	5	2,5	0	- 1,30	1,30
Comfort	7,50	6,00	MAX	III	5	0	0	1,50	- 1,50

The value d (A1, A2) is calculated by looking at the differentiation A1 with A2

d (A1, A2) = (A1) - (A2)

= 12,563 - 15,350

= -2.787

This calculation shows that A1 is dominated by A2 as much as 2,787, while the differentiation A2 to A1 is calculated by

P (A2, A1) = d (A2) -P (A1)

= 15.350 – 12.563

= 2.787

In the calculation of d (A2, A1) shows A2 dominates A1 as much as 2787 for the price to be carried out until all the criteria have been continued to see the A1 preference with A2 according to the type of preference, the results are shown in table 5

TABLE. 5 P(A1),P(A2)

ALTERNATIVE / CRITERIA	A1	A2	RULE	TYPE	parameter			d(A1,A2)	d(A2,A1)	p(A1,A2)	p(A2,A1)
					p	q	r				
Cost	12.563,00	15.350,00	MIN	III	50	0	0	- 2.787	2.787	0	1
Security	8,20	5,00	MAX	V	10	3	0	3,20	- 3,20	0,32	0
Time	6,00	7,30	MIN	V	5	2,5	0	- 1,30	1,30	0	0,26
Comfort	7,50	6,00	MAX	III	5	0	0	1,50	- 1,50	0,3	0
										0,62	1,26

Price criteria uses preference type III so that it requires only p parameters. in this study used the value of p = 50, so that it corresponds to the formula of type preferance III shown in figure 5 and figure 6, that if the value of d <= q then is 0, in table 5 it can be seen that d (A1, A2) = -2.787 <= 0, then P (A1, A2) is 0. While P (A2, A1) is shown that the value d (A1, A2) = 2.787, so that it fulfills the criteria that differentiation is more than P, then the value of P (A2, A1) criteria price = 1.

The same rules will be used to find the values P (A1, A3), P (A3, A1), P (A1, A4), P (A4, A1), P (A2, A3), P (A3, A1), P (A3, A4), P (A4, A3)

The step of calculating the preference index matrix is to include all preference sums for each paired matrix, the preference index matrix shown in table 6

TABLE 6. PREFERENCE INDEX

	A1	A2	A3	A4
A1	0	0,62	0	1,18
A2	1,26	0	0	1
A3	1,822	2,182	0	1,602
A4	0,4	0,58	0	0

The next operation is to calculate the direction. After the evaluation of the table is complete, the next step is to make TabeL π (i, j). Table π (i, j) is a table 7 that shows the level of dominance of a criterion against other criteria. The basis for filling out Table π (i, j) is the calculation of evaluation. Each pair pairs the alternative dominance with the other alternative, indicating the advantage that is referred to by the leaving value has a weakness shown by the entering value. Leaving value is calculated by the formula [5].

$$Q^{+}(a) = \frac{1}{n-1}\sum_{b \in A} \pi(a,b)$$

$$Q^{-}(a) = \frac{1}{n-1}\sum_{b \in A} \pi(b,a)$$

$$q(a) = q^{+}(a) - q^{-}(a)$$

TABLE 7. VALUE OF LEAVING AND ENTERING

	A1	A2	A3	A4	LEAVING
A1	0	0,62	0	1,18	0,6
A2	1,26	0	0	1	0,75333333
A3	1,822	2,182	0	1,602	1,86866667
A4	0,4	0,58	0	0	0,32666667
ENTERING	1,16067	1,12733	0	1,26067	

The next operation is to calculate the direction. After the evaluation of the table is complete, the next step is to make TabeL π (i, j). Table π (i, j) is a table that shows the level of dominance of a criterion against other criteria. The basis for filling out Table π (i, j) is the calculation of evaluation. Each paired matrix calculates the alternative dominance of one with the other alternatives, indicating the advantage that is referred to by the leaving value has a weakness indicated by the entering value. Leaving value is calculated by the formula.

$$Q^{+}(a) = \frac{1}{n-1}\sum_{b \in A} \pi(a,b)$$

$$Q^{-}(a) = \frac{1}{n-1}\sum_{b \in A} \pi(b,a)$$

$$q(a) = q^{+}(a) - q^{-}(a)$$

Leaving A1 = (1/(4-1)*(0+0,62+0+1,18+1,8)
= (0,333)*(1,8)
= 0,6
Entering A1 =((1/(4-1))*(0+1,26+1,822+0,4)

To get a complete ranking value then proceed to find the netflow value which is a reduction in the value of entering minus leaving. Table 8

Table 8 shows the ranking values. So based on the above calculation by the system obtained ranking or rank 1 is occupied by alternative 3, rated 2 is occupied by alternative 2, followed by rank 3 by alternative 1 and the last rank is alternative 4. The system will recommend alternative 3 based on the criteria specified.

TABLE 8. RANKING OF ALTERNATIVE

	A1	A2	A3	A4	LEAVING	ENTERING	NETFLOW	RANKING
A1	0	0,62	0	1,18	0,6	1,16067	-0,56067	3
A2	1,26	0	0	1	0,75333333	1,12733	-0,37399667	2
A3	1,822	2,182	0	1,602	1,86866667	0	1,86866667	1
A4	0,4	0,58	0	0	0,32666667	1,260067	-0,93340033	4

IV. CONCLUSIONS

Based on the discussion, the results of this study can be concluded that of the four recommended airline alternatives that rank first in rankings are airlines with A3 codes that obtain the final value of 1,868. This result is the result of the calculation with the promethee profile method based on four aspects of the criteria (price, time, comfort, and security). The modeling design results in this study are able to provide modeling media to facilitate customers in making a decision and can speed up the process of considering the selection of an alternative airline

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Spreadsheet Based Application to Facilitate Implementation of Final Tax for Small Businesses

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***Abstract*—Revenue cycle application is needed by small business that using cash register machine to manage the transaction. The focus of this research is how to develop the spreadsheet- based revenue cycle application for small business that using cash register machine to manage the transaction. The problems of this research are 1) how to make the spreadsheet-based revenue cycle application for small business that using cash register machine? and 2) how to measure the validity of the spreadsheet-based revenue cycle application for small business that using cash register machine? Furthermore, the aim of this research are 1) produce a draft of spreadsheet-based revenue cycle application for small business that using cash register machine; 2) to analyse validity of spreadsheet-based revenue cycle application for small business that using cash register machine. Research model that has been used is research & development model. The approach that used in developing the application is prototype approach. The result of research is a spreadsheet- based revenue cycle application for small business that using cash register machine which is valid used in the actual activity.**

Keywords— spreadsheet, application, revenue cycle, small business, cash registe

I. INTRODUCTION

Comprehensive to dual income taxation and complements which neveal the haracteristic.The Government needs to develop more of our micro, small, and medium enterprises as part of citizen economy integral that has place, role, and strategic potential to realize the structure of national economy that developed each day.

Empowerment organized thoroughly, optimally, and continuously establishing conducive climate, giving the small business opportunity, protection, and financial support to grow the business widely. Empowerment will be able to raise the position, role, and the potential of micro, small, and medium enterprises in achieving economic growth, equitable distribution and improvement of people's income, job creation, and poverty reduction (Law No. 20 Year 2008).

A. Main Problems

1) How to make the spreadsheet-based revenue cycle application for small business that using cash register machine?
2) How to measure the validity of the spreadsheet-based revenue cycle application for small business that using cash register machine?

B. Research Purpose

1) To produce a draft of spreadsheet-based revenue cycle application for small business that using cash register machine;
2) To analyse the validity of spreadsheet-based revenue cycle application for small business that using cash register machine.

II. RESEARCH METHOD

The type of research method that we used is Research & Development Model and the approach that used in developing the application is prototype approach. In addition, the object of this research is final PPh tax for small businesses that using cash register machine. The data that used are qualitative and quantitative data that can be gotten by doing interview, observation, taking documentation, and giving questioner. The instruments that we used is questioner from expert that using scale 4 Likert, starts from: 1 (very bad) until 4 (very good). And the analysing techniques are descriptive and presentation analysis. Comprehensive to dual income taxation and complements which neveal the characteristic

III. RESULT AND DISCUSSION

The spreadsheet application divided by some parts, following as:

1) General information
   This parts explain about: a) name, address, identity address; b) periode; and c) name and the card number of the tax payer (NPWP). These information will be used at

the other part from this application. This is the figure that explains about the general information.

2) Transaction

The transactions include cash receipt from the selling transaction and cash payment for buying and other payment. Cash receipt form from selling and cash payment are provided for 12 months (Starts from January until December). The form of cash receipt from selling budget loads about the transaction date cashier codes, Cash in Drower (CID), selling, and cash that reported, retraction, and cash balance.

The cash payment form shows the transaction time, cashier codes, CID, all of payments and Pre Order (PO), selling, retraction, and cash balance. Payment cash had been done for buying activities, saving, and other things such as following table below:

TABLE 1. THE FORM OF CASH PAYMENT RECAPITULATION

Detail information	**LPD**	**Bank**	**Cooperation association**	**Electric**	**pulsa**	**Others**
Beginning balance						
Deposit	-	-	-			
Retraction	0	0				
Closing balance	-	-	-	-	-	-

The total of savings: - Balance ___

3) PPh tax according to Law PP no. 23 year 2018

The forms are provided for calculating how much the income tax (PPh) that will be reported. According to government law (PP) no. 23 year 2028, the number of final PPh tax that must be reported is equal to 0.5% from bruto in a month. These are the following form:

TABLE 2. PPh tax according to Law PP no. 23 year 2018

Month	Bruto cycle	Tarif (%)	Tax
January	-	0.5	-
February	-	0.5	-
March	-	0.5	-
April	-	0.5	-
May	-	0.5	-
June	-	0.5	-
July	-	0.5	-
August	-	0.5	-
September	-	0.5	-
October	-	0.5	-
November	-	0.5	-
December	-	0.5	-
Total amount	-		-

TABLE 3. THE ASSESSMENT RESULT BASED ON TECHNICAL ASPECT

No.	DEFINITION	**.STS.**	**TS**	**AS**	**SS..**
The function of the hardware and operating system					
1.	Central Processing Unit (CPU) is able to maintain all requests quickly.			1	9
2.	The operating system supports the accounting cycle that is used.			3	7
Flexibility in applying					
3.	Easy to learn the application			2	8
4.	Easy to use the application			4	6
5.	Providing the guidelines helps the users with inputing data		4	6	
6.	The structure of menu bars helps the users with applying the acounting cycle.		4	6	
	Total		8	22	30

Note:
STS : Completely disagree
TS : Slightly disagree
S : Agree
SS : Completely agree

Based on the Table 5 above, we got that there are 13.33% of the audience disagreed, 36.67% agreed, and 50% fully agreed with the aspect of application technical. It has meaning that the accounting application is qualify to be used.

TABLE 4. THE ASSESSMENT RESULT BASED ON OPERATIONAL ASPECT

No	IV. DEFINITION	**STS**	**TS**	**S**	**SS**
The users are able to apply the accounting cycle					
1.	Users can apply the accounting application easily		3	7	
2.	Users can handle the problems in using the accounting application		7	3	
The application of the accounting cycles is able to give the information needed					
3.	Able to make accounting reports		9	1	
4.	Able to produce accurate information		4	6	
5.	Able to make infromation that can be shown on the screen			3	7
6.	Able to produce information in document files			4	6
The application of accounting cycle has control menu					
7.	The application is protected with passwords			8	2
8.	The application has validation, accuration, and reliability tests		6	4	0
9.	The application has control output		2	7	1
	Total		31	43	16

IV. CONCLUSION

Based on the explanation Based on the explanation, the conclusions of this research are:

1) The draft of income tax based on spreadsheet for small business that organise by using cash register machine is an application based on spreadsheet that helps small business in preparing data of their obligation in reporting

the income tax. This application submitted some information about the company, cash cycle, selling and payment transaction, and part of PPh based on PP no. 23 year 2018.

2) The draft testing results of the tax application based on spreadsheets for small businesses that use cash register machines to manage the transactions showed that the application is qualify based on technical and operational systems.

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Determining The Premium Value Of Credit Life Insurance Using 1980 Cso Mortality Table, 1999 Indonesia Mortality Table And 2011 Indonesia Mortality Table Case Study In The Cooperation Of Civil State Employees In Bali State Polytechnic

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Abstract*— Credit life insurance is one way of managing financial at loan and saving unit of the Cooperation of Civil State Employees in Bali State Polytechnic (KPN PNB) to overcome financial losses due to the risk of non performing loan. The risk that is considered the most serious is the death of the customer, therefore, the determination of the premium cost is the most important part of this insurance. The purpose of this study is to find the value of a single premium of credit life insurance using the calculation of term life insurance based on the actuarial concept. Single premium is calculated based on 1980 CSO Mortality Table, 1999 Indonesian Mortality Table and 2011 Indonesian Mortality Table. In an insurance, mortality table is the main element in the premium determination process. The mortality tables show the average number of deaths that occur each year in each age group. The results of the analysis show that the calculation of a single premium using the 1980 CSO Mortality Table is greater than the Indonesian Mortality Table of 1999 and 2011. The premium value is calculated based on the loan period and the age of the borrower. The PNB's KPN premium is only based on the loan period so that the premium value for all ages is the same. Single premium calculation using all three mortality tables generate different premium based on the age of the borrower. The higher the age, the higher the risk of death, then the higher the premium.

Keywords— Credit life insurance, term life insuranc, single net premium, mortality tables

I. INTRODUCTION

Bali State Polytechnic Civil Servants Cooperative (KPN PNB) is a non-bank microfinance institution (LKM) as a savings and loan cooperative. In general, the scope of business activities of PNB KPN cooperatives is the collection of funds and the distribution of funds in the form of loans. The savings and loan unit managed by KPN PNB is a cooperative effort that is useful to provide opportunities for its members to obtain loans easily and with low interest. Therefore, cooperatives will be vulnerable to risk if there is bad credit. If the risk of an event befell the borrower or the borrower's family, this will often have an impact on the ability to repay the loan. This impact will effect the development of KPN PNB as LKM in Indonesia. The factor to determine the success of development of LKM in Indonesia is the ability of micro-borrowers to repay their loans on time (zero or no credit at all) [14].

The un-ability of customer to repay the loan will create risk for LKM's development. Risk is a condition that results in damage or loss [2]. The risk of financial losses of micro businesses is in the form of matters relating to death, illness, natural disasters and theft or property damage. Risks that are considered the most serious is the death of a customer. To overcome the vulnerability to the risk of bad credit, PNB KPN imposes additional expenditure on debtors. This additional fund is accommodated as a reserve fund so that if a borrower dies, the remaining loan will be written off and covered from this reserve fund. This additional cost is a credit life insurance that is used by cooperatives in protecting themselves from risks due to customer's death.

The element of insurance are the insured event, the number of benefits or the number of claims paid at the time of the insured event, the beneficiary, and the period of coverage. Events that cause claims must be clearly defined. Both the insurer and the insured need to have the same understanding. The amount of benefits must be in accordance with the interests that can be contested. The period of time in which the insured event takes place includes a fixed period of time that is the occurrence of the incident within a certain period and a lifetime period of coverage [2].

Basic credit life insurance is a life insurance product [10], where in this case the insured is the debtor and the sum

insured is a number of loan values. Claim rights arise if the debtor passed away within the agreed loan period. In this case, the loan has a certain period of time for repayment. So that credit life insurance is a form of term life insurance. Term life insurance is an insurance program in which the insurance protection period is only within a certain period and benefits are paid only if the insured passed away during the insurance period [3].

Each insurance base all of its premium calculations on the mortality table, interest rate and cost. Determining the cost of premiums of credit insurance is the most important part of this credit insurance. If the premium that is set too low it will be detrimental to the finances of the savings and loan institution. However, if the price is set too high, then the savings and loan institution is not competitive and detrimental to customers. Applicable insurance premiums to the savings and loan unit of the KPN PNB are currently only based on the loan period, so the premium value for ages is the same. The savings and loan unit of KPN PNB in determining the premiums does not consider the mortality factor of the debtor. Mortality factor is gained from mortality table. Mortaity table is a list of tables containing the probability of death in a year for each age and sex of a particular population [2]. Mortality tables illustrate the number of population groups with birth at the same time and then slowly diminish due to death. Mortality tables are widely used in Indonesia, referring to the Mortality Table of Commissioners Standard Ordinary (CSO), namely, CSO 35, CSO 40, and CSO 80. Mortality tables currently used in Indonesia are mortalita III table (2011) which is a change from mortality table II (2009). The mortality table III was prepared by the Indonesian Life Insurance Association (AAJI) and the Indonesian Actuary Association (PAI). Improving the mortality table as a reference to help insurance companies in setting the right premium rates. Mortality table is the most important part in calculating insurance premiums. The premium value will differ according to the mortality table used.

Mortality tables in Indonesia have undergone several changes adjusted to the situation and condition of the population both in terms of health, mortality rates, the presence of urbanization and other factors. Mortality tables are arranged based on the characteristics of the population. Like the South African mortality table which compiled by the Actuarial Society of South Africa (ASSA) which estimates mortality rates based on all causes, including HIV / AIDS [2]. Smoking also associated with mortality rates which form a mortality model as in testing differences in mortality rates in a number of developed countries based on smoking prevalence [7]. Smoking and obesity, substance abuse and rural / urban life are associated with mortality rates among adult white workers in the United States [15].

Another factor in determining insurance premiums is interest. Interest is the amount of money paid in return for the use of money [5]. Determination of net single premium of credit insurance in this study uses the concept of term life insurance by analyzing the value of actuarial present value (APV). APV is the present value of the value that must be paid to get the same amount of value at the time of death within a period of up to years [1]. Mortality tables and interest rates affect the calculation of APV values. The APV results are then used in finding the net single premium value. APV determination is the most important part in determining a single net premium.

Determination of premiums is not only based on mortality and interest rates only. The loading factor or cost also affects the premium value, which is a gross single premium. A single net premium is only enough to pay the claim without taking into account the costs or other needs that are incurred, such as the insurance management fee. Charges are needed to protect the company from adverse situations.

This study uses 1980 CSO mortalita tables, TMI 2009 and TMI 2011. Interest rates and large loading are assumed. The APV results are then used in finding the net single premium value. APV determination is the most important part in determining a single net premium. Therefore it needs to be formulated with good mortality and interest rates to get the right premium value. Gross single premium is obtained by adding gross single premium by loading.

II. RESEARCH METHOD

A. Mortality Table

Mortality tables illustrate the number of population groups that begin with birth at the same time and then slowly diminish due to death.

In a population group, there are 100,000 newborns denoted by newborn babies with $l_0 = 100.000$ Then *L(x)* denotes the group's number of survivors to age x, it can be written [1]:

$$L(x) = \sum_{j=1}^{l_0} I_j \tag{1}$$

With

$$I_j = \begin{cases} 1 & \text{If life j survives to age x old} \\ 0 & \text{Otherwise} \end{cases}$$

$$E[I_j] = S(x)$$

Then $E[L(x)] = E\left[\sum_{j=1}^{l_0} I_j\right] = l_0 S(x)$

Then if $E[L(x)]$ denoted by l_x, that is l_x represents the expected number of survivors to age x from the l_0 newborn, and then found:

$$l_x = l_0 S(x) \tag{2}$$

S(*x*) is a function of defined survival function:

$$S(x) = 1 - F(x) = \Pr(X > x),\ x \geq 0 \tag{3}$$

Can be stated that $S(x)$ is an opportunity that a person will survive to reach age x years old.

The survival model is an opportunity distribution for a certain type of random variable [8]. The survival model is used in the analysis of the chance of death, where the survival model states that a person's chances of surviving up to or more than a certain time. The survival model is related to survival time, where the time obtained for survival events such as failure, death, recurrence of a disease, etc. in a random variable. Survival analysis was used in the study of the mortality rate of HIV-AIDS sufferers after taking antiretroviral therapy in Ethiopia, the survival time used was the time from antiretroviral therapy to the time of death of HIV / AIDS patients with the result of reduction in mortality due to HIV / AIDS through routine therapy and treatment [11]. Survival analysis is also used to determine the contribution of low birth weight to neonatal mortality in Indonesia. The results obtained from children born with low weight and born to young mothers have a higher risk of neonatal death [13].

Suppose someone is x years old symbolized by (x) and X is age (x) at death, then the future lifetime of (x), X-x can be denoted by T (x) [1] which obtained:

$$ {}_t q_x = \Pr[T(x) \le t], t \ge 0 \quad (4) $$

$$ {}_t p_x = 1 - {}_t q_x = \Pr\left[T(x) > t\right], t \ge 0 .. \quad (5) $$

${}_t q_x$ is the chance of a person (x) old to die before attaining age $x+t$, meanwhile ${}_t p_x$ stating the chance of a person (x) old will survive to an age $x+t$.

$$ {}_t p_x = \frac{S(x+t)}{S(x)} = \frac{l_{x+t}}{l_x} \quad (6) $$

$$ {}_t q_x = 1 - {}_t\ p_x = 1 - \frac{S(x+t)}{S(x)} = 1 - \frac{l_{x+t}}{l_x} \quad (7) $$

Suppose someone is 30 years old (male), then the chance of living up to the age of 70 can be determined using a mortality table. From the 2011 Indonesian mortality table, it is known $l_{30} = 98000$ and $l_{100} = 190$, which obtained:

$$ {}_t p_x = \frac{S\left(x+t\right)}{S\left(x\right)} = \frac{l_{x+t}}{l_x} $$

$$ {}_{70} p_{30} = \frac{S\left(30+70\right)}{S\left(30\right)} $$

$$ = \frac{l_{30+70}}{l_{30}} = \frac{l_{100}}{l_{30}} = \frac{190}{98000} = 0.001939 $$

The opportunity for a 30-year-old man to survive to reach the age of 100 is 0.001939 or 0.19%.

B. Actuarial Present Value

In life insurance, there are two benefits payment systems, namely at the time of death (continuous) and at the end of the year of death (discrete). in this study will link the payment of continuous benefits and the payment of discrete benefits. Function of the value of death benefits using the model z_t namely the present value for the policy of the benefits of continuous death payments and z_{k+1} for discrete [1].

The expectation value of the random variable present value E [Z] is called the actuarial present value / APV. Continous APV dnoted as $\bar{A}_{\overline{x:n}|}^{1}$ with Z is a function of T. For discrete APV denoted as $A_{\overline{x:n}|}^{1}$ is a function of K [1] Each formula is as follows:

$$ \bar{A}_{\overline{x:n}|}^{1} = E\left[Z\right] = \int_0^{\infty} z_t f_T(t) dt = \int_0^{n} v^t\ {}_t p_x \mu_x(t) dt \quad (8) $$

$$ \bar{A}_{\overline{x:n}|}^{1} = \int_0^{n} e^{-\delta t}\ {}_t p_x \mu_x(t) dt \quad (9) $$

$$ A_{\overline{x:n}|}^{1} = E[Z] = \sum_{k=0}^{n-1} v^{k+1}\ {}_k p_x q_{x+k} \quad (10) $$

Notation v is a discount function with the equation:

$$ v = \frac{1}{1+i} \quad (11) $$

Where i is the interest rate.

Notation $\mu(x)$ hazard function states the death rate or failure at the time when t up to $t + \Delta t$ with the subject being observed to live up to t. Hazard function in actuarial survival model is also called mortality acceleration.

The factors that influence the high and low of APV value in addition to mortality are interest rates and time period. Interest is the amount of money paid in return for the use of money [5]. In the calculation of continuous psychological annuities for life insurance using a life table with a uniform assumption, it is seen that the increasing interest rate causes the APV value to be lower [9]. Another factor is the time period. The insurance used in this study is term insurance, where the period of time will affect the APV value. The longer the time period, the higher the APV value. As in calculating the APV pension program, the longer working period shows higher APV value [6].

C. Premium

Assurance requires the insured to pay a premium, where premium payments have two basic types, namely single and recurring [2]. Single premium is an insurance premium payment made when the insurance contract is approved, then there is no further payment. While recurring premiums for insurance premium payments are carried out periodically during the insurance period (Futami).

Premiums that only estimate interest rates and mortality rates regardless of the level of fees are called net premiums. Therefore net premium calculation requires information about age, benefits provided, mortality rate and the assumed interest rate. Net premiums must be sufficient to cover claims costs, therefore the net premium csots for an insurance benefit is the same as the expected claim costs. Determination of the premium rates that are widely applied in insurance using the principle of equality. This principle applies $E[L]=0$ which means the obligations of the insurance company are equal to the rights received by the customer [1].

The APV value is the present value for the policy value of the benefit payment. So that the net single premium is the APV value multiplied by the number of insurance benefit.

Net Single Premiums = $b_t \bar{A}^{1}_{x:n\rceil}$ (12)

With *b* is the value of benefits, or in this case the number of loans.

Furthermore, to determine the overall premium value in addition to the mortality rate and interest rate, the premium value is also determined by the presence of a cost factor so that the equation formed:

Gross Single Premium = Net Single Premiums + Loading

Or suppose the gross premium is denoted by *P** which obtained by the equation [4]:

$$P^* = P\,(1+k) \quad (13)$$

Where gross premiums (*P**) are net premiums (*P*) added to the amount of *k* multiplied by net premiums.

The cost factor calculated and included in life insurance is called a "loading charge." If an insurance company only charges a single net premium for coverage, the company will only receive enough money to pay benefits, but not enough for operational costs. Therefore the company charges an additional burden on a single net premium. Cost factors included in the calculation of premiums are: development costs, procurement costs, distribution costs, maintenance costs, contract termination fees, general administration fees and taxes [5].

III. Result and Discussions

The results of this study are the development of previous research. Previous research only determined the value of single net premiums based on Indonesian mortality table 2011. The results showed that the value of single net premiums using actuarial concepts increased based on the age of the debtor and sex. Women are considered to have a lower insurance risk than men [12].

Determination of the value of the premium with the risk of death are based on three factors, namely interest, mortality and costs. The process begins with data collection, then data analysis by looking at the chance of death based on age using CSO 1980, Indonesian Mortality Table 2009 and Indonesian Mortality Table 2011. Several mortality tables are used to view and compare the effectiveness of mortality tables as basic considerations in determining premiums. Mortality value used is unisex mortality value, which is the average of male and female mortality. Furthermore, the calculation of premium value is carried out using the calculation of actuarial values on life insurance term.

A. Analisis Data Debitur

The process begins with data collection, then data analysis. The data for analysis is loan transaction data from 2013 to 2017, where the loan period is annual. From the data, the age of KPN PNB debtors is 26 years to 60 years, as shown in Fig. 1.

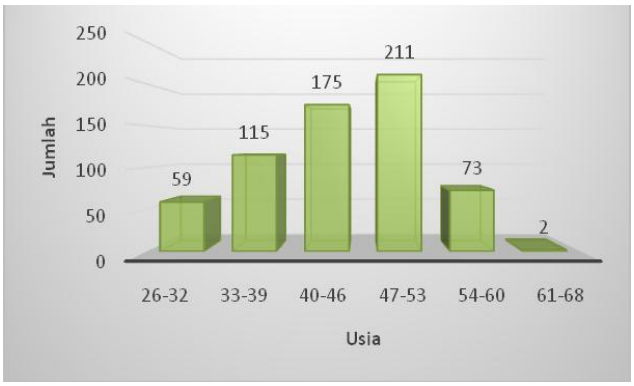

Fig. 1. The Age of KPN PNB Debtors

The most debtor age group that conducts loan transactions is 47 to 53 years old with total 211 transactions or 33%, followed by ages 40 to 46 years by 28% and others 18% age groups 33 to 39, 12% age groups 26 to 32 years, 9% are 61 to 68 years old. Based on the loan period, the results of the loan data tabulation are shown in Fig. 2.

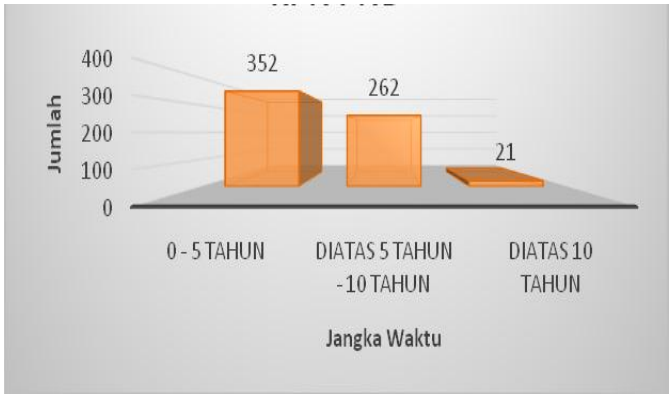

Fig. 2. Loan Term Data at KPN PNB

The longest loan period is 5 years with 352 transactions amounting to 56% of the total loan transactions. Followed by 5 to 10 years loan period for 41% and above 10 years for just 3%.

B. Mortality Table Analysis

The mortality table for in this study is using CSO 1980 table, 1999 Indonesian Mortality Table (TMI) and 2011 TMI by looking at the average chance of death of men and women. These three tables show a decrease in the chances of living along with age, in the sense that there is an increase in the chance of death. Graph of the chance of death aged 0 - 111 years based on 3 mortality tables is shown in Fig. 3.

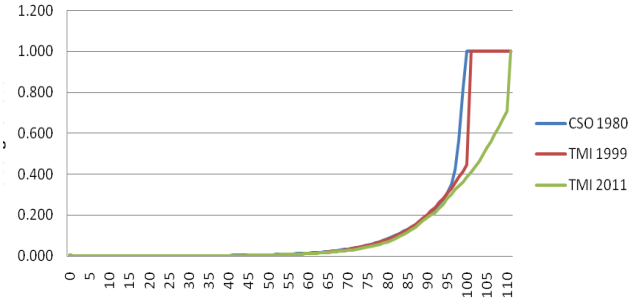

Fig. 3. Age Comparison 0-110 Years

The graph shows the chance of death in 1980 CSO table higher than 1990 TMI and 2011 TMI. Figure 1 shows the lowest debtor age is 26 years, and the highest is 60 years.

Referring to the 1980 CSO table, 1999 TMI and 2011 TMI, for ages 26 to 60 years, the higher the age, the chance of mortality is increasing or the chance of life is decreasing. Fig. 4 shows the value of the chance of death of a person aged 26 to 60 years based on age.

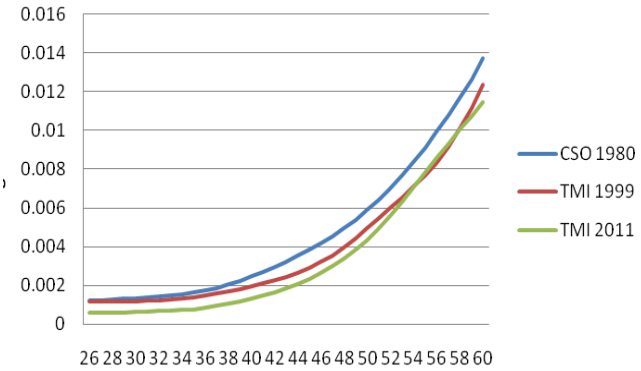

Fig. 4. Comparison of age 26-60 years old

Based on the Fig. 4, the chance of death of age x to reach age $x+t$ ($_tq_x$) drawn as a linear function, with increasing chance of death from age 26 to 60 years. The assumption of fraction age can use uniform distribution assumptions, with linear interpolation:

$$S(x+t)=(1-t)S(x)+t\cdot S(x+1) \tag{14}$$

where $0\le t\le 1$, so their respective equations for chance of death $_tq_x$, life chances $_tP_x$ and acceleration of mortality $\mu(x+t)$ as follows:

$$_tq_x = 1-{}_tp_x = 1-\frac{S(x+t)}{S(x)} = t\cdot q_x \tag{15}$$

$$_tp_x = \frac{{}_{x=t}p_0}{{}_xp_0} = \frac{S(x+t)}{S(x)} = 1-t\cdot q_x \tag{16}$$

$$\mu(x+t) = \frac{-S'(x+t)}{S(x+t)} = \frac{q_x}{1-t\cdot q_x} \tag{17}$$

$$q_{x+t} = \frac{q_x}{1-t\cdot q_x}, \tag{18}$$

C. Calculating Actuarial Present Value

The relationship between insurance that is paid instantly at death and insurance paid at the end of the year of death can be obtained by analyzing the present value of actuarial or Actuarial Present Value (APV). In equation 8, it is assumed that a one-year term insurance with a death benefit of 1 year is paid immediately at the time of death, as follows:

$$\bar{A}^{1}_{x:\overline{1}|} = \int_0^1 v^t\,{}_tp_x\mu_{x+t}dt \tag{19}$$

Based on uniform assumptions, a decrease in equations 6 and 7 is obtained:

$${}_tp_x\mu(x+t) = (1-t\cdot q_x)\cdot\frac{q_x}{1-t\cdot q_x} = q_x \tag{20}$$

With $v=e^{-\delta}$ then the APV value for one year life insurance is:

$$\bar{A}^{1}_{x:\overline{1}|} = \int_0^1 v^t q_x dt = q_x\int_0^1 e^{-\delta t}dt = \frac{i}{\delta}vq_x \tag{21}$$

In equation 21 obtained the relationship to insurance paid at the end of the year of death, using linear interpolation namely:

$$q_{x+t} = \frac{S(x+t)-S(x+t+1)}{S(x+t)} = \frac{q_x}{1-t\cdot q_x} \tag{22}$$

From the equation 10 the relationship is:

$${}_tp_xq_{x+t} = (1-t\cdot q_x)\cdot\frac{q_x}{1-t\cdot q_x} = q_x \tag{23}$$

For n-year insurance, the APV equation for n-year term life insurance is:

$$\bar{A}^{1}_{x:\overline{n}|} = \frac{i}{\delta}A^{1}_{x:\overline{n}|} \tag{24}$$

The APV value will be calculated for debtors aged 45 years using the 1980 CSO Mortality table, 1999 TMI and 2011 TMI, where the loan term is 3 years with an interest rate of 6.50%.

Given the interest rate (i) is 6.5%, the watch function is 0,938957. With $v=e^{-\delta}$ then δ value 0,063.

The initial step is to find the discrete APV value according to **equation 10.**

$$A^{1}_{45:\overline{3}|} = \sum_{k=0}^{3-1} v^{k+1}\, {}_k p_x q_{x+k} = \sum_{k=0}^{2} v^{k+1}\, {}_k p_x q_{x+k}$$

The result shown at **Table I**, **Table II** dan **Table III**.

TABEL I. CALCULATION RESULTS OF 3-YEAR APV FUTURES INSURANCE FOR DISCRETE AGE MODEL OF 45 YEARS BASED ON MORTALITY TABEL CSO 1980

Year	Age (x)	v^{k+1}	${}_k p_x$	q_{x+k}	$v^{k+1}\, {}_k p_x q_{x+k}$
1	45	0.938967	1	0.00386	0.003624
2	46	0.881659	0.99614	0.0042	0.003689
3	47	0.827849	0.991956	0.004565	0.003749
$A^{1}_{45:\overline{3}|} = \sum_{k=0}^{2} v^{k+1}\, {}_k p_x q_{x+k} =$					0.011062

TABEL II. CALCULATION RESULTS OF 3-YEAR APV FUTURES INSURANCE FOR DISCRETE AGE MODEL OF 45 YEARS BASED ON TMI 1999

Year	Usia (x)	v^{k+1}	${}_k p_x$	q_{x+k}	$v^{k+1}\, {}_k p_x q_{x+k}$
1	45	0.938967	1	0.002915	0.002737
2	46	0.881659	0.997085	0.00321	0.002822
3	47	0.827849	0.993884	0.00357	0.002937
$A^{1}_{45:\overline{3}|} = \sum_{k=0}^{2} v^{k+1}\, {}_k p_x q_{x+k} =$					0.008496

TABEL III. CALCULATION RESULTS OF 3-YEAR APV FUTURES INSURANCE FOR DISCRETE AGE MODEL OF 45 YEARS BASED ON TMI 2001

Year	Age (x)	v^{k+1}	${}_k p_x$	q_{x+k}	$v^{k+1}\, {}_k p_x q_{x+k}$
1	45	0.938967	1	0.00236	0.002216
2	46	0.881659	0.99764	0.00266	0.00234
3	47	0.827849	0.994986	0.00301	0.002479
$A^{1}_{45:\overline{3}|} = \sum_{k=0}^{2} v^{k+1}\, {}_k p_x q_{x+k} =$					0.007035

Based on discrete APV values then obtained APV values for each mortality table

$$\bar{A}^{1}_{45:\overline{3}|} \text{ CSO 1980} = \frac{i}{\delta} A^{1}_{45:\overline{3}|} = 0.011418$$

$$\bar{A}^{1}_{45:\overline{3}|} \text{ TMI 1999} = \frac{i}{\delta} A^{1}_{45:\overline{3}|} = 0.00877$$

$$\bar{A}^{1}_{45:\overline{3}|} \text{ TMI 2011} = \frac{i}{\delta} A^{1}_{45:\overline{3}|} = 0.007261$$

The results of data analysis obtained by debtors who often conduct transactions are aged 46 - 51 years. For the next age (46 - 51 years) presented in Table IV which is obtained with the same steps as the calculation for the age of 45 years.

TABLE IV. COMPARISON OF APV VALUE

Age	CSO 1980	TMI 1999	TMI 2011
45	0.011418	0.008770	0.007261
46	0.012417	0.009736	0.008207
47	0.013509	0.010852	0.009280
48	0.014718	0.012086	0.010495
49	0.016046	0.013418	0.011874
50	0.017500	0.014823	0.013451
51	0.019090	0.016269	0.015207

The results of the study were arranged in the form of graphs shown in Fig. 5, where the APV value at TMI 2011 was 45 to 51 years lower than TMI 1999 and CSO 1980.

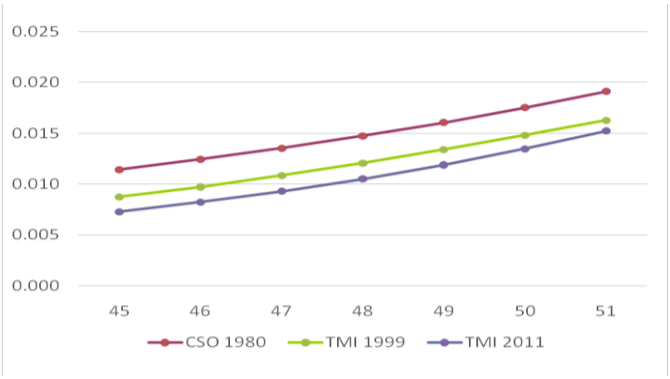

Fig. 5. Comparison of APV Value

D. Calculating Premium Value

The value of the single net premium rate is imposed on the debtor. Based on the case example of APV calculation, it will get a single net premium value where it is assumed that the loan amount is Rp. 10,000,000.

Obtained the value of a single net premium for each mortality table is:

- CSO 1980

$$P = b_t \bar{A}^{1}_{x:\overline{n}|} = 10,000,000\left(0.011418\right) = 114,180$$

- TMI 1999

$$P = b_t \bar{A}^{1}_{x:\overline{n}|} = 10,000,000\left(0.00877\right) = 87,700$$

- TMI 2011

$$P = b_t \bar{A}^{1}_{x:\overline{n}|} = 10,000,000\left(0.007261\right) = 72,610$$

For the next age, the value of single net premium is shown in Table V.

TABLE V. COMPARISON OF NET PREMIUM VALUE

Age	CSO 1980	TMI 1999	TMI 2011
45	114,180	87,700	72,612
46	124,170	97,360	82,070
47	135,090	108,520	92,800
48	147,180	120,856	104,950
49	160,460	134,184	118,740
50	175,000	148,230	134,510
51	190,900	162,690	152,070

The value of a single net premium charged to a 45-year-old debtor with a loan amount of Rp. 10,000,000, - with loan period of 3 years viewed based on the age of 45 years to 51 years based on the three mortal tables, then TMI 2011 has the lowest net premium value. This is due to differences in APV value where the 2011 TMI APV is lower than TMI 1999 and CSO 1980.

Gross premiums are influenced by three factors, namely mortality, interest rate and loading/costs. Where gross premiums are obtained by adding net premiums to costs. Based on equation 13 if it is assumed k = 30%. Then the value of gross single premium is obtained:

$$P^*_{CSO1980} = P(1+k) = P + Pk$$
$$= 114{,}180 + 114{,}180(30\%)$$
$$= 148{,}428$$

$$P^*_{TMI1999} = P(1+k) = P + Pk$$
$$= 87{,}700 + 87{,}700(30\%)$$
$$= 114{,}004$$

$$P^*_{TMI2011} = P(1+k) = P + Pk$$
$$= 72{,}610 + 72{,}610(30\%)$$
$$= 94{,}396$$

The value of the gross premium based on the actuarial concept calculation will be compared to the premium value based on the rate charged by the current KPN PNB. KPN PNB premium is calculated based on the rate determined in accordance with the loan period. The rate for the 3-year loan period is 0.00187.

From these results obtained the value of the premium comparison using CSO 1980, TMI 1999, TMI 2011 and KPN PNB rate shows in Table VI.

TABLE VI. COMPARISON OF KPN PNB PREMIUM VALUE AND ACTUARIAL CALCULATION

Age	CSO 1980	TMI 1999	TMI 2011	PNB
45	148,428	114,004	94,396	81,700
46	161,419	126,563	106,692	81,700
47	175,621	141,071	120,635	81,700
48	191,329	157,117	136,434	81,700
49	208,600	174,439	154,367	81,700
50	227,497	192,698	174,860	81,700
51	248,171	211,498	197,693	81,700

KPN PNB in determining the premiums imposed on debtors do not consider the age factor. Based on the above example, the value of gross single premium on credit life insurance using the actuarial concept is influenced by age (mortality), loan period, interest rate and costs. Based on age, the higher the age, the chance of death increases. Another factor is the loan term, where the risk of debtor death is also higher with the length of the loan term. The older a person is and the longer the loan term, the greater the value of the gross single premium.

IV. CONCLUSIONS

Calculation of the value of gross single premium using the actuarial concept in KPN PNB consists of several stages. The first is to determine life chance and chance of death based on mortality tables with survival analysis. Furthermore, determining the interest rate value, using the interest rate of 6.5%, calculating the actuarial present value (APV) for ages 45 years to 51 years, determining the loading value and finally determining the gross premium value based on three mortality tables. The usage of mortality tables to calculate the premium, adjusted to debtor characteristics. Debtors with higher risk (eq having a history of illness) will be using a mortality tables with the highest chance of death.

The results show that the gross premium value using the 2011 TMI mortality table is lower than the other tables. The values shown vary by age. In this study the cost factor in determining the gross single premium charged to the debtor only of assumptions that is 30%. For further research, it is expected that in determining the value of gross premiums, the value of other costs is calculated using the basis of theoretical calculations that correspond to the characteristics of expenditures incurred by cooperatives.

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Student' Interest on Spreadsheet-Based Manufacturing Accounting Practice Module with Transaction Cycle Approach

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***Abstract*—The spreadsheet-based module is very helpful for students and lecturers in the learning process. The purpose of the study is to describe the spreadsheet-based manufacturing accounting practice module with transaction cycle approach, and evaluates student interest on spreadsheet-based manufacturing accounting practice module with transaction cycle approach. Data obtained consisted of quantitative and qualitative data. Qualitative data include comments and suggestions contained in the questionnaire. Instruments used in this evaluation is the student interest questionnaire. The instrument uses 4 Likert scale, from 1 (very uninterested) to 4 (very interested). Student interest includes aspects of content, language, presentation and graphics of the module. Quantitative data were analyzed by comparing the number of answers within one (1) item by the number of ideal answer within one (1) item. The results of research were: 1) spreadsheet-based manufacturing accounting practice module with transaction cycle approach developed based on spreadsheet-based manufacturing accounting practice application with transaction cycle approach. This module consisted of four main cycles namely the purchase cycle, material use cycle, sales cycle and cash cycle; 2) students were very interested on spreadsheet-based manufacturing accounting practice module with transaction cycle approach.**

Keywords— module, accounting, transaction cycle; spreadsheet

I. INTRODUCTION

Companies need to have effective and efficient data processing methods. The data processing methods chosen by the company can vary from simple to complex. This option is adjusted to the volume of data processed, the complexity of data operations, data processing time constraints, and others. When the volume of data is processed more and more, the more complicated the operational data, and time constraints in generating information, then the use of software (software) computer becomes more important. Computer-based accounting applications used by companies to process data into information required by users. Companies can use off the self-accounting software or developing Accounting Applications. From off the self-accounting software produced by suppliers and sold to users. The developed accounting applications are developed independently in accordance with the operations of each company [1].

Spreadsheet-based applications are widely used by companies to process accounting data. Given the importance of the role of spreadsheet-based applications in the company, the students of Accounting Department of Bali State Polytechnic need to be equipped with the ability to design and use spreadsheet-based accounting applications. Therefore, students are not only given accounting practices manually but must also be given computer-based accounting practices.

The cost accounting lab is one of the practice courses in Accounting Department of the Bali State Polytechnic. The cost accounting lab module used is still manual. Spreadsheet-based spreadsheet cost accounting module with transaction cycle approach has not been used because based on the survey result (shop / library) it is known that there is not yet a cost accounting lab module that suits the needs of Accounting Department. Therefore, it is necessary to develop application of spreadsheet-based manufacturing accounting cycle with transaction cycle approach as the basis for preparing the cost accounting lab module.

The purpose of this research is to produce model of spreadsheet-based manufacturing accounting cycle application with transaction cycle approach, and produce cost accounting lab module in Accounting Department of the Bali State Polytechnic.

The use of spreadsheet-based manufacturing accounting cycle application with transaction cycle approach in accounting learning can improve the understanding and mastery of teaching materials. [2], examines the use of excel programs to improve the teaching and learning process in the introductory course of accounting. [3], examines the development of accounting module based on scientific approach on cost accounting subjects. [4], examines the development of fixed asset based scientific approaches to support the implementation of K-13. Each of these studies examined only a small portion of the cost accounting material. The development of spreadsheet-based practice module with transaction cycle approach is expected to improve student competence. According [5], the use of computer-based introduction laboratory computer module can improve the implementation of learning programs, learning activities, and learning outcomes. According [6], computerized by using Microsoft

Excel can produce accurate information more quickly. According to [7], the use of basic computer-based accounting practice module with transaction cycle approach can improve student competency achievement. Transaction processing system consists of three cycles, namely purchasing cycle, income cycle, and conversion cycle [1]. The transaction cycle approach makes it easy in accounting learning [8].

The module is a form of instruction-based instructional material designed for self-study. Teaching materials are systematically arranged by lecturers and students in lecturing process [9,10]. Several researches on the development of teaching materials have been done, among them by [11,12,13,14].

The purpose of module writing by Directorate of Higher Education [15,16] is to clarify and simplify the presentation of messages so as not to be verbal, to overcome the limitations of time, space, and the sensory power of learners and learning resources, can be used appropriately and varied. According to [10,17], a module can be said to be good and interesting and improves learning motivation if there are self-instructional, self-contained, stand alone, adaptive and user friendly characteristics.

II. RESEARCH METHODS

In this research used research and development model (Research & Development) Borg & Gall. This approach is often used in research development of teaching materials. Modifications to this approach are tailored to the development undertaken [17].

This research is designed to take place in two years where the research and development procedure is carried out in seven stages, the 1st year is: 1) needs analysis, 2) development of spreadsheet-based accounting cycle application with transaction cycle approach, 3) testing of spreadsheet-based accounting cycle application with cycle approach transactions, 2nd year, namely: 4) determination of costing laboratory module model module, 5) development of cost accounting module draft, and 6) testing of cost accounting lab module. Data collection methods required in the development of the first year of the survey and interviews and instruments of data collection by questioner.

III. RESULTS AND DISCUSSION

A. Spreadsheet Module Draft

The module of manufacturing accounting cycles with a transaction approach is designed to be used in completing the manufacturing company's accounting cycle. The module sections are as follows:

1) Company information

Company information contains company information, accounting information, authorization information, and language options. Company information includes the company name, address and city where the company is located. Accounting information includes; Information on the dates, and periods covered in the financial statements, and the VAT rates. Authorization information includes the names of officials and positions authorized to authorize. The choice of language contains language options for use in print reports and financial reports (Indonesian or English). Automation is only done on account data. The account data will be automated in such a way as to optimize the use of the IF () function and the VLOOKUP () function by taking into account the language options in the enterprise information section.

2) Account

The account consists of two parts: a full account and an account. The full account contains information about a relatively more complete account. While the contents of the account tailored to the choice of language, if Indonesia is selected then the name of the account in the Indonesian language that appears, if not selected then the English language that appears is the account name in English.

3) Costs

The fee contains information about the serial number, cost name, cost number, sub charge, H / D, beginning balance, and final balance.

4) Vendor

Vendors contain information about the serial number, vendor name, vendor number, address, city, phone, terminal, and beginning balance of payable on each vendor.

5) Customers

The customer contains information about the serial number, customer name, customer ID, address, city, phone, customer details and outstanding balance

6) Inventory

The inventory contains information about the serial number, item name, item number, unit, purchase price, selling price, initial amount, and inventory value.

B. Transaction Cycle:

1) Purchase cycle

The purchase cycle form is used to enter transactions related to the buying, purchasing, repurchase, and debt repayment cycle arising from purchases made on credit. This section will be automated in such a way by optimizing the use of the appropriate IF () and VLOOKUP () functions and formulas.

2) Sales cycle

The sales cycle form is used to include transactions related to the sales cycle, ie sales, sales proceeds, and receivables arising from sales made on credit. This section will be automated in such a way by optimizing the use of the appropriate IF () and VLOOKUP () functions and formulas.

3) Cash cycle

Cash cycle form is used to enter transaction related to cash cycle that is cash transaction not from debt payment transaction arising from purchase, not from transaction of cash receipt from revenue from sale. This section will be automated in such a way as to maximize the use of the appropriate IF () and VLOOKUP () functions and formulas. Cycle of material use

The form of material use cycle is used to enter data relating to the use of materials for the production process. This section

will be automated in such a way as to maximize the use of the appropriate IF () and VLOOKUP () functions and formulas.

a) Purchase journal

The form of a purchase journal is an output containing the date, invoice, description, ref, debit (purchase, VAT input, transportation cost), credit (debt). Automation is done by maximizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

b) Sales journal

The form of sales journal is output containing date, invoice, description, ref, debit (receivable), credit (sales, VAT proceeds, catch income). Automation is done by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP (), as well as the appropriate Cash Adjustment formula.

The form of cash receipts is output that contains date, no deck, description ref, debit (cash, deduction), credit (receivable, income, penalty, etc.). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas. Journal liquidation of cash

The form of cash dispensing journal contains date, check, description, ref, debit (debt, fin charges, etc), Credit (purchase, cash). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

c) Journal of materials Use

General journal forms include general journals to record material use transactions. General journal form contains date, no BPPB, description, no account, account name, amount, debit, and credit). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas. General ledger

General journal forms include general journals to record transactions that can not be recorded in special journals, journal adjustments and journal closures. General journal form contains date, no proof, account name, no account, debit, and credit). Automation is done by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP (), as well as the appropriate formula

C. Ledgers and subsidiary ledgers

1) Ledgers

The ledger form contains the account name, account number, date, description, ref, debit, credit, and balance (debit, credit). Automated ledgers by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas. The Debt Relief Form contains vendor names, vendors, addresses, cities, dates, descriptions, debits, credits, and balances. Automated debt help book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

2) Subsidiary ledgers

a) Additional trade receivables

The forms of accounts receivable of a child consist of customer name, no customer, address, city, date, description, debit, credit, and balance. Automatic accounts receivable ledgers by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas

b) Inventory of books

The helper auxiliary form contains the name of the goods, no goods, units, beginning balance, date, description, debit, credit, amount. Auxiliary authors book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

c) Additional book costs

Additional fee form contains date, description, debit, credit, amount. Automated cost help book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

D. Trial balance, and worksheet

1) Trial balance

The trial balance form contains account names, account numbers, debits and credits.

2) Worksheet

The worksheet form contains no account. account name, trial balance (debit/ credit , adjustment (debit / credit), adjusted trial balance (debit / credit), profit &loss (debit/credit), financial position (debit / credit).

Trial balance, and worksheet data are outputs in the manufacturing accounting cycle application with a transaction cycle approach. Trial balance, and work sheet are performed automatically by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

E. Financial statements

1) Income statement and other co mprehensive income

This form contains the components of the income statement and other comprehensive income as defined in IFRSs.

2) Statement of financial position

This form contains the components of the statement of financial position as set forth in IFRSs.

3) Statement of changes in equity

This form contains the components of the statement of change in equity as stipulated in IFRSs..

4) Statements of cash flows

This form contains the components of the cash flow statement as defined in IFRSs.

5) Notes to the financial statements

This form is the place to fill the notes to the financial statements as contained in IFRSs Financial statement data in addition to notes on financial statements is the output in the application of manufacturing accounting cycles with a transaction cycle approach. The financial statements (income statement and other comprehensive statements of income, statement of financial position, statement of changes in equity, and cash flow statement) are performed automatically by

optimizing the use of the appropriate IF (), SUMIF (), and VLOOKUP () functions and formulas. More Reports

In addition to the financial statements, this application can also generate other reports such as cost reports (cost recapitulation, cost allocation, and production costs), list of accounts payable, and list of accounts receivable.

F. Ending balance

The trial balance form includes account name, account number, debit and credit. The closing balance sheet data is the output in the accounting cycle application with the transaction cycle approach. The balance of the balance is closed automatically by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP ()

G. Application controls

Application controls which is used to improve the application control of the accounting cycle among others; password file, protect workbook, protect sheet, locked, data validation, and conditional formatting.

H. Application menu

The application menu is used to set the dialog between the inside of the application. This menu is designed by considering the process in accounting. The application menu can be seen in Figur 1.

I. Draft module tests

Testing the Draft Module Lab. Spreadsheet-based Cost Accounting by users Draft module testing is done by giving a questionnaire of interest and interest in the user in this case as many as 50 students in the aspect of content of the module, language, presentation of the module. Content aspects include; the contents of the module refer to manufacturing companies, while aspects of language include; the language used is easy to understand, practical, for the account name used, complete with an explanation and aspects of the module presentation; where the module is presented in a systematic, interesting way referring to the purpose of the spreadsheet-based cost accounting lab, namely information on production costs and financial reports on manufacturing companies in accordance with PSAK.

Based on the results of module testing using 4 Likert scales from 1 (very uninterested) to 4 (very interested), from the aspect of content, it can be seen that 40% expressed interest, and 60% were very interested that the contents contained in the module matched the application requirements accounting cycle in manufacturing companies. For language aspects, 5% are less interested, 35%, expressed interest, and 60% are very interested in the ease and practicality of language use, account names in the module.

And from the aspect of the module presentation, it can be seen that 2% of students stated that they were less interested, 33% expressed interest, and 65% said they were very interested that the module had been presented systematically in accordance with the PSAK. content or content, aspects of language and presentation.

IV. CONCLUSION

Based on the discussion, the following conclusions can be drawn:

Module the spreadsheet-based cost accounting lab consists of: journals and journal recap with purchase applications, use of materials, memorial journals); recapitulation of BOP allocations with spreadsheet-based applications; Report production costs with spreadsheet-based applications; Ledgers and subsidiary books with spreadsheet-based applications; Balance sheet and balance sheet with spreadsheet based applications; Financial reports with spreadsheet-based applications (reports of profit and loss and other comprehensive income, statements of changes in equity, statements of financial position, and statements of cash flows).

The spreadsheet-based cost accounting module consists of 4 main cycles, namely the purchase cycle, material usage, sales and the cash cycle.

Users or students consider that a spreadsheet-based cost-accounting lab module has a transaction cycle approach that meets the content or content aspects, language aspects and presentation aspects, so that this module is expected to be able to facilitate learning and teaching.

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Tax Amnesty in Raising Compliance of Registered Taxpayers at the South Badung Small Tax Office

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Abstract **- Bali's economic growth must be in line with the increase in revenues from the tax sector. The realization of tax revenue for the Bali Regional Office in 2017 was only 8.4 billion from the target of 10.2 billion or by 84%. Tax Amnesty is a momentum to increase taxpayer compliance as indicated by increased tax revenues. The purpose of this study was to determine the success of the Tax Amnesty (TA) policy in terms of taxpayer compliance, especially in South Badung region which is the economic center of tourism in Bali. The analysis technique used is the Independent Sample t-Test statistical test. Taxpayer compliance is viewed in terms of 3 indicators, namely (1) the amount of tax revenue, (2) the number of taxpayers who pay taxes, and (3) the number of taxpayers who submit tax return. The results of the study find that TA has a significant impact on the number of taxpayers and the number of taxpayers who submit tax return. However, TA does not have a significant impact on the indicator of tax revenue.**

Keywords: Tax Amnesty, Tax Revenue, Taxpayers Complience

I. INTRODUCTION

Bali's economic growth from 2010 has always been recorded to grow higher than the national economy. Economic growth supported by the provision of accommodation and food and beverages sectors became the highest source of growth with a contribution of 1.54 % growth, followed by wholesale and retail trade and car and motorbike repair (trade) of 0.67 %, agricultural sector accounted for 0.60 % and the construction sector is 0.60 %. Meanwhile, for other sector, this contributed to Bali's economic growth in the first quarter of 2017 at 2.39 %. Bali's good economic growth should be in line with the increase in state revenues from the tax sector. Data from the Regional Office of the Directorate General of Taxes (DGT) of Bali shows that the realization of Bali Tax Office DGT tax revenue in 2017 was IDR 8.4 trillion of the target of IDR 10.26 trillion. This condition shows that the revenue from the tax sector has not reached the target. The greater the rate that income is increasing, the more generous people may feel, and the greater the degree of redistribution through the tax system [1]. State government policy frequently focuses on stimulating a healthy business environment with the assumption that this is linked with long term economic growth [2].

To increase state revenues from the taxation sector, real efforts are needed, and implemented in the form of government policies. The state must have an active tax policy to contribute to the achievement of their economic and social objectives, whereby they have to find an adequate measure as not to jeopardize the economic and market principles and a favorable economic environment [3]. Tax amnesty is also one of the factors that affecting the considerations of taxpayers [4]. Tax amnesty is a controversial revenue-raising tool as advocates emphasize the immediate and short-run revenue impact, and often argue that future tax revenues may increase if the amnesty induces individuals or corporations not on the tax rolls to participate, and if the amnesty is accompanied by more extensive taxpayer services, better education on taxpayer responsibilities, and stricter post-amnesty penalties for evaders and greater expenditures for enforcement [5]. According to the Law of the Republic of Indonesia Number 11 of 2016 concerning Tax Amnesty, tax amnesty is the elimination of taxes that ought to be owed, not subject to tax administration and criminal sanctions in the field of taxation, by declaring assets and paying redemption as stipulated in the law this invite. The application of the Tax Amnesty policy is expected to create public awareness to register as a Taxpayer and provide opportunities for repatriation of part or all of the assets of Indonesians abroad [6]. Incoming investment from the facility can support macroeconomic stability

Tax Amnesty implementation is a momentum to improve the tax administration system in Indonesia, including increasing taxpayer compliance which has an impact on increasing tax revenue on an ongoing basis. Compliance with the tax law typically means (i) true reporting of the tax base, (ii) correct computation of the liability, (iii) timely filing of the return, and (iv) timely payment of the amounts due . The bulk of tax evasion involves the first point [7]. Over the last thirty years or so, a considerable body of literature has developed in the area of taxpayer compliance from which has emerged two significant and widely accepted findings. Firstly, taxpayer non-compliance is a continual and growing global problem that is not readily addressed. Secondly, despite a great deal of research emanating from a wide variety of disciplines, there is not a great deal of consensus about why people do, or do not, pay their taxes or otherwise comply with their tax obligations[8]. Based on the practice of DGT implementation in accordance with the provisions of Law Number 16 of 2009 concerning General Provisions and Tax Procedures, indicators of taxpayer compliance can be seen from (i) Aspects of

timeliness (ii) Aspects of income or income of taxpayers (iii) Aspects of law enforcement (imposition of sanctions). In this research, taxpayer compliance is measured based on three indicators, namely (1) *)* the amount of tax revenue (2) Number of taxpayers who pay taxes (3) Number of taxpayers who submit tax return.

Previous researchers discusses the multiple tax amnesties enacted in the Russian Federation during its main transition period of the 1990s and analyzes the impact of these amnesties on tax collection and find that these amnesties had little short- or long-term impact on revenues and conclude that the Russian amnesties, like most other amnesties, seem unlikely to have had significant and demonstrable positive or negative impacts on the revenues of the Russian Federation, a conclusion that calls into question their usefulness as a policy instrument [9]. Tax amnesties generate less short-run revenue than predecessors and tend to magnify revenue losses associated with disincentives for long-run tax compliance [10] .

In Turkey the tax amnesties harm the principle of the justice as well [11] . In Spanish find that the amnesty had no effect on tax collection in either the short or the long term. The phenomenon of Tax Amnesty policy and the lack of studies on the success of the Tax Amnesty program, the authors feel the need to examine the success of the Tax Amnesty program in improving taxpayer compliance.

II. RESEARCH METHODS

A. Sample and Research Location

The location of this research in the South Badung Tax Service Office. The sampling technique used is purposive sampling with criteria of data is the taxpayers are registered in South Badung small Tax Service Office as business entities. The period before Tax Amnesty (TA) policy is defined from October 1st, 2015 to June 30th, 2016. While the period after TA policy is defined from July 1st, 2017 to December 31st, 2017.

B. Analysis Technique and Hypothesis

This research is an event study about Tax Amnesty policy. Data analysis technique used is comparative statistical analysis using Independent Sample T-Test. Independent sample t-test is done by comparing the difference between means of two populations (before TA and after TA) with a standard error of the difference. The t-value formula can be written as follows:

$$t_{value} = \frac{\overline{X_1} - \overline{X_2}}{s_{\overline{X_1} - \overline{X_2}}} \quad (1)$$

Note:

$\overline{X_1}$ = mean of first sample (before TA)

$\overline{X_2}$ = mean of second sample (after TA)

$s_{\overline{X_1} - \overline{X_2}}$ = standar deviation of the mean difference

An alternative hypothesis is accepted if the value | t value | > t table (α / 2; n-1), or if the significance value is less than alpha with alpha of 0.1. Independent sample t-test used in this research test is to find out how successful the tax amenesty is to improve taxpayer compliance before and after the Tax Amnesty policy.

The alternative hypothesis in this study will be divided into 3 (three) according to the indicators tested.

H1: Tax revenue before and after the Tax Amnesty policy is significantly different

H2: The number of taxpayers who pay taxes before and after the Tax Amnesty policy is significantly different.

H3: The number of taxpayers who submit tax return before and after the Tax Amnesty policy is significantly different

III. RESULT AND DISCUSSION

The independent sample t-test was conducted to test the hypothesis whether there were significant differences before Tax Amnesty and after Tax Amnesty. The variables tested are the tax revenue report, the number of taxpayers paying taxes, and the number of taxpayers who submit tax return. The summary of the results is shown in Table 1.

TABLE I. THE SUMMARY OF INDEPENDENT SAMPLE T-TEST

Variable	Levene's Test			T-Test	
	F value	Sig	Varians Equality	t-value	Sig
Tax Revenue	2.427	0.139	Equal	-0.922	0.37
Number of Taxpayer who pay taxes	1.572	0.228	Equal	-1.776	0.095
Number of Taxpayer who submit Tax Return	0.416	0.528	Equal	-4.044	0.001

A. Tax Revenue

Before testing the hypothesis, the varians equality test was done first. The purpose is to know wheter the two samples have an equal varians or not. The test was done by using Levene's Test, where if the F-value is greater than the F table, or the Sign is lower than alpha (10%), the varians of the two samples are stated not equal. If the F-value ia less than F table or Sign is greater than alpha (10%), the varianse are equal.

Based on the results shown in Table 1, the F value for variable Tax Revenue is 2.427 and Sig 0.139. The Sign value 0.139 is greater than alpha 10% (0.1) so the varians of Tax revenue before TA and after TA is equal.

The t-test shows that t-value for Tax Revenue is -0.922 and Sign is 0.37 whisch is greater than alpha 0.1. Thus, the first alternative hypothesis (H1) is denied. The conclussion is Tax revenue before and after the Tax Amnesty policy is not significantly different. This condition shows that the Tax Amnesty policy has not resulted in an increase in taxpayer revenues in 2017.

B. Number of taxpayers who pay taxes.

Before testing the hypothesis, the varians equality test was done first. The purpose is to know wheter the two samples have an equal varians or not. The test was done by using Levene's Test, where if the F-value is greater than the F table, or the Sign is lower than alpha (10%), the varians of the two samples are stated not equal. If the F-value ia less than F table or Sign is greater than alpha (10%), the varianse are equal.

Based on the results shown in Table 1, the F value for variable number of taxpayers who deposit or pay taxes is 1.527 and Sig 0.228. The Sign value 0.228 is greater than alpha 10% (0.1) so the varians of number of taxpayers who deposit or pay taxes before TA and after TA is equal.

The t-test shows that t-value for number of taxpayers who deposit or pay taxes is -1.776 and Sign is 0.095 whisch is less than alpha 0.1. Thus, the second alternative hypothesis (H2) is accepted. The conclussion is The number of taxpayers who deposit or pay taxes before and after the Tax Amnesty policy is significantly different. This condition shows that the Tax Amnesty policy already success in increasing the number of taxpayer who pay taxes in 2017.

C. Number of Taxpayers who deliver notification letters.

Based on the results shown in Table 1, the F value for variable number of taxpayers who deliver notification letter is 0.416 and Sig 0.528. The Sign value 0.528 is greater than alpha 10% (0.1) so the varians of number of taxpayers who deliver notification letter before TA and after TA is equal.

The t-test shows that t-value for number of taxpayers who deposit or pay taxes is -4.044 and Sign is 0.001 whisch is less than alpha 0.1. Thus, the third alternative hypothesis (H3) is accepted. The conclussion is The number of taxpayers who submit notification letter before and after the Tax Amnesty policy is significantly different. This condition shows that the Tax Amnesty policy already success in increasing the number of taxpayer who deliver notification letter in 2017.

IV. CONCLUSION

The Tax Amnesty Policy has a significant impact on taxpayer compliance in the South Badung tax office in terms of the number of taxpayers as well as the number of tax return submission. However, the Tax Amnesty policy has not had a significant impact on compliance reflected in tax revenues increase in the South Badung Tax Office in 2017. There is a significant increase in the number of taxpayers and tax returns submission. This reflects that after the tax amnesty policy, taxpayers begin to aware in fulfilling tax obligations. On the other hand, the tax revenue indicator had no significant impact in the long run continuity and sustainability in terms of the number of taxpayers who pay taxes and submit tax return in 2017.

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Spatial Planning of the Noongan Minahasa Watershed

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***Abstract*— The spatial plan that has been made is not realized properly, due to inadequate law enforcement, so that land use in the Noongan Sub-watershed is not in accordance with the ability of the land. Therefore, a re-assessment needs to be done and more importantly, the enforcement of spatial rules and their more explicit realization in the Noongan Sub-watershed area to support environmental sustainability and sustainable use of space in Lake Tondano. Problem Formulation, to formulate the right spatial model based on the function of the area in the Noongan Sub-watershed, which can support environmental sustainability and sustainable use of space". Research Objectives, to formulate appropriate spatial planning models in accordance with the function of the area in the Noongan Sub-watershed, so as to support environmental sustainability and sustainable utilization of space. The method used, a) Making a Map of the Land Unit with GIS. b) Determination of Regional Functions. Results of the study: Protected forest area category (A), this area covers the upstream area of the Noongan River Sub-Region namely Protected Area is an area with natural water resources, flora and fauna conditions such as protected forest, asylum forest, tourism forest, area around water source , river channel, and other protected areas; Buffer Zone (B) is a buffer function area, an area that can function as a protection and cultivation function, located between the protected function area and cultivation function area such as limited production forests, plantations (perennials), mixed gardens and the like; Annual Crop Cultivation Area (C), The area of annual crop cultivation function is the cultivation area cultivated with annual crops such as Permanent Production Forest, Industrial Plantation Forest, Community Forest, Plantation (perennials), and fruit plants; Seasonal Plant Cultivation Area (D), the annual cultivation function area is an area that has the function of cultivation and cultivated with annual crops, especially food crops or for settlements.**

Keywords— ***Spatial planning, sub-watershed, conservation of lake tondano***

I. INTRODUCTION

Lake Tondano is the estuary of the Noongan Sub-watershed, therefore the kelterian of Lake Tondano is influenced by the sustainability of the Noongan Sub-watershed. Considering that the function and benefits are very large for the welfare of the community, it is necessary to preserve the Noongan Sub-watershed in relation to the conservation of Lake Tondano.

Lake Tondano is a major asset because it has an important economic role in North Sulawesi, namely having a variety of benefits for the surrounding population, namely water sources for freshwater fisheries, bathing, washing and latrines, water exploitation for the benefit of drinking water companies consumed by tens of thousands of Minahasa residents and some residents The city of Manado, besides being one of the attractions in North Sulawesi. Results of the 2000 NRM / EPIQ research, there was a decline in the quality of Lake Tondano in the Tondano watershed, namely a high sedimentation rate of 15-20 ppm in 1970 to 25 ppm in 1980, 30 ppm in 1990, and 30-50 ppm in 2000. siltation occurred in 1934 with a maximum depth of 40 meters, in 2000 the maximum depth was only 20 meters, in 2010 the deepest point was 12 meters. Acceleration of silting because every year there is silting of approximately 1.04 meters. Eutrophication occurs with the entry of fertilizers, detergents, solid waste, fish culture waste in cages (nets), and organic materials, (Hariyadi, M.A, 2011)

Noongan sub-watershed has a forest area based on its function used as a protected area and conservation of natural resources. The Noongan Sub-watershed is an upstream sub-watershed where Lake Tondano is included, and this Sub-watershed is a source of considerable water distribution for agricultural purposes, especially rice field agriculture. But now it has undergone a change, namely the decline in environmental resources where natural forests become residential and restaurant areas, infrastructure / road, plantation, and agricultural buildings which have resulted in an increase in the rate of erosion, flooding and a decrease in water discharge

Spatial planning in the Noongan Sub-watershed already exists, but the law enforcement efforts are still inadequate, so that land use in the field is no longer appropriate with its intended use as planned. To overcome damage to the Noongan Sub-watershed, one of the efforts is to make spatial planning based on the function of the Noongan Sub-watershed area for the conservation of Lake Tondano.

According to Murtianto H (2008), spatial planning needs to be carried out by various parties, both government and society, in order to support each other in the environmental and spatial sustainability program of a region. The use of space in accordance with the ability of the region is expected to provide support for the maintenance of a sustainable and

supportive environment for human life in a sustainable manner.

Spatial plans that have been made are not realized properly, due to inadequate law enforcement, so that land use in the Noongan Sub-watershed is not in accordance with the capabilities of the land. more firmly in the Noongan Sub-watershed area to support environmental sustainability and sustainable use of space.

"How to formulate the right spatial model based on the function of the area in the Noongan Sub-watershed, which can support environmental sustainability and sustainable use of space".

To formulate an appropriate spatial planning model in accordance with the function of the area in the Noongan Sub-watershed, in order to support environmental sustainability and sustainable utilization of space.Danau Tondano merupakan muara dari Sub DAS Noongan, olehnya kelesterian danau tondano dipengaruhi oleh kelestarian Sub DAS Noongan. Mengingat fungsi dan manfaatnya yang sangat besar bagi kesejahteraan masyarakat maka diperlukan upaya pelestarian Sub DAS Noongan kaitannya dengan upaya pelestarian danau tondano.

II. RESEARCH METHODS

A. Making a Map of Land Unit with GIS

The research method used is direct measurement of primary and secondary data in the field with a land unit approach. Maps of land units are made based on overlapping land maps, slope maps, landform maps, and land use maps.

B. Determination of Area Functions

Determination of regional functions in the study area based on Minister of Agriculture Decree No. 837 / Kpts / Um / 11/1980, and No. 683 / Kpts / Um / 8/1981 concerning the criteria and procedures for establishing protected forests and production forests. Criteria for determining the function of the area through the assessment of 4 variables of land characteristics, namely; slope, soil type, rainfall intensity, classification and score scores of the following three factors:

TABEL 1. CLASSIFICATION AND SCORE OF SLOPES

CLASS	SLOPE	CLASSIFICATION	SCORE
I	0-8 %	Flat	20
II	8-15 %	Ramps	40
III	15-25 %	Rather Steep	60
IV	25-40 %	Steep	80
V	> 40 %	Very Steep	100

Source: Arsyat, S (1987)

TABEL 2. CLASSIFICATION SCORE OF SOIL TYPES

CLASS	TYPE OF SOIL	CLASSIFICATION	SCORE
I	alluvial, glei, planosol, hidromorf, laterik, latosol	Not Sensitive	15
II	Latosol	Less Sensitive	30
III	brown forest soil, non calsic brown, mediteran	Sensitive	45
IV	andosol, laterit, grumosol, podsol, pedsolic	More Sensitive	60
V	Regosol, litosol, organosol, rensina	Very Sensitive	75

Sumber: Arsyat, S (1987)

TABEL 3. CLASSIFICATION AND SCORE OF RAIN INTENSITY

CLASS	RAIN INTENSITY	CLASSIFICATION	SCORE
I	0-13,6	Very Low	10
II	13,6-20,7	Low	20
III	20,7-27,7	Medium	30
IV	27,7-34,8	High	40
V	34,8	Very High	50

Sumber: Arsyat, S (1987)

Determination of the function of the area is carried out by adding up the scores of the three variables above in each land unit. The amount of the score value is the value of the area function criteria score. The type of regional function is determined based on the value of the land capability score and other special criteria, as well as the criteria and procedures specified in the RLKT pattern preparation instructions. Area functions as follows:

a. Install protected forest functions
b. Buffer forest function area
c. Annual crop cultivation area
d. Seasonal cultivation area

The object of the research is the Noongan Sub-watershed spatial arrangement model according to the function of the area in the framework of preserving the lake ofondondano. Subjek is the Noongan Watershed Land.

III. RESULTS AND DISCUSSION

The spatial plan is the spatial plan for the Regency, specifically the Noongan Sub-watershed. The preparation of detailed spatial plans is based on various considerations, including the development of growth centers, revitalization of the downtown area, development of large-scale residential areas, and the preservation of Lake Tondano. Similarly, in areas prone to erosion and landslide disasters, a detailed spatial plan must also be prepared based on considerations of saving the environment from the threat of disasters, especially the preservation of Lake Tondano. In the detailed plan of the Noongan Sub-watershed spatial layout, the direction of developing aquaculture activities is limited to activities that are in accordance with the characteristics of the area. In addition, the detailed spatial plan also includes directives for the construction of disaster prevention infrastructure such as embankments, retaining walls and so on in areas prone to erosion and landslides.

Regarding the management of erosion-prone areas, landslide disasters, spatial plans at all levels must contain rules that are consistent with the criteria and determination of protected areas, cultivation areas, and areas prone to erosion and landslides. In order for the consistency of inter-level spatial planning to be realized, it is needed:

Intensive dialogue in the process of preparing spatial plans

Lower level of government compliance with the provisions set out in the above spatial plan.

Based on the results of the research, the classification of the function of the Noongan Sub-watershed area is divided into 4 categories, namely:

a) Protected Area (Code A)

Protected Area is an area with natural water resources, flora and fauna such as protected forests, asylum forests,

tourism forests, areas around water sources, river channels, and other protected areas as stipulated in Presidential Decree 32 of 1990. Protected areas in this study were obtained data as follows: the intensity of the rain is as big as? 175 or meet one of the following criteria: (1) has a slope of> 40%, (2) has a height of 900 m dpal. Based on the physical criteria, an area is included in the category of protected forest area (A), this area covers the upstream area of the Noongan Sub-watershed.

b) Buffer Area (Code B)

The buffer function area is an area that can function as a protection and cultivation function, located between the protected function area and cultivation function areas such as limited production forests, plantations (hard plants), mixed plantations and the like. A land unit designated as a buffer function area meets one of the general criteria as follows: (1) the physical condition of the land allows for economical cultivation, (2) its location is economically easy to develop as a buffer zone, (3) does not harm the environment if developed as a buffer zone. Based on these physical criteria, an area is included in the buffer zone (B) category, this area includes the middle area of the Noongan Sub-watershed.

c) Annual Crop Cultivation Area (Code C)

The function area of annual crop cultivation is the cultivation area cultivated with annual crops such as Permanent Production Forest, Industrial Plant Forest, Community Forest, Plantation (hardwood), and fruit plants. A land unit is designated as the area and function of annual crop cultivation if it has a slope of 15-40% and meets general criteria such as the buffer function area. Based on these physical criteria, an area is included in the category of annual crop cultivation area (C), the area of coverage includes; Noongan Sub-watershed in Touliang region.

d) Seasonal Plant Cultivation Areas (Code D)

Seasonal cultivation function area is an area that has a function of cultivation and cultivated with annual crops, especially food crops or for settlements. To maintain the sustainability of the area of cultivation function of seasonal crops, the selection of the type of commodity must consider the suitability of the commodity to be developed. The value of land capability meets the criteria of land that can be developed as a cultivation area and the slope of the slope is not more than 8%, so in this area there is no land that meets the criteria of slope should not be greater than 8%, so that at the location of research the function of annual cultivation area do not meet the requirements for planting land with annual crops only. Planting land with annual crops can be done by integrating the planting pattern of annual crops between core crops or perennials that are at the research site. Its coverage area is Noongan Sub-watershed, Tompaso (North Langowan District, Tolok); Langowan (Toraget, Tumaratas, Walewangko).

IV. CONCLUSION

Spatial planning in the Noongan Sub-watershed area is carried out with consideration of the ability of the area based on the characteristics of the land in question. Determination of the function of the area for certain uses is carried out with consideration of physical and social characteristics. Important spatial planning is carried out by various parties, both government and society, to support each other's environmental and spatial sustainability programs, especially the Noongan Sub-watershed within Lake Tondano. The use of space in accordance with the ability of the region is expected to provide support for the maintenance of a sustainable and supportive environment for human life in a sustainable manner. Community empowerment to become a community that is aware of environmental conditions will be crucial for the success of the regional structuring program. Regional arrangement is not only based on increasing community economic activities, but also considering the preservation of the natural environment of the Noongan Sub-watershed in the vicinity, especially the preservation of Lake Tondano.

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The Bathymetry Map-Based Analysis of Morphometry Change of Tondano Lake

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***Abstract*—Opinion differences about how quick the process of shallowing Tondano Lake remain happening, it affects the varied Information about the approximation of how long Tondano Lake will last to the future. This research aims to analyze the morphometric change of the bottom of the lake in the last ten years, since 2006 until 2016.The analysis of morphometic change is undertaken by comparing two results of bathymetric mapping taken in 2006 and 2016. The morphometric aspect that has been examined are the vast of water surface (km^2), water volume (m^3) and the depth (m). The finding shows that in 10 years the surface of the lake has reduced 1, 03 km^2, while the water volume has hugely increased 10, 41 m^3. The depth average in 10 years has almost not significantly changed, it gets shallower 0, 01 meter. From its contour pattern shows that shallow has not only been moving to south but to east. It means that the sediment is mostly from west. The rain catchment area in west of the lake has wider area compared to west east (Eris subdistrict), it causes the most sediment is from this area.**

Keyword: bathymetry, morphometry, map, change.

I. INDTRODUCTION

The causal factor of why Tondano Lake gets shallower is still becoming the big conversation to the academician, researcher, societal organization and journalist. Even the principle maker often gives the statement that is related to why Tondano Lake gets shallower. It shows that attention and the worry of Tondano Lake gets shallow has valuable and strategic meaning to the community of Northern Sulawesi. Although there are still differences in terms of point of view, Tondano Lake has been declared by the Environmental Ministry [1] as one of 15 lakes in Indonesia thaw draws attention to be saved.

The deepest depth of Tondano Lake that is measured by Dutch in 1989 was 20 meters in south area, 15 meters in north area (Koperberg, 1982) in [2]. Another source from BRLK (1992) states that the depth of Tondano Lake in 1934 was 40 meters, in 1983 was 27 meters, in 1988 became 20 meters, and in 1992 was reported 16 meters. The other information assumes the depth of the lake in 1939 was 43 meter and has become 19 meters in 1992 [3]. Reference [2] in his research reports that in the year he was doing the research the depth of the lake was 22 meter. Different from the research undertaken by Samratulangi Univeristy in 2000 states that the depth was 14 meter [4], Research Center of Manado State University (2006) found the depth was 23 meters. The result of Bathymetric mapping in May 2010 that is taken from WIIP Bathymetry Survey [5]. informed that the lowest level of the bottom of the lake is between 22 34 meters. At the same year Dirjen SDA-BWS reported the average depth of Tondano lake was 15,11 meters with the puddle width 46,16 km^2 and the capacity 668,57 million m^3 [4]. While the hydroacoustic survey that was undertaken by the Ministry of Naval and Fishery (2016) in March 2016 stated the depth of the lake came at 30 meters [6] .

Looking at the data above raises a question, Has the bottom of the lake been getting more shallow from 28 meters in 1898 to 40 meters in 1934, thus increased again to 27 meters in 1983. To discuss about the reality of the data, methodological, geological and geomorphological approach can be used, still, it is not going to be the focus of this study. This research emphasizes the description of morphometrical change about the bottom of the lake and the Bathymetric mapping-based analysis of sediment tendency that potentially contribute the shallow of the bottom of the lake.

Lake morphometry is the form of lake water substance that includes the width of water surface are, water volume, and average depth c. Morphometric information is extremely needed to have the overview of physical condition of the lake either vertically (Hakanson, 1981) in [7]. Surface dimension includes the length and the width of the lake, the width of the water surface, while the under surface dimension includes the depth and volume of the lake. Lake Morphometry is affected by environmental variable such as sedimentation process, therefore morphometric data can be used to evaluate the accumulation and the pattern of the sediment spread.

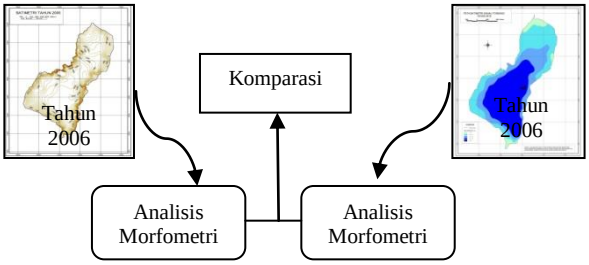
The source of sediment substance that goes into the bottom of the lake also becomes interesting issue to those who have something to do with Tondano Lake. At least,

there are two different poles in facing the source of the substance that goes into the bottom of the lake. The first party states the main source of sediment substance is from erosion at the upper course dry soil, even so there are still many have a notion that the source of sediment substance is caused by wet soil cultivation around the lake. The statement is used as the base of both parties in facing the age of the lake. The chief of Agency for Regional Development in Minahasa Regency (2007), predicted that Tondano Lake will only last until 2020, but the reality is way far from what is predicted. The other assumption had by [2], stated that the size of sediment that goes into Tondano Lake is 7.540 t/year if it is compared to the volume of the lake which is 680 million m3, the lake shall be fully filled with sediment in thousands of years.

Based on the opinion differences that are found pertaining the depth of the lake, the source of sediment substance that goes into the bottom of the lake and the age of the of Tondano Lake in years to come, so this research is going to investigate by using bathymatic mapping-based about morphometric change of the bottom of the lake.

II. RESEARCH METHODS

This research is done at Tondano Lake, Minahasa Regency, North Sulawesi Province, by using bathymetric data in 2006 and 2016. Both maps were re-calculated using software namely arcview 3.3 for the analysis of morphometric aspect needed in this investigation. Morphometric aspect observed in this investigation were the vast of surface (m^2), average depth (m) and total volume of lake water (m^3). The vast of surface (m^2) is measured based on the vast of lake water area, measured based on the vast of polygon on bathymetrical map helped by SIG. The average depth was calculated by dividing the total volume of lake water from the vast of lake water surface by measuring tape. Total volume of lake water was calculated by multiplying the vast of water surface (m^2) and average depth (m) in each contour layer. The analysis of morphometric change was done by comparing morphometry of the lake in 2006 and 2016.



III. RESULT AND DISSCUSION

The analysis finding shows that there is no significant morphometric change since 2006 until 2016. The morphometric changing dimension will be described in further explanation

A. The changing of water surface

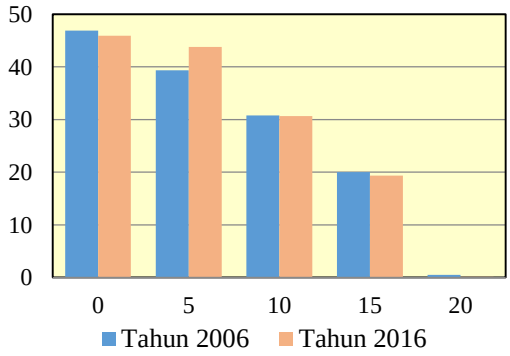
The vast of the surface of lake water was calculated in each 5 meter contour interval, started from interval 0 meter to the deepest which is 20 meter.

The vast of water surface is the vast of polygon in each interval contour. Each polygon was calculated using *Xtools extension* provided in *software ArcView GIS.* The result of vast analysis is presented in Table 1.

Table 1. Comparison of Water Surface Vast According to Depth (km^2)

Depth (meter)	Year 2006	Year 2016	Change
0	46,91	45,88	-1,03
5	39,34	43,78	4,44
10	30,76	30,65	-0,11
15	20,00	19,33	-0,68
20	0,52	0,15	-0,37

Source: The result of bathymetric mapping analysis (2018)



Picture 1. The comparison water surface vast 2006 and 2016 by depth.

The table above shows the water surface has not significantly changed in the last 10 years. The lake water surface at 0 meter has reduced, on contrary, it has increased the vast of lake water surface at 5 meter depth. The data indicates the process of getting shallow, and on the other hand, it is assumed that abrasion has contributed the increase of water surface vast.

He analysis finding above reinforces the previous study by Trisakti and Nugroho (2012) by using the image of multi temporal satellite since 1990 – 2011 and as the finding was the shape and the vast of Tondano Lake surface had not relatively changed, with 46 – 47 km^2 vast. The study finding showed constriction -1, 03 km^3 of water surface.

B. Total Volume of Lake Water

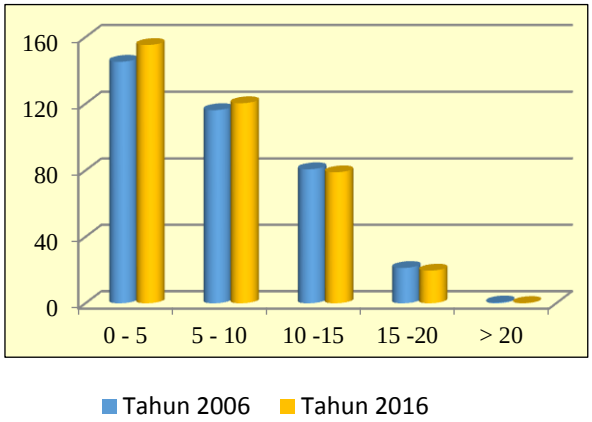
The total volume of lake water has totally increased from 364, 11 million m^3 ^{in} 2006 became 374, 53 million m^3 in 2016. The increase of 10, 41 million m^3 of lake water has occurred in 10 years. The significant change that took place at 0 - 5 meter deep was 10, 05 million m^3. There was suitability between the increase of water surface and total of

water volume in each depth level. The increase was caused by the morphometric change of the bottom of the lake as the result of sedimentation.

Table 2. The change of water volume by each depth zone (in million m^3)

Depth zone(meter)	Year 2006	Year 2016	Change
0-5	145,27	155,32	10,05
5-10	116,25	120,40	4,15
10-15	80,78	78,95	-1,83
15-20	21,30	19,70	-1,60
>20	0,52	0,15	-0,37
Total	364,11	374,53	10,41

Source: The Result of Bathymetric map, (2018)



Picture 2. The comparison between water volume (million m^3) in 2006 and 2016

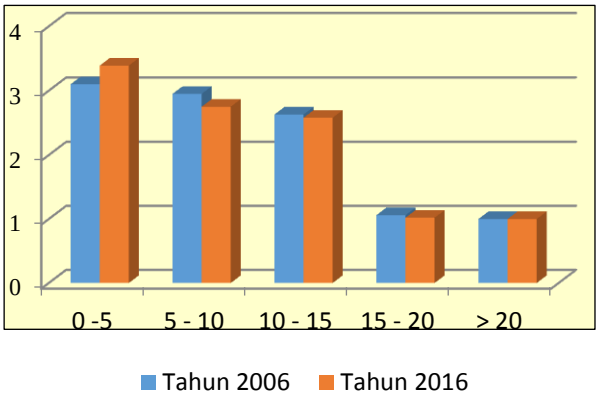
C. Average Depth

The average depth of the lake was the correlation between water volume and the vast of water surface. The result analysis of the average depth according to bathymetric map in 2006 and 2016:

Table 3. Average depth of the lake according to its depth zone (meter)

Depth	Year 2006	Year 2016	Change
0-5	3,10	3,39	0,29
5-10	2,95	2,75	-0,20
10-15	2,63	2,58	-0,05
15-20	1,06	1,02	-0,04
>20	1,00	1,00	0,00
Total	10,74	10,73	-0,01

Source: The result of bathymetric map (2018)



D. The analysis of morphometric change

Morphometric aspects observed in this research were the vast of water lake water surface, water volume and average depth of the lake. These 3 aspects relate to sedimentation process. The vast of water surface can be used to predict whether or not process of sedimentation is happening underneath. Even so, the vest of water surface is not the only parameter to detect the source of sediment substance.

The analysis finding shows reduction as wide as 1, 03 km^2 on water surface in 10 years. This information depicts that there was no significant change on water surface. The increase of sediment substance that enforces the widening of Tondano Lake water surface is still have to be continuously studied.

The vast of lake water closely relate to the volume of lake water. The analysis finding shows the increase of volume of lake water as 10, 41 million m^3 in ten years with 0 – 5 meter deep. The increase is occurred because of the increase of water vast at 5 meter deep. The water volume also depicts how large is the lake capacity and can be used to predict the age of lake. One of factor that causes the reduction of lake capacity was the sedimentation to the bottom of the lake.

The depth of lake also determines lake storing capacity. The faster the lake gets more shallow the faster the reduction of the depth of lake. The finding shows the average depth in 10 years has insignificantly decreased which is 0, 01 meter. The data depicts that the process of reduction was little, so that the assumption about the concern of the process of getting the lake more shallow is excessive.

The result of bathymetric map shows that there was no significant change in the bottom of the lake in 10 years as predicted by the former researcher that stated 0, 43 meter reduction per year would happen. Based on the assumption, and if the factor that caused reduction is still in same condition; he depth in 2006 should've reached 13 meters. As the matter of fact, the result of bathymetric mapping analysis in year 2016 shows different information that is the depth is still 20 – 22 meters. It is admitted that the erosion

speed done by the former researcher was only obtained by indirect assumption, which using USLE (Universal Soil Loos Equation) method that is usually used to predict sheet erosion. On the other side, not every erosion occurred at the upper course is being sedimented in the bottom of the lake, instead half part is detained by the land cover and hollow either the natural ones or man-made.

IV. CONCLUSION

Morphometric change has not significantly happened. The vast of water surface reduced to 1.03 km^2 or 0, 01 km^2 per 10 years. The morphometric change signs that the reduction is not as fast as predicted in previous research. Can be said that erosion speed in Catchment Area DAS Tondano is well-controlled. This research also reinforces JICA (2001) research that in 1994 - -2000 there has been no sedimentation in the bottom of the lake.

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The Enhancement of Leg Muscle Strength by Back Half Squat and Leg Extension Practice towards Long Range Kicking Ability of Soccer Player

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***Abstract*—The purpose of this study is to measure how influential the enhancement of leg muscle strength by back half squat and leg extension practice towards long range kicking ability of Sea Horse soccer player. The population is all soccer player in "PS Seahorse Partners" soccer association. 20 respondents as sample were picked by "Random Sampling" technique. Sample is divided into two group through "Matched Ordinal Pairing" technique in which 10 respondents for leg muscle strength exercise with half squat and other 10 respondents do leg extension exercise (comparison). Used method in this research is experimental method, "randomized control group pre-test ad post-test design" as the research design. Research instrument used in this research is "kick ability test". To examine the hypothesis t-test is used based on two independent samples by real standard α=0,05. T-test score obtained from the calculation result using t-test statistics is tob = 10,66. While score obtained from t table critical score with real standard α = 0,05; n1+n2-2 is as ttab = 2,101. This fact shows that tob = 10,66 > ttab = 2,101, so zero hypothesis (o) is refused and accepting the alternative hypothesis (Ha), which clarifies that the ability average of long range kick in back half squat exercise group that treated by leg muscle strength exercise is bigger than the ability average leg extension exercise group. So, the finding shows that leg muscle strength exercise with back half squat is better in enhancing the log range kicking ability of Seahorse Partners soccer player compared to leg extension exercise group.**

Keywords – Leg Muscle Strength, Back Half Squat, Leg Extension, Long Range Kicking

I. INTRODUCTION

Soccer can be easy it is done simple way and as best as one can. It is better if soccer is undertaken with burden so the achievement, of course, will not be as it should be. Soccer as a team match in which each team consists of eleven players. So a best soccer team consists of best players. Basically, players must master the basic techniques well so that it can be easier in enhancing the ability in plating as well as to be first rate player.

The available potential must be the prior attention to the government, advisor as well as soccer coach to be enhanced. But, in order to be successful in sport, insufficient of media, infrastructure, funding, professional advisor and coach have often become issue. There are many coaches that only rely on their experience while they were soccer players and not provided with supporting knowledge to increase the achievement, such as knowledge about exercise, nutrient, psychology etc. The discipline has to be mastered by the coach, moreover soccer as a type of team sport consists of varied characters player.

As the matter of fact, it has been often found in "PS Seahorse Partners" soccer association that those who really wanted to play were not sufficiently capable. Moreover, many player could not hold out for 2 x 45 minutes match. It was caused by weak leg muscle, or when they did kick the ball but miss the target and also they did kick but the ball did not go to where it was targeted because of less powerful kick.

The strength of leg muscle is necessarily needed in any sport types particularly soccer especially in doing the long range kick. So, in kicking the ball to the target requires maximal power of leg muscle, if an athlete or player does not have strong leg muscle, of course, the achievement cannot be achieved as expected. In soccer match, power in doing the job which is kicking the ball, contraction will be taking place on muscle.

In staking out a good exercise program, so that the athlete avoid the unwanted factors in reaching the achievement, states that "exercise is a physical movement and mental activity that has to be undertaken systematically and repetitively in long duration with level increasing progressively and individually in order to recondition the system and physiological body function so that optimal performance can be achieved while doing sport.

Exercise is a systematic process of train or work one repeatedly with the increasing of burden or job as one gets to the higher level. In doing an exercise, an athlete need a clear exercise program because it is crucial in order to do exercise program. Exercise program is a process of preparation in facing the implementation and in completing the report that is beneficial to support the exercise. After an athlete followed the exercise then a settled exercise program is needed. [1] said, "Exercise program plan is one to the strategies of the coach to achieve as optimal as can in the future".

Leg muscle strength can be improved by the appropriate of varied methods as well was various exercise types. In relation to this research, so the researcher wants to utilize sufficient form of exercise to support the strength of leg muscle. The form of exercises meant by the researcher are: back half squat and leg extension. Both of these exercises are able to improve the strength such as; quadriceps muscle, gluteus maximus, hamstring, erector spinae, abdominal, deltoids, trapezius, upper, biceps, radial and flexor.

Noticed from various opinion above, one of physical condition elements particularly leg muscle is needed by an athlete in a match, especially in soccer. In this case, proper and correct kicking technique really determines the successful of a team during the match, beside it needs specific and repeated exercise for an accurate and well kick. Nowadays, a soccer team sometimes does the short time preparation as days are getting closer to the match day, it cause the players are only focused in technical and tactical factor.

In soccer, muscle strength is necessarily needed to assist athlete doing the long range kick. The dominant supporting elements is physical readiness particularly strength and endurance factor, it was seen in "PS Seahorse Partners" soccer player that had lack in term of physical quality especially leg muscle strength.

Looking at the fact going on in "PS Seahorse Partners", where the players seem not having the ability of better long range kick, it was seen while they were doing kick and not reaching the target, and not having good strength of leg muscle for maximal result was not seen when the kicked. This reality shows lack of exercise and self-understanding of the player themselves about the influence of leg muscle strength towards the ability of long range kick in soccer match.

If this situation remains happening so there will be big possibility for the unsuccessful soccer achievement of "PS Seahorse Partners". Therefore, the researcher does the research on how influential the exercise of leg muscle strength by back half squat and leg extension towards the ability of long range kick in "PS Seahorse Partners" players' match is.

II. RESEARCH METHODS

The method used in this research was experimental research, used research design was "*randomized control group pre-test and post-test design*" [2] With design as shown below:

R	Group	Pre-Test	Treatment	Post-Test
	A	X^1	T	$X_1{}^2$
	B	X^2	-	$X_2{}^2$

Picture 1. Research Design

Ket : R = Random
A = Back Half Squat Exercise Group
B = Leg Extension Exercise Group

X^1 = Pre-test before back half squat exercise
X^2 = Pre-test before leg extension exercise
$x_1{}^2$ = Post-test after back half squat exercise
$x_2{}^2$ = Post-test after leg extension exercise

The ability of long range kicking is player's ability to kick the ball as far as possible which in this research means the longest range as the result of a player or a kid tries to kick from the start. The score is the longest range from two attempts using the inner side of the leg. The exercise program of leg muscle strength meant in this research is a type of exercise given to a child to tri doing the exercise systematically, by putting more burden in certain point of time. The exercise program giver for the leg muscle exercise was *back half squat and leg extension* done in 3 months with frequency three times a week.

The population is all soccer player in "PS Seahorse Partners" soccer association. 20 respondents was taken by "Random sampling" technique. Sample is divided into two groups by "*Matched ordinal pairing"* technique in which 10 respondents of each groups will do exercise for leg muscle by *back half squat* and other 10 respondents by *leg extension (comparison).*

The research instrument used in this research was "test of kicking ability" [3] while the media used was as follow: field, ball, pole, rope, measuring tape, whistle, and stationery.

To obtain the data about the ability of long range kick, these following steps were taken: (1) the ball is motionless, (2) player or student tries to stand in 3 to 5 steps backward next to the ball, (3) sight towards the ball (4) player or student runs forward, (5) ball is bounced kicked, (6) the longest kick from two attempts becomes the data of research finding.

To examine the hypothesis t-test was used based on two independent sample with real standard/level α=0,05 [4].

III. RESULTS AND DISCUSSION

After assumption test was done that the sample taken from the normal distributing population and followed by the homogeneity test that both sample groups are homogeneous, so the hypothesis examination can be continued to computation result by using t-test statistic that obtain the t value as tob = 10,66. While from critical value table with real standard/level α = 0,05; n1+n2-2 t-table value/score as ttab = 2,101 was obtained. This reality shows that score tob = 10,66 > ttab = 2,101, thus Nul Hypothesis (Ho) was rejected and allternative hypothesis was accepted.

T-test know based on the criteria test that states that reject Ho if tobe >, this thing indicates that in the investigation Ho was rejected thus Ha was accepted that states that the average ability of long range ball kicking in exercise group of back half squat gains treatment with exercise program for leg muscle strength is bigger than the average ability of long range ball kicking over Seahorse Partners soccer player if it is compared to the exercise group of leg extension.

From the analysis result of data normality test by using the Lilliefors statistic test shows that the sample take from bot group, either back half squat exercise group as well as leg extension exercise group from the normal distributing population.

Same as in homogeneity test in which both sample shows the homogenous or same variants, this means that before having different treatment, both sample groups do have same capability so if changes happen merely by the factors of same treatment or exercise which is treatment through leg muscle exercise program either through back half squat exercise as well as leg extension exercise.

From the presentation of long range ball kicking seen that the earlier condition or pre-test and latest condition or post-test from both groups had difference in terms of the gained grade on the ability of long range kicking. The finding shows that the pre-test condition of both groups did not indicate significant difference, but at the post-test condition both groups showed considerable difference, where the post-test score of long range ball kicking with back half squat is better than what gained by the leg extension.

This happening shows that exercise program of leg muscle from those two back half squat and leg extension given for eight weeks with exercise frequency three times a week can provide the considerable effect in the enhancement of both exercise models, show that the exercise group that utilizes the back half squat was more effective in enhancing the ability of long range ball kicking compared to leg extension exercise.

The fact above is reinforced by the computation result of the t-test statistical analysis, where the result of tob = 10,66 > ttab = 2,101 so that Ho is rejected and Ha is accepted clarifies that the average capability of long range kicking on back half squat exercise group for leg muscle strength has greater improvement from the average ability of long range kicking on leg extension exercise group.

Thus, this research shows that there is distinguished effect on leg muscle strength exercise program namely back half squat exercise and leg extension exercise given during eight times with three times a week of frequency toward the enhancement of long range kicking ability of Seahorse Partners soccer player.

IV. CONCLUSION

From research finding, it is proven by the implementation of the exercise and analysis data examination based on measured variable, so it can be concluded that there is distinguished effect towards the enhancement of long range kicking ability of Seahorse Partners soccer player.

Suggestion:

This research finding is expected to be beneficial in terms of advices on the following points:

1) This can be an input to the advisors, coaches, and athletes as well as soccer fan as an effort to sport development and cultivation especially in the development of Sport Training Education.

2) In training, this can be meaningful input to choose the appropriate exercise program in enhancing the long range kicking ability in soccer match.

3) In training, to notice the influential factors that may can affect the physiological aspect relating to the training program, such muscles at lower extrimity, the heaviness, relating to the joints/ligament in knee, and others.

4) This finding can be additional information to next researcher future.

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The Effectiveness of Active Intermittent Anaerobic Exercise and Passive Intermittent Anaerobic

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***Abstract*— The purpose of this study was to determine the type of exercise that has a more effective effect in increasing the maximum work capacity between active anaerobic exercises with passive anaerobic exercises after conducting research on 24 male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima) in aged 17-19 years as samples. The sample was divided into 2 groups, each of 12 people, namely anaerobic exercise group with active and passive intermittent anaerobic training groups. Both types of exercise are carried out on an ergometer bicycle (Monark). Design of the study "Randomized control group pre-test and post-test design". Collecting instrument "Ergometer bicycle which is stated by the number of Watts". Analysis with paired observation pair t-test statistics and two independent sample t-tests. The results obtained in this study are as follows; (1) The first hypothesis, there is the effect of anaerobic training that is active later on to increase the maximum work capacity in the male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima). (2) The second hypothesis is that there is an effect of passive anaerobic training on increasing the maximum work capacity of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima). (3) The third hypothesis, there are differences in the effect of active intermittent anaerobic training and passive intermittent anaerobic exercises on increasing maximum work capacity. However, from the results of different tests prove that active intermittent anaerobic training is more effective when compared to passive anaerobic training to increase maximum work capacity in male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).**

Keywords*— *Anaerobic exercises intermittent active, intermittent passive, maximum work capacit.

I. INTRODUCTION

Achievement abilities that an athlete can achieve are determined by many factors. Broadly speaking there are two main factors, namely; hereditary factors and environmental factors. These two factors are equally important and mutually supportive. However the magnitude of the biological potential (heredity / talent) of an athlete, without the support of environmental factors (for example: proper training), the maximum achievement is difficult to achieve [1].

In an effort to improve the performance of an athlete, the quality of the training given is a very decisive thing. Therefore, the training program needs to be carefully prepared. This is where the contributions of scientists to the development of training theory and methodology, and the insight of a trainer on this matter also influence the performance of an athlete. Each training program must always include physical factors, techniques, tactics and mental factors of athletes, because it is a basic factor of an athlete's performance. These four factors are interconnected with each other to achieve peak performance[2].

In various sports, one of the components of the physical condition that determines to achieve maximum performance is endurance. This endurance or endurance does not only include muscle endurance, but also the endurance of the lung heart which in exercise is expressed with the ability to carry oxygen to the maximum or what is more called maximum working capacity. Maximum work capacity determines the amount of oxygen that can be transported to networks and transport of CO2 and substances that are not useful to expenditure devices [3]. The ability of the maximum work capacity can also be interpreted to be the same as the maximum oxygen transport capability or also known as VO2max. in this study researchers used the term maximum work capacity.

The main maximum work capacity is the ability of the heart to pump blood, the ability of the lungs to absorb oxygen and the ability of cells to use oxygen [4]. Maximum work capacity is one of the main factors in supporting the appearance or achievements of athletes in long activities. This is very much needed in almost all sports, more specifically on anaerobic sports activities that prioritize not only muscle endurance but the heart's lung resistance. Besides that, maximum work capacity is the best physiological parameter to determine a person's resilience capacity [5].

Before elaborating and discussing intermittent training in relation to maximum work capacity, it should be understood in advance what is meant by training, so that there is a unified language and interpretation in following the next description.

What is meant by training? There are various understandings given by sports experts about the meaning of training. Physiologists like Brooks, (1996)[3] "are more likely to provide a definition of this training as an attempt to improve the system of organs or body organs and their function with the aim of optimizing the appearance or performance of athletes". Furthermore, from various opinions of reference [6], perfecting that "training is a systematic process of repetition, a progressive performance which also involves the learning process and has the aim to improve the system and function of the organs so that the

athlete's appearance reaches optimal. Physiologically physical training is a process of forming conditional reflection, the process of learning to move and the process of memorizing movements. Other similarities have been raised by reference [7], that training or "training is a systematic process rather than practicing or working repeatedly, with more and more days increasing the amount of training or work." In connection with the training, reference [8] explaining that "by doing systemic training the organs of the body function will increase more than before training. This function enhancement is needed to fulfill the performance of the body's activities or performance, both during sports activities and while working ".

Thus training is a physical movement and / or mental activity that is carried out systematically and repeatedly (repetitive) over a long period of time, with progressive and individual loading which aims to improve the system and physiological and psychological functions of the body so that when doing sports activities can achieve optimal performance.

Intermittent training is a physical exercise method that takes place alternately between work intervals and resting phases, where the resting phase can change to work relief or rest relief [9].

Intermittent training is one of the training methods of a small number of training systems that have been systematically and scientifically investigated. This method provides a variety of variations that can be arranged in such a way as to develop both anaerobic systems as the main energy system, as well as the reverse aerobics system as the main energy system, or to develop the three energy systems equally, depending on the intensity and duration of the exercise used [4]; [9]. According to references [10] and [4], intermittent training is the basis of conditioning for all sports branches and is considered the best training method, because this exercise uses the principle of progressive overload; with an increasing training load nearing maximum, a person's physical ability will gradually increase.

Anaerobic exercise is active and passive intermittent, is one of the intermittent training variations, where the load given during the work phase is anaerobic load (maximum or near maximum load done for less than 3 minutes). If the resting phase is given a light or medium workload, for example jogging, then anaerobic exercise is called active intermittently, and if it is not given a load or very light work, for example the road, called passive intermittent anaerobic training.

If we want to improve the energy system ATP-CP-LA more dominant than the others, then the burden that must be given during the work phase is anaerobic load that lasts for 30-80 seconds with a resting phase in the form of light work (work relief), and a comparison between the working phase with the resting phase is 1: 2 - 1: 3. With this exercise it will certainly increase the anaerobic power through increasing ATP-CP-LA, as well as its aerobic power, although the development of anaerobic power is more dominant than its aerobic power. Therefore, this exercise, hereinafter referred to as active intermittent anaerobic exercise, will increase the maximum work capacity which is the maximum anaerobic power plus maximum aerobic power. If this exercise is made a new variation, by changing the resting phase into passive rest (rest-relief), so that it becomes passive intermittent anaerobic exercise without changing the duration of work, the comparison of the working phase with the resting phase, and the number of repeaters, this will make some questions. Does this passive intermittent anaerobic exercise have a different effect on increasing maximum work capacity? if different, which one is better?

To determine the type of training that can increase maximum work capacity, there are still many different opinions. Under maximum training conditions can increase maximum work capacity [4]. To increase maximum work capacity you should do anaerobic exercises with intermittent breaks [11]). However, the reality in various trainings is that coaches use methodical approaches, some prioritize anaerobic training later with active breaks, while on the other hand they prefer anaerobic training after passive terms.

Because there is still an inequality of opinion in an effort to increase this maximum work capacity, it is felt necessary to look for answers that might help sports coaches, coaches and athletes to carry out their duties, so that good waste in the form of time, effort and cost can be eliminated or can be avoided.

From the problems and theoretical studies, the objectives to be achieved in this research are; (1) To find out whether active anaerobic exercises affect the maximum work capacity. (2) To find out whether passive anaerobic exercises affect maximum work capacity. (3) To produce a training model that is more effective in increasing the maximum work capacity between active anaerobic exercises and passive intermittent anaerobic exercises for PKL FIK Unima.

With the problems encountered in this study, it is hoped that it will provide meaningful benefits to; (1) Having meaning for the development of the substance of science, especially in increasing maximum work capacity (theoretical benefits). (2) Having meaning for the development of methodology, which will support efforts to improve sports performance (methodological benefits). (3) Having meaning for practical use in the field of sports coaching to choose methods, types or forms of exercise that are more effective or appropriate (applicative benefits).

II. RESEARCH METHODS

The type or method of research used is "true experiment". The research design was "Randomized control group pre-test and post-test design" [12]. For data collection the maximum work capacity is carried out using a bicycle ergometer which is stated by the number of Watts both measurements in the initial conditions (pre-test) and measurements in the final condition (post-test) conducted in the three groups [13]. The research site at FIK Unima Laboratory for data collection of maximum work capacity and anaerobic training is active and passive intermittent. The time needed in this study is for 5 (five) months.

The population were all male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima) semester two (II) and semester four (IV), with 72 male students. The sample was obtained as many as 24 respondents who were drawn

using the "Semple random sampling" technique. Furthermore, the sample was divided into two groups with a "Matched ordinal pairing" technique, each group of 12 respondents for active intermittent anaerobic exercise and 12 respondents for passive intermittent anaerobic exercise. The test statistic used is the paired observation t-test and is based on two independent samples.

III. RESULTS AND DISCUSSION

The first hypothesis testing result. From the results of calculations using the paired t-test statistical observations obtained t observation value of tob = 7.853. Whereas from the table of critical values t with a significant level $\alpha = 0.05$; n - 1 obtained t table value of ttab = 2.201 (table value attached). This fact shows that the value of tob = 7.853> ttab = 2.201, thus the null hypothesis (Ho) is rejected and accepts an alternative hypothesis (Ha).

Based on the testing criteria in the first hypothesis, it states that refuse Ho if tob> ttab, this shows that Ha is accepted which states that there is an effect of anaerobic training actively on the maximum work capacity of the male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

The second hypothesis testing result. From the results of calculations using the paired t-test statistical observations obtained t observation value of tob = 6.196. Whereas from the table of critical values t with a significant level $\alpha = 0.05$; n - 1 obtained t table value of ttab = 2.201 (table value attached). This fact shows that the value of tob = 6.196> ttab = 2.201, thus the null hypothesis (Ho) is rejected and accepts an alternative hypothesis (Ha).

Based on the testing criteria in the second hypothesis states that reject Ho if tob> ttab, this shows that Ha is accepted which states that there is an effect of passive anaerobic training on maximum work capacity in male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

The third hypothesis testing result. From the results of calculations using the t-test statistics of two independent samples (different tests) obtained t observation value of tob = 2.407. Whereas from the table of critical values t with a significant level $\alpha = 0.05$; n1 + n2-2 obtained t table value of ttab = 2.074. This fact shows that the value of tob = 2.407> ttab = 2.074, thus the null hypothesis (Ho) is rejected and accepts an alternative hypothesis (Ha).

Based on the testing criteria in the third hypothesis which states that reject Ho if tob> ttab, this shows that in the Ho Ho rejected, Ha was accepted which states that the average maximum working capacity with active anaerobic training is better than the average value Maximum work capacity with anaerobic training is passive intermittent for male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

The first hypothesis testing result, show that with active intermittent anaerobic exercises can increase maximum work capacity. It can be seen that the initial conditions or pre-test and final conditions or post-tests indicate a change in the acquisition numbers for each child in terms of their maximum work capacity. The results are evidenced by the calculation of statistical analysis of pair observation t-test, where the result of tob = 7.853> ttab = 2.201 so that Ho is rejected and accepts Ha which states that there is an effect of active intermittent anaerobic training on maximum work capacity in male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

Thus in this study, specifically on testing the first hypothesis shows that active intermittent anaerobic training carried out based on the principles of proper training and carried out for eight weeks of training with the frequency of exercise three times a week can increase the maximum work capacity of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima)..

The second hypothesis testing result, show that with passive intermittent anaerobic exercises can increase maximum work capacity. It can be seen that the initial conditions or pre-test and final conditions or post-tests indicate a change in the acquisition numbers for each child in terms of their maximum work capacity. The results are proven by the calculation of the statistical analysis of the t-pair observation test, where the result of tob = 6.196> ttab = 2.201 so that Ho is rejected and accepts Ha which states that there is an passive anaerobic training effect on the maximum work capacity of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

Thus in this study, specifically on testing the second hypothesis shows that passive intermittent anaerobic training carried out based on the principles of proper training and carried out for eight weeks of training with the frequency of exercise three times a week can increase the maximum work capacity of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

From the third hypothesis testing result, it shows that there is a difference in the increase in the maximum work capacity between active anaerobic exercises and passive intermittent anaerobic exercises. This can be seen from the data of the initial conditions or the pre-test and the final condition or post-test of the two training groups, it can be seen that there are differences in the acquisition figures at maximum work capacity. These results show that the initial conditions or pre-test of the two groups did not show significant differences, but in the final condition or post-test the two groups showed significant differences, where for the post-test scores the anaerobic exercise group was later active the acquisition of more numbers the increase is higher than the acquisition of the numbers in the passive anaerobic training group. These results have been proven by the calculation of the statistical analysis of the two independent samples t-test, where the result of tob = 2.407> table = 2.074, so Ho is rejected and accepts Ha which states that the average value of maximum working capacity with anaerobic active training is better than the value the average maximum work capacity with anaerobic training is passive in the male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

Thus in this study, specifically on testing the third hypothesis shows that intermittent anaerobic training and passive intermittent anaerobic exercises are carried out based on the principles of proper training and carried out for eight weeks of exercise with the frequency of exercise three times a week, both groups can increase work capacity maximal in the students of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima). However, the results of different tests prove that active anaerobic training is more effective when compared to passive anaerobic training for maximum work capacity in male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

IV. CONCLUSION

From the research findings that has been proven by conducting training and testing data analysis based on the measured variables, a conclusion can be drawn as follows; The first hypothesis, there is the effect of active intermittent anaerobic training which is carried out based on the principles of proper training and carried out for eight weeks of training with the frequency of exercise three times a week can increase the maximum work capacity of the students of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima). The second hypothesis, there is the effect of passive intermittent anaerobic training which is carried out based on the principles of proper training and carried out for eight weeks of training with the frequency of exercise three times a week can increase the maximum work capacity of the students of male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima). The third hypothesis, there are differences in the effect of active intermittent anaerobic training and passive intermittent anaerobic exercises that are carried out based on the principles of proper training and carried out for eight weeks of training with the frequency of exercise three times a week, both groups can increase maximum work capacity. However, from the results of different tests prove that active intermittent anaerobic training is more effective when compared to passive anaerobic training for maximum work capacity in male students of the Department of Coaching Education (PKL) Faculty of Sport Sciences (FIK) Manado State University (Unima).

The research findings are expected to provide meaningful suggestions on the following matters: Can be input for trainers, trainers, and athletes as well as sports lovers as an effort in the development and coaching of sports, especially the development of sports coaching knowledge. In an effort to increase maximum work capacity, intermittent and active passive anaerobic exercises can be used. However, to get faster and better results in increasing maximum work capacity, you should use anaerobic exercises later on. Further research is recommended with the same exercises at various age levels and with specific measurements of physiological parameters to determine with certainty the increase in the energy system which is a component of maximum work capacity. If deemed necessary the research findings may be additional information for further research.

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Using Bankruptcy System to Guarantee Labor Rights on Private Company Went Bankrupt

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***Abstract*—Private company is bankrupt will give a bad impact on labor given the weak position. the weak position that needs to let the workers are given a legal protection when a private company is declared bankrupt. Problems always being debated in bankruptcy the company associated with the position of workers in the process of settlement of property in bankruptcy. The labor position determines the credentials as one of the creditors, as is known in bankruptcy law. Labor has always been the last in the division of property in bankruptcy. Whereas the purpose of the bankruptcy process is to protect the weak from the oppression of creditors. These circumstances are very injured the justice for the workers because their work is not replaced with the appropriate wages they receive due to the position of the workers as concurrent creditors. To solve that problem using the legal method with the statute and conceptual approach. In this article have the result that the position of the labor as the party is not concerned over the existence of the debt at a paced by limited liability company/private company must also be got the result of the bankruptcy of the company. Unfair labor while already working cannot get the wages as is supposed to receive the result of the process of the completion of the property in bankruptcy.**

Keywords—Bankruptcy, Labor, Rights, Private Company

I. INTRODUCTION

The problem of rampant occurs when the monetary crisis hit Indonesia in 1998. The financial crisis led to the collapse of the country's economic fundamentals with marked a large number of limited liability company/private company which collapsed anyway. The private company most affected by the financial crisis so much trouble to continue the activities of the company include one of them to meet the obligations towards its creditors. A. Tony describes the deterioration of the economy as follows:

> *Domestic Businesses are under much pressure from both internal and external forces. Due to the weakening value of the rupiah, most of the businesses have seen their external debt swell to the point where they are in default. This has led to the further depreciation in rupiah, creating a complex vicious cycle* [1]

The much private companies is owed to foreign creditors in order to overcome the crisis. In the end, a private company can't afford to pay its obligations. One of the implications of many of its employees is subject to a termination of employment relationships (layoffs). With the layoffs to employees may not necessarily be those obligations – uninstalling private company obligations that must be met by workers as a form of countertop accomplishment of his work. These achievements can be counter money wages and severance.

A private company is driven by two important groups that have different roles and positions. As for the group in question is the organ of the private company and labor/workers. The two groups mutually synergize for one purpose and that is looking for a profit of – for the company and the results will be used in part to pay the wages of the workers. The two groups have a significant difference when in review in terms of their economic and social position.

When are reviewed from the angle of Economics and his position was already in labor is not supernatural in its weak and result in economic status increases although the greatest contributions workers in a production process of the company. It is asserted by Uswatun Hasanah as follows

> *Labor as a factor of production has great significance and a big role in economic, political, and social development. However, from ancient times until the present, the position of laborers has always been weaker and their interests have been seconded and diminished by the interests of employers* [2]

In addition to labor, as one of the groups within the company, there are also private company organ consists of the general meeting of shareholders, Board of Directors, and the Board of Commissioners [3]. All the private company organ synergized with the function itself – to the benefit of the company. That became the caretaker of the private company is the Board of Directors. The policy adopted by the Board of Directors is in the interest of the company. It thus shows that the Board of Directors of private company Permata – will do for their own interests as do relationships with other parties one of which do credit agreement. Thus it is seen that the real form of the private company. Therefore, the form of responsibility between the different labor with private

company organs while the private company underwent bankruptcy. According to Iveta Mietula and Alona Klodane which cites the opinion of R. Šneidere concludes that definitions of the term provided in the literature and legislative acts define company's insolvency as financial conditions of the company, when it (company) cannot carry out payments for its liabilities inprompt time [4] The same opinion was expressed by Rahayu Hartini "bankruptcy is a common confiscation of all the wealth of bankrupt debtors whose management and ordering is done by the Curator under the supervision of the Supervisory Judge" [5]

A private company in a large scale requires workers to move the mobilization of his company. The relationship between labor is limited to the private company with a working relationship in which the laborers working on orders from the company to support its activities. Labor will do a job on the basis of instructions from the company represented by the Board of Directors, as the company's Executive Board. Top work/service that has been done by the then labor are entitled to a wage. Give labor rights after he does the job is a form of Justice and this has been in accordance with the terms in employment i.e. no work no pay. On the other hand the reality of the number of jobs that are inversely proportional to the amount of labor makes labor the lower position on entrepreneurs. Therefore, a weak position that needs to let the workers are given a legal protection when a private company was declared bankrupt by the Court judgement. Legal protection is the real manifestation of the concept of Justice.

In the company's bankruptcy process such as private company (persero) in the year 2007, and Indjah Pontjan private company year 2012 as an example. Problems always being debated in bankruptcy-related labor position in the process of bankruptcy. The labor position determines the credentials as one of the creditors, as is known in bankruptcy law. The qualifications of the position of the creditors to determine the proportion of debt that is paid as well as its position with other creditors in the bankruptcy.

Review of the factual circumstances that occur, from both the private bankruptcy above. Labor has always been the last in the division of property in bankruptcy. Whereas the purpose of the bankruptcy process is to protect creditors who are weak from other creditors. These circumstances are very injured the justice for the workers because their work is not replaced with the appropriate wages they receive due to the position of the workers as concurrent creditors.

From the background of the issues to be examined are as follows:

a) The position of labor in perspective of justice

b) Justice for Workers in the bankruptcy of a limited liability company

II. RESEARCH METHODS

To address the above problems legal research using the statute and conceptual approach. Statute approach used to analyzing the guarantee labor rights afforded by the Bankruptcy Act. Conceptual approach used to analyzing the concept of division of labor is right for in the fulfillment of its rights when a limited liability company went bankrupt.

III. RESULTS AND DISCUSSION

A. The Position Of Labor In Perspective Of Justice

Workers who until now always suppress, but on the other hand workers who have contributions to shore up the country's economy. When labor was great once its role to the State, other than as a driving force of the economy, but also as a major builder of civilization. Labor moves lower economic sectors that in fact has a tremendous contribution in the economy and becoming the rescuer even offsetting the balance sheets of the country's economic growth.

The contribution given by the workers are not offset by the Labor Department position is difficult because the relationship between workers and employers. Workers and employers have a fundamental difference of interests. Labor has a motive to work and earn wages. While employers have a goal to chase profits as much as – number.

Two such opposite interests that produce a State that is not balanced between workers and employers. Workers could not sue because too much of his life at the hands of his employers. These circumstances shall be in balance with the presence of a third party who has the power to put pressure on employers.

It is understood that the working agreement between workers and employers have a relationship which is not equivalent, because on one side of the entrepreneur has fresh value is higher because he has the capital (investment) while the worker in this case is representatives from the labor of which there are many. So with the background "as long as it can work" then workers unwilling to accept the agreement whose contents are less profitable. Another thing that makes the State of unequal is the command elements (gezag ver houding) where the entrepreneur is an employer, so he has the right and the obligation to give the commandments pertaining to his work. Labor's position as the party received orders to carry out the work. The relationship between employers and workers is the relationship between superiors and subordinates, and so are the subordination (vertical relationships, i.e. top and bottom). In the unequal position will certainly bring a sense of unfair to workers, because the workers vulnerable to pressed to sign contracts, receive no wages in accordance with unilateral layoffs even in

Relations that are not equivalent between workers with employers is what takes the role of Government. Expected with the Government intervention as the policy makers will be able to guaranteed the position of workers is not too weak and not too strong as employers position. Government's role is to mediate between workers and employers as well as the party that can provide legal protection on workers. H.L.A. Hart stated "What is the state without justice but robber-bands

enlargest". In other words, a country that does not reflect justice does not have to call himself the State.

When associated with forms of Justice. The position of the workers and employers of this relates to the distributive and komutative justice. According to the view of Aristotle, the justice shall be differentiated in two forms, namely distributive justice and corrective justice. Distributive justice assumes a man is equal to each other. Distributive justice this refers to divisions based on the position of the individual in the community and equal treatment before the law (equality before the law). Corrective justice is a technical measure of the principle governing the application of the law.

Distributive justice manifested while the worker wages every pay by employers despite bankruptcy. Wages is the inherent rights and are owned by each of the workers. Meijers argues that those rights is something inherent in humans both physical aspect as well as its existence. Peter Mahmud Marzuki agreed with Meijers that those rights exist because the recognized or protected by law. [6] Dworkin argues that the right is something to be high esteem by anyone [7]

While the komutative justice embodied by the presence of a proportional position between workers and employers with a balance of rights and obligations, as well as the implementation of obligations by the parties as a follow-up to the employment agreement he made.

The problem of the protection of workers by the Government primarily associated with the fulfillment of wages by employers. The Government plays as a third party that has a purpose to balance the bargaining position of labor in dealing with businessmen. The Government tried to suppress its power with employers through a regulation. One of the Government's intervention is a matter of the regional minimum wage assignment.

The determination of the Government, based on the regional minimum wage labor law, after negotiations between representatives of the erstwhile of entrepreneurs and workers, is a reflection of the theory of utilitarianism, John Stuart Mill. Each individual interests who wanted higher wages of the Ordinance must be ruled out by regional minimum wage discharge regulation which sets the regional minimum wage is the will of workers globally. The regional minimum wage later applies for the purposes of public and labor on a large scale. It is a form of the greatest happiness for the greatest numbers.

Thus, the theory of utilitarianism in the determination of regional minimum wage by Governments where the existence of the regional minimum wage resulted in workers ' wishes (individual) which requires a high-wage statutes should be ruled out regional minimum wage to happiness general audiences who embodied in an agreement between the representatives of employers, workers, and Governments.

Determination of magnitude of regional minimum wage done by laborers each year by doing the action took to the streets demanding the Government to lend a hand raise the magnitude of the regional minimum wage. It is as though with the increase – regional minimum wage annually is seen that increasing workers welfare. The implementation of the Ordinance the regional minimum wage by labor law could be sidelined for a while by the employers, with the provisions of the government apply an objection to the local labor office in the form of suspension of payment of wages in accordance with the regional minimum wage. These circumstances very injure the justice for the laborers because of the nature of such postponement is the subjective application of entrepreneurs. It is not an objective judgment there should be an assessment of the Government to the entrepreneur/company accompanied the workers to establish feasibly or whether a company was given the suspension of the granting of wages based on minimal based on the regional minimum wage to entrepreneurs.

At first with the establishment of the regional minimum wage are visible that the existence of Justice for related labor wages are eligible to received. However, with the presence of a waiver of the provision the regional minimum wage resulted in injustice distributive happened. Waiver of statute regional minimum wage, by way of the petition for suspension by the entrepreneur, should not happen. The Government should give assurances to each of its citizen’s proportionally i.e. true worker’s wages in accordance with the regional minimum wage without reduced at all. The task of such a Government in line with the opinion of H.L.A. Hart stating that "What are state without justice but robber-bands enlargest". Hart stated that the country's role as the keeper of Justice for its citizens [8]

The Government, as a third party in the industrial relationship, have a responsibility to provide protection for workers in conjunction with the employers that are not balanced, as spelled out in advance is the relationship of the sub ordination. The presence of such third parties as the Government is expected to provide balance whether Sha – in an industrial relationship. The expected protection is provided the right – labor rights in accordance with the proportion that should be accepted. Circumstances in accordance with expressed by Aristotle that the existence of the State is not only the guarantee of rights to all citizens, but especially the protection given to citizens of countries that have weak bargaining position. It is revealed by Jeremy Bentham that the mere existence of the State and law – the eye just for the sake of the true benefits, namely, the happiness of the majority of the people [9] . The role of the State is not only during the process of formulation of the magnitude of the regional minimum wage, but also law enforcement for entrepreneurs who violate the agreement by providing sanctions. In the process of law enforcement that the workers should also be included in determining the worth or whether a company was given the suspension for not implementing ordinance on the regional minimum wage because labor is also an element of the company.

B.Justice for Workers in the bankruptcy of a limited liability company

The bankruptcy and suspension of payment act, based on four principles, one being the principle of Justice, which consists of understanding, that the provisions on bankruptcy can fulfill a sense of Justice for the parties concerned. The basis of the justice to prevent the occurrence of a collection party dress arbitrariness payment for respective bills against the debtor, with the ignore other creditors. Formula explanation bankruptcy act and the basic fairness of the suspension of payment, thus has been breached by the provisions of article 55 paragraph (1), article 59 paragraph (1), and section 138 of the Bankruptcy act and suspension of payment act absolute authority, which gives the holder the right of creditors to dependents to execute his right as if bankruptcy does not occur, after 90 (ninety) days since the verdict statement pronounced bankrupt.

Dimensions of fairness in bankruptcy can also be reviewed from the purpose of its creation. The purpose of bankruptcy according to Failissementverordening is to protect creditors in order to obtain concurrent rights related to the enactment of the principle which guarantees rights (creditor) of the wealth the owe (the debtor). This goal summed up the understanding of insolvency in the Memorie van Toelichting declaring bankruptcy as a confiscated by law over all the wealth the debtor to the interests of the creditors [10]. Confiscated under the laws of harmony with the provisions of article 1131 BW stating that all material si owe is the guarantee for the 2. Warranty this law aims to provide peace to the creditor that loan will be paid in full by the debtor.

Max Radin and Louis e. Levinthal argues that the confiscated wealth of the entire statement after the debtor in bankruptcy to prevent the debtor does not do acts that can be detrimental to the interests of the creditors [11]. In addition, bankruptcy prevent the debtor to share wealth equally to each of its creditors without seeing the magnitude of each creditor accounts receivable. It is in harmony with the provisions of article 1132 BW contained therein the principle of pari passu pro rata parte.

Blurb about the history and purpose of the bankruptcy gives an understanding of the most fundamental aspects influenced the birth of Justice that a Failissementverordening to Bankruptcy and suspension of payment act. Justice for creditor, the debtor and third parties (stakeholders) that are relational abstract and this was the soul of creation of an act of bankruptcy and suspension of payment act. These circumstances are in tune with the existing theory. Justice in originally a scattered outside the norm, to provide legal certainty and realize that justice is manifestly, then established a norm.

Morally, shall be fulfilled by the debt owed. Through the mechanism of the bankruptcy creditors ' interests over receivables is guaranteed by law. Guarantees for the benefit of creditors was a form of Justice that is in bankruptcy.

The public resulted in the confiscation of property the debtor bankrupt make debtor lost the right to take care of her anymore and further the wealth for the creditors, after matching accounts receivable are pari passu pro flat parte (proportional). The proportional calculation, calculate based on the position of the creditors and the magnitude of debt creditors. The bankruptcy division of property carried out pari passu pro rata parte because the debtor in bankruptcy is likely to have debt to many creditors while the bankrupt property is estimated to be insufficient to pay in full.

While the bankrupt debtor is a company that has many workers, then the assertion of rightsof the workers is a central issue in the bankruptcy. As for the cases have occurred among other bankruptcy limited liability company (persero) in the year 2007, and PT Indjah Pontjan, Medan year 2012.

In principle the workers entitled to the rewards of the work they used to do. The rights of such workers is a debt that must be paid by the company. In the Act Number 13 Year 2003 about Employment, hereinafter called the labor law, the labor rights expressly, to ensure legal certainty in order to realize justice, declared a debt the more precedence the payout than other debt (vide Article 95 paragraph (4) of the Employment act). Granting a privileged position of labor law is a prevalent due to employment act is made to raise the degree of the workers that is is not supernatural have always been under from the employer. The circumstances of such labor can be seen in the formulation of article 1601 letter a BW that formula is as follows lows:

> "Labor Agreement is the agreement by which one party, the labor, committing itself to under the direction of the other party, the employer for a certain amount of time doing the work with pay"

These circumstances by the labor law is about to give a protection and legal certainty for workers. The presence of Article 95 paragraph (3) the Employment act when traced historically is a recommendation from the International Labor Organization (ILO). The ILO issued the recommendation number Recommendation R-180, claims the worker (Employers Insolvency), 1992.

As for the outline the substance of ILO recommendation R-180, recommendation claims worker (Employers Insolvency), 1992 is to provide protection for workers who are working in a company undergoing bankruptcy. Form of protection is a means of granting privileges. The privilege referred to in the ILO recommendation is imperative for a company to give precedence to the payment of wages and other rights worth received by workers through court verdict or arbitration. Introduction of payment of wages gives meaning that companies must provide guarantees for the workers of the associated wages should they receive.

In Recommendation R-180 which includes claims that are given special privileges are as follows:

1) The protection afforded by the privilege claim must include the following:

a) Wages, overtime wages, commissions and other rewards-rewards that are associated with the work carried out over a period of time prior to the bankruptcy or prior to the termination of the working relationship. This time period should be set by law or regulation and may not be less than 12 months;

b) Wages on public holidays payable as a result of the work carried out during the year of occurrence of the insolvency or the termination of the working relationship, and in the previous year;

c) Amounts payable in respect of other types of paid absence, year-end bonuses and other bonuses are determined by legislation or regulation, national mutual agreement or individual employment contract, relating to the specified time period, which may not be less than 12 months, prior to the insolvency or prior to the termination of employment relationships;

d) Payments are to be paid in lieu of notice of termination of employment relationships;

e) Severance money, compensation for unfair dismissal and other amounts that must be paid to the workers upon termination of their employment relationship;

f) Compensation that can be paid directly by employers in connection with accidents and illnesses due to work.

2) The protection afforded by the privilege claims might include the following:

a) The contribution payable in respect of the compulsory national social security scheme, which if not paid will impact adversely the rights of workers;

b) Contributions payable in respect of the private social security schemes, areas of work, between working areas or companies apart from the mandatory national social security scheme, which if not paid will impact adversely the rights of workers;

c) Allowances that workers are entitled to it before bankruptcy based on their participation in the social security scheme of the company and which are to be paid by the employers.

3) The claims mentioned in subparagraf (1) and (2) that has been decided for a worker via the Court or arbitration within 12 months prior to bankruptcy should be covered by the privilege without the time limits specified in subparagraf-subparagraf.

ILO recommendation is next followed by Indonesia with putting it in one Article on labor law. The privilege provided by labor law to the workers became complicated when such concepts in associate with the concept of privilege in the regimecivil law. Privilege in the labor law are identical with those in the regime of private law. Such identification is important because bankruptcy is a lex specialists from private law.

The rules in the labor law is a good step to improve the position of workers from a lower position than ever under article 1149 BW. Increased rights are indeed allowed to happen by 1134 Article paragraph (1) BW. With the labor law is already the position would be a preferred creditor. This is still a preferred creditor get a division of property in bankruptcy from the outside who pledged to creditors separatists. It needs to be noted here is the grant of privilege by the act could not be construed as a right that is higher than the lender separatists.

Although the position of labor increased to preferred creditors, but not easy for workers to get the division of property in bankruptcy. A company when all assets belonging to a limited liability company in guarantee to separatists credior. In the end the workers won't get their due. One example is the case of the bankruptcy of PT Sindoll Pratama North Jakarta in May 2006, involving 1,045 (forty five thousand) labor PT Sindoll Pratama with businessman who guarantee to the Bank Negara Indonesia (BNI) the whole machinery the company's land, buildings and even the personal assets of commissioners anddirector, in the form of four houses. All guarantee have auctioned and sold by BNI in May 2007 and August 2007, with no labor did not receive their wages.

The case of PT Sindoll Pratama Jakarta that it is extremely unfair to the workers because of the results that private company work for no result. Whereas the results of the work are essentially to finance their life. Although in the regime of employment law that workers have been given legal protection, but in bankruptcy law that labor is still in a weak position. It is this weak position is one of the not harmonious between substantial justice there with norm in Bankruptcy law

Legislators had been negligent in formulating the act on bankruptcy and suspension of payment, which tend to only think of rescue capital which comes from bank loans, with a special authorisation for the creditors separatists as the holder of the guarantee rights dependents without formulating extra protection to workers on the debtor in bankruptcy, the assets have become a pledge of collateral, and lenders.

Injustice for other labor was on the fate of the workers at the private company has been declared bankrupt, determined by curators based on the provisions of article 39 paragraph (1) of the bankruptcy and suspension of payment act. Such provisions unfair considering the agreement that was originally created by the limited liability company with the workers. However, the principle of privity of contract the excluded by the provisions of article 39 paragraph (1) of the Bankruptcy and suspension of payment act. Clear Once such terms are not in harmony where justice can only be terminated by agreement of the parties. It is possible with the authority he has the curator from arbitrary detention – action such as termination working relationship with not giving or determine a nominal severance to workers without any prior agreement in the past.

From the explanation above was clear that labor is morally entitled to wages from their work. The State subsequently made the cornerstone of the philosophy of the creation of labor law. Article 95 paragraph (3) labor law gives privilege to the workers for precedence fulfillment – right in the insolvency process. The privileges granted by the labor law making labor's position as a preferred creditor. Such a position is a progress in achieving justice for workers. However, a private company who declared bankrupt by the commercial court of all its assets is pledged to creditors and separatist. In the end, the separatist authorities to execute a creditor of property in bankruptcy whereas the workers must sit speechless without getting the treasure from a continental Indonesia bankrupt because of property in bankruptcy has been discharged. The position of the labor as the party is not concerned over the existence of the debt at a paced by PT must also be got the result of the bankruptcy of the company. These circumstances indicate the presence of the disharmony between the komotative justice, in the context of employment "when we work, we must get the pay", with the norm in Bankruptcy and suspension of payment act blocking labor to get the fulfillment of rights

III. CONCLUSION

The law taken as a continuation of the norm of principle – the principle of fairness, the law is the law – the law fair. The sense of this law in accord with the teachings of traditional philosophy, where substantial legal sense with regard to the meaning of the law as a justice. If a concrete law, i.e. legislation – legislation contrary to principle – the principle of Justice, then the law is not normative in nature again, and in fact cannot be called a law again. Legislation – legislation only when it is fair. Thus, the fair is a constitutive element of any notion of law.

The position of the labor as the party is not concerned over the existence of the debt at a paced by limited liability company/private company must also got the result of the bankruptcy of the company. Unfair labor while already working cannot get the wages as is supposed to receive the result of the process of settlement of property in bankruptcy.

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Effectiveness of Training Methods on Shot Put Athletic Learning Results: A Comparative Studies

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***Abstract*—Athletic learning, especially Shot put at school, is increasingly in demand by students. This is due to the quality of the material provided by the teacher, facilities and infrastructure as well as not attracting the learning process by students. This study aims to compare the role of playing training methods and demonstration training methods by using the strength of arm muscles to learn the results of a bullet repelling. The method used in this study is a 2x2 factorial experiment. Subjects involved are students of athletic extracurricular members totaling 40 students. Data analysis in this study is two-way ANOVA using SPSS 20. The results of this study are 1) there is an effect of training methods on learning results of bullet repelling, 2) the effectiveness of learning outcomes is influenced by the quality of high arm muscle power, and not influenced by the strength an of low arm muscle power, 3) there is no interaction between exercise methods and arm muscle strength t,o the effectiveness of learning outcomes to reject bullets. The conclusion that can be drawn from the results of this study is that training methods to achieve maximum results can be adjusted to the characteristics of students learning.**

Keywords—learning outcomes, shot put, training method

I. INTRODUCTION

Student achievement is not always gained from the teaching-learning process in the classroom. Physical subject provides es an opportunity for students to develop their physical and motoric potential through motion activity, for example, by studying sports material. Athletics is a part of the sports branch, in which there are road numbers, running, throwing, and jumping. Previous most sports workers in the shot put teaching hours, in teaching the students action is in accordance with the textbook technical norms movement essentials, very strict according to the textbook requirements step by step teaching [1]

In linthore's opinion the throwing technique requires great throwing explosive strength and ability to perform the elements in the precise moment and in limited space. The achieved result of the throw depends on morphological characteristics, motor abilities, and throwing technique [2]. The goal of the throw the shot away as far as possible, but according to the rules and regulations of the competition. Rotational (spin) and the slide (O'Brien) throwing technique are considered equal, but it was noticed that beginners and female athletes often use the slide technique, while men use the rotational technique of throwing more often [3]. Athletics is an exclusive collection of sports events that involve competitive running, jumping, throwing, and walking. The most common types of athletics competition are track and field, road running, cross country running, and race walking [4]. On the part of throwing a number, there is shot put. Currently, shot put has been taught at schools due to some factors. However, It may be a daunting proposition to have teach 30 or more throwers of widely varying ability levels at the same time. This problem is compounded by the fact that most schools only have one or two rings for practice. Athletes are the sport of speed, strength, which requires extreme nutrition because the thrower group requires maximum strength. Mastering the learning of shot put, students, can study more on material and learning result through extracurricular activity. It is due to the fact that learning focus is carried out not during school hours, students with the same goals are interested, and they have the same characteristic. The use of exercise method in developing learning result influences maximum result. Learning result with the various method can increase. Therefore, this study focuses on the influence of shot put learning result using two methods and arm muscle.

II. RESEARCH METHODS

This research uses 2x2 factorial experimental design. Factorial experimental is an experiment in which almost all or all level of factors are combined or crossed with all level of each factor in the experiment. Factorial design involves two or more independent variables that are at least manipulated by the researcher. The term factorial refers to the fact that the design involves some factors. Each factor has two or more levels. This experimental design consists of independent variables which are the treatment variable, that is, the role-playing method and demonstration method. Meanwhile, moderator variable is arm power. Design formulation on picture 1:

V.Manipulative / V.Atribut	Metode Latihan	
	Role-playing(A_1)	Demonstrasi (A_2)
Power Otot Lengan Tinggi (B_1)	A_1B_1	A_2B_1
Power Otot Lengan Rendah (B_2)	A_1B_2	A_2B_2

Figure 1.Research Design Framework

This research is conducted for 16 meetings, started with pre-test and ended with post-test. Treatment frequency is conducted for three times a week, which is carried out for four weeks. It is due to the fact that the body needs to be adapted wit the exercise burden. Data analysis technique uses variance analysis (ANOVA) of two paths to test the hypothesis with a significance level α= 0.v of increases significance, carried out using T-test (Pair Samples), that is, -13.082 with significance value 0.00<0.05.

III. RESULTS AND DISCUSSION

A. *Results*

The result of this research is exercise method of role-playing on high arm muscle power group is able to increase shot put learning result. It is based on the data result of the increase of shot put learning result using role-playing method in low arm muscle power group. It is gained a difference between before and after treatment. Based on the descriptive statistic result, mean of the increase of shot put learning result through in the treatment of role-playing method on high arm muscle power is 1.56. The condition explains an increase that after treatment method using low arm muscle power can increase shot put learning result. After then, to find out the significance of the increase, it is conducted T-test (pair samples), that is, -7.031 with significance value 0.00<0.05. It can be concluded that exercise method of role-playing in low arm muscle power group is able to increase shot put learning result.

a. Shot put learning with demonstration method. Data of the increase of shot put learning result using demonstration method in the high arm muscle power group shows the difference between before and after treatment. Descriptive statistic result shows that the mean of the increase of shot put learning result on demonstration method treatment using high arm muscle power is 2.44. The condition concludes that after treatment with demonstration method in the high arm muscle power can increase shot put learning result. After then, to find out the increase significance, it is conducted T-test (pair samples), that is, -14.044 with significance value 0.00<0.05. It can be concluded that demonstration method on high arm muscle power group is able to increase shot put learning result.

b. Data of the increase of shot put learning result using demonstration method on the low arm muscle power group shows the difference between before and after treatment. Statistics result shows that the mean of the increase of shot put learning result on the low arm muscle power group is 1.44. The condition shows that exercise treatment with demonstration method is able to increase shot put learning result. To find out the increase of significance, it is conducted t-test (pair samples) with t-test (pair samples), is -8.645 with significance value 0.00<0.05. It can be concluded that demonstration method of exercise on the low arm muscle power group is able to increase shot put learning result.

c. The increase of learning result after treatment in each attribute variable is in line with a treatment using low and high arm muscle power groups, that can be described in the following figure 3.

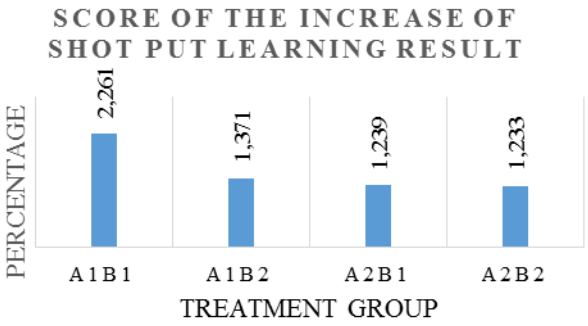

Figure 3.Desciption of the Increase of Learning Result

The test used in this research is two pahs variance analysis (ANOVA). The process of calculation is conducted using SPSS 20.

1. The First Hypothesis Test
   Analysis result using ANAVA obtains F price p<level significance 0.05. F calculation is 42.255 with significance level 0.021. Therefore, hypothesis is accepted, and there is different influence of role playing method and demonstration method toward shot put learning result. Meanwhile, effectiveness result of those two methods obtains a result that role playing method has mean difference of 0.546, compared to demonstration method. It can be concluded that demonstration method is more effective used as exercise method in shot put learning result.

2. The Second Hypothesis Test
   The analysis of ANOVA result F price, p< significance level 0.05. F calculation is 48.342 with significance level 0.065. therefore, the hypothesis is accepted, students having high arm muscle power and those having low arm muscle power have different influence toward shot put learning result. Meanwhile, based on the effectiveness result, a mean difference of 2.314 states that students having high arm muscle power influence better shot put learning result.

3. The Third Hypothesis Test
   Based on the result of the ANOVA analysis, significant is 0.723>0.05. There is no interaction between exercise method and arm muscle power. It can be concluded that students having high or low arm muscle power given different exercise method can reach the same shot put learning result. Based on the analysis result using ANAVA, there is obtained F price, p<significance level 0.05. F calculation is 42.255 with significance level 0.021. Therefore, the hypothesis is accepted, and there is the different influence of role-playing method and demonstration method toward shot put learning the result. Meanwhile, effectiveness result of those two methods shows that role-playing method has to mean difference 0.546, compared to demonstration method. It can be concluded that role-playing method is more effective used as exercise method in shot put learning result.

B. Discussion

The discussion explains the data analysis result. Based on the hypothesis analysis result, it can be concluded that role-playing method is a method using strategy in which friends give example to the others. Based on the research result, it can be concluded that role-playing method is more effective than demonstration method. It is due to the characteristics factor of students which are reluctant to be taught by a teacher with shot put material. Characteristic of role-playing method emphasizes that difficult and risk motions will be easy to be learned by friends at the same age and apply them to the others. It is due to the fact that individual will be easier to master a technique if he does it on his own. An alternative cross-sectional approach, which is less frequently used, is to compare several trials of the same individual [5] It is in line with exercise regulation, the more the behavior is repeated, trained, and practice, the stronger the association will be. It is also in line with an opinion by [6], traditional approach, “practice makes perfect”. Meanwhile, method 1 has weakness, that is, inefficient time use. Either high or low arm muscle power has different in shot put learning result. It is influenced the high explosive power. It is concluded that al shot put is dynamic event demanding high power production ([7]. Shot put is an dynamics event that needs high power production. Muscle power, precisely, is determined by muscle strength, maximum motion, and neuromuscular activation [6]. Interaction of exercise method and arm muscle power. It is explained that there is no interaction between exercise method and arm muscle power.

IV. CONCLUSION

Shot put learning exercise should be carried out by paying attention to the maximum result. A teacher should understand and has various methods that can be applied during learning process. Shot put has different characteristics in athletic number in the throw number. Role-playing method used in shot put learning should be reconditioned to the arm muscle power. Meanwhile, demonstrations method has its own strength in the high arm muscle power. A method can support effective and efficient learning result that can be used by a coach and a teacher to be reconditioned to the characteristics of students in this research.

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Management Analysis of Poultry Slaughterhouse Food Security, Livestock and Animal Health Service of Merauke Regency

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***Abstract*—Food sovereignty plays a strategic role in national development. Management Analysis has an impact on decision making so that the RPU can carry out various mandates of the Law which it's his job. This study aimed to determine the internal and external strategic factors as well as the alternative management strategies for poultry slaughterhouses in the Food Security, Livestock and Animal Health Services of Merauke Regency. This study used the descriptive approach with qualitative and quantitative types of research and the analysis techniques was Analytical Strategy Formulation** [1]**. The results of the study indicate the strategic factors that become strengths are access to information and regulation, financing and infrastructure. UPTD has not been implemented, human resources, socialization, and promotion were strategic factors that become weaknesses. Market, Regulation, Livestock Technology Development were strategic factors that give opportunity, while Poultry Distribution, Season, Cutting Outside RPU was strategic factors wich become a threat. Of the six alternative strategies, the increase in HR Quantity and Quality is a strategic alternative with the highest TAS value.**

Keywords—Strategy, Poultry Slaughterhouse (RPU), Analytical Strategy Formulation

I. INTRODUCTION

Food Needs Increased moves along with population growth. Based on Law Number 18 of 2012 on Food[2], as well as Government Regulation Number 17 of 2015[3] on Food Security, food sovereignty plays a strategic role in national development by providing sufficient, safe, varied, nutritious, and affordable food. Fulfillment of food needs of every household is reflected by food with good quantity and quality.

Flavor, price and easy access make chicken meat a favorite menu everywhere in the society. High demands drive the certain party to do things which disadvantage customers, e.g. the sale of "*tiren*" chicken, usage of formalin to preserve carcass, and injection of water to the chicken carcass to increase its weight.

With decentralization, poultry shelters and slaughterhouses are expected to improve the quality of chicken meat in the market and reduce environmental pollution, as well as the spread of diseases caused by poultry shelters and slaughterhouses. Article 61 verse (1) of Law No 18 of 2009 on Livestock and Animal Health states that the slaughter of animal whose meat is distributed must be performed in a slaughterhouse and must follow slaughter procedure which meets health rules of the veterinary and animal welfare society[4]. In this case, poultry slaughter must be performed in a poultry slaughterhouse (RPU).

The implementation of law number 33 of 2004 on Financial Balance between Central Government and Local Government [5], as well Law number 28 of 2009 on Regional Taxes and Regional Retributions[6] give opportunities and mandate local governments to explore local potentials and improve their financial performance to crease regional independence. To create regional independence, local governments must adapt and try to improve the quality of public services and various potential sectors which could become sources of PAD.

The government through the Food Security, Livestock and Animal Health Service of Merauke Regency keeps improving the quality of the public services by providing facilities and infrastructures of Slaughterhouse (Poultry/RPU, Cow, Buffalo/RPH-R and Pig/RPB) to provide decent and safe food for the society. Analysis of various strategic factors could give direction for their policies so that Slaughterhouse management could provide quality public services and be a source of PAD.

This study aimed to determine internal and external strategic factors, as well as alternative management strategy for the Poultry Slaughterhouse of the Department of Food Safety, Livestock and Animal Health of Merauke Regency, thus improving the performance RPU to provide Safe, Healthy, Whole andHalal (ASUH)poultry and potentially become a source of locally-generated Revenue (PAD).

II. RESEARCH METHOD

The study was performed in Poultry Slaughterhouse (RPU) of the Food Security, Livestock and Animal Health Service of Merauke Regency for 3 months and used descriptive approach qualitative and quantitative. To obtain information related to the requirements of the study, 7 informants were selected purposively. Data were collected by reviewing published and unpublished data from the Department and other sources, as well as observation, interview, and questionnaire. The data analysis technique was Analytical Strategy Formulation.

III. RESULTS AND DISCUSSION

A. Result

Access to Information and Regulation, Financing and Infrastructure Facility are strengths. The weaknesses were UPTD which wasn't implemented, poor human resources and skill of managers, socialization, and promotion. Table 1 shows the strengths were strong and the biggest weakness was the Implementation of UPTD, while socialization and promotion were minor weaknesses. By level of importance, financing has a major impact on RPU management(0.20), followed by human resources of managers (0.19); access to information and regulation(0.18); UPTD which has not been implemented (0.17); Infrastructure Facility (0.16); an socialization and promotion (0.10).

Market availability or size, applicable regulation, technological development gave RPU opportunities to achieve its objectives based on the mandates it receives. These factors have very great opportunities. Meanwhile, poultry distribution, seasonal change, and slaughter outside of RPU were threats. Poultry distribution and season change were the biggest threats, and slaughter outside of RPU was a minor threat. EFE matrix shows the level of importance in which market, regulation, season and distribution were important external factors in RPU management with the weights as shown in table 2

Table 1. Matriks IFA (Internal Factor Analysis)

Internal Strategic Factors	WEIGHT	RANK	WEIGHTED SCORE
Strength			
1 regulation	**0.18**	**3.57**	**0.63**
2 Financing	**0.20**	**3.71**	**0.75**
3 Infrastucture Facility	**0.16**	**3.29**	**0.53**
Total	**0.54**		**1.91**
Weekness			
1 UPTD not being Implemented	**0.17**	**1.00**	**0.17**
2 Manager HR	**0.19**	**1.57**	**0.31**
3 Socialization and Promotion	**0.10**	**2.71**	**0.28**
Total	**0.46**		**0.75**
Total Weight dan Score Internal	**1.00**		**2.66**

Table 2. Matriks EFA (External Factor Analysis)

External Strategic Factors	WEIGHT	RANK	WEIGHTED SCORE
Opportunities			
1 Market	**0.21**	**4.00**	**0.83**
2 Regulations	**0.20**	**3.86**	**0.79**
3 Livestock technology	**0.15**	**3.29**	**0.51**
Total	**0.57**		**2.13**
Threats			
1 Poultry distribution	**0.16**	**1.86**	**0.30**
2 Seoson	**0.17**	**1.71**	**0.29**
3 Slougther outside of RPU	**0.11**	**2.29**	**0.24**
Total	**0.43**		**0.83**
Total Weight dan Score External	**1.00**		**2.95**

SWOT Analysis produced 6 Alternative strategies. SO strategy was improving RPU service; WO strategy was putting UPTD into the function and enhancing the quantity and quality of human resources; ST strategy was improving regulation and making and implementing season change anticipatory and poultry disease counter measures programs, and WT strategy was making socialization and promotional efforts. Improving the quality and quantity of human resources was the most attractive strategy with sum total attractiveness score (STAS) of 8.19, then putting UPTD into a function with 7.74 and followed by improving slaughter service with 7.40. The data is presented in tables 3 and 4

Table 3. Matriks SWOT

IFE / EFE	Strengh 1 Access to information and regulation 2 Financing 3 Infrastucture Facility	Weakness 1 UPTD not being Implemented 2 Manager HR 3 Socialization and Promotion
Opportunities 1 Market 2 Regulations 3 Livestock technology developments	**SO Strategy** - Improving slaughter services	**WO Strategy** - Putting UPTD into function - Improving the quantity and quality of human resources
Threats 1 Poultry distribution 2 Seoson 3 Slougther outside of RPU	**ST Strategy** - Improving regulation - Making and implementing season change anticipatory and poultry disease countermeasures programs	**WT Strategy** - Socialization and promotional efforts

Table 4. Quantitative Strategic Planning Matrix (QSPM)

Strategic Factors	Bobot	Alternative Strategy											
		Improving slaughter services		Putting UPTD into function		Improving the quantity and quality of human resources		Improving regulation		Making and implementing season change anticipatory and poultry disease countermeasures programs		Socialization and promotional efforts	
		AS	TAS	AS	TAS	AS	TAS	AS	TAS	AS	TAS	AS	TAS
Strength													
1 Access to information and regulation	0.18	2.86	0.50	4.29	0.76	3.00	0.53	6.00	1.06	3.43	0.60	1.43	0.25
2 Financing	0.20	4.57	0.93	4.71	0.95	5.00	1.01	1.14	0.23	3.29	0.66	2.43	0.49
3 Infrastucture Facility	0.16	4.57	0.74	5.00	0.81	4.43	0.72	1.71	0.28	2.71	0.44	2.57	0.42
Total	0.54												
Weekness													
1 UPTD not being Implemented	0.17	4.57	0.76	4.57	0.76	5.71	0.95	1.57	0.26	2.57	0.43	2.00	0.33
2 Manager HR	0.19	4.29	0.82	4.14	0.79	5.86	1.12	2.29	0.44	2.14	0.41	2.29	0.44
3 Socialization and Promotion	0.10	2.00	0.20	3.00	0.31	3.57	0.37	3.71	0.38	2.71	0.28	6.00	0.61
Total	0.46												
Total Weight Internal Factros	**1.00**												
Oportunit													
1 Market	0.21	3.86	0.80	3.29	0.68	4.00	0.83	3.00	0.62	3.86	0.80	3.14	0.65
2 Regulations	0.20	3.57	0.73	4.29	0.88	3.43	0.70	4.29	0.88	2.43	0.50	3.00	0.61
3 Livestock technology developments	0.15	4.29	0.66	4.14	0.64	5.29	0.82	1.71	0.27	2.86	0.44	2.71	0.42
Total	0.57												
Threats													
1 Poultry distribution	0.16	4.14	0.66	3.43	0.55	2.43	0.39	5.43	0.87	3.00	0.48	2.57	0.41
2 Seoson	0.17	1.57	0.26	1.57	0.26	2.86	0.48	4.86	0.81	6.00	1.00	4.14	0.69
3 Slougther outside of RPU	0.11	3.14	0.34	3.29	0.35	2.71	0.29	4.14	0.44	4.71	0.51	3.00	0.32
Total	0.43												
Total Weight External Factors And STAS	**1.00**		**7.40**		**7.74**		**8.19**		**6.53**		**6.55**		**5.65**

B. Discussion

To realize the vision of "Realizing MANTAP (Independent, Strong, and Professional) Food Security Supported by Reliable Livestock Development", 12 missions are set and described in objectives, strategic goals,

and policies. Based on a review of the Strategic Plan of Local Government Organization (Renstra – OPD) of the Food Security, Livestock and Animal Health Service of Merauke Regency 2017-2021, the research result was in line with and accommodated by the Renstra.

Quantitative Strategic Planning Matrix/QSPM showed improvement of quantity and quality of human resources as the most attractive strategy with sum total attractiveness score (STAS) of 8.19. Based on the main duties and functions of Food Security, Livestock and Animal Health Service of Merauke Regency, RPU management is used Veterinary Public Health Section of the Animal Health Department where the people responsible and the officers were technical workers of ASN animal health and contract/honorary workers who had joined internship/training on RPU management. RPU managers didn't only perform their duties and functions as RPU officers, but also other duties and function in the department and section, leading to heavy workload and unfinished duties or workloads, even limited slaughter due to lack of managers. Limited human resources of managers impacted RPU services and the implementation of RPU as UPTD. The three alternative strategies were top alternative strategies which should be prioritized because they're closely related. Law no. 12 of 2017 on Guideline of Formation and Classification of Department Branch and Regional Technical Implementation Unit requires the availability of employees, funding and facilities, and infrastructures to establish UPTD [7]. Internal Factor Evaluation/IFE Matrix showed that when the study was performed, the financing and facilities and infrastructures were strategic factors which became the strengths of RPU. However, in terms of employees, the available human resources should be enhanced by quantity and skills. The advantage of UPTD in the independent organizational unit which performed operational technical duties and/or technical duties of the organization was giving quick services required by the public. By improving HR and putting RPU into the function as UPTD, slaughter service in RPU can be improved.

Population growth and demand for food needs continue to increase and it is undeniable that Poultry Farming creates an external environment that must be faced. Some of the driving factors for livestock business development are land availability, production capability, government support, market growth, experience, and economic motivation. The inhibiting factors include price fluctuations, death risk, capital, farmer behavior and non-financial finance support [8].

Government support through the establishment of regulations and market availability and technological developments provide opportunities. Season changes increase the risk of death and the ability of livestock production and the economic value perceived by farmers has an impact on livestock distribution. EFA Matrix shows the season, and Poultry distribution is a major threat. Alternative Strategies for this condition are Improvement of Regulations and making and implementing programs to anticipate season changes and control of poultry diseases, which are expected to increase service demand at RPU because of the availability of poultry production

Slaughter outside of RPU which was a minor threat and has the lowest importance level, with a weight of 0.11, it was influenced by not maximally socialized various applicable regulations and not yet collected all of the slaughter where slaughter before regulation and supporting facilities are carried out by poultry entrepreneurs themselves cut in different places. However, the RPU needs to take various preventive measures so that this small threat does not develop into a major threat.

IV. CONCLUSION

Based on the conditions of internal and external environments, strategic factors which became strengths were access to information and regulation, financing and facilities and infrastructures. As long as the access is maintained, and there is a budget allocation for operation and facilities and infrastructures, RPU services can be provided. Putting UPTD into a function, manager of human resources and socialization and promotion were strategic factors which became weaknesses, requiring improvement to prevent it from growing and impacting the services. Market, Regulation, Livestock Technology Development were strategic factors which provided opportunities, while poultry distribution, season, slaughter outside of RPU were threats. Sustainable monitoring and review should be performed on the external strategic factors.

Therefore, the suggestions to be used as considerations and inputs in decision making on RPU management to provide Safe, Healthy, Whole and Halal (ASUH) poultry and potentially become a source of Locally-generated Revenue (PAD)were reinforcement of the quality and quantity of human resources, putting RPU into function as UPTD and improving slaughter services, which must be supported by funding structure and cooperation of stakeholder.

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