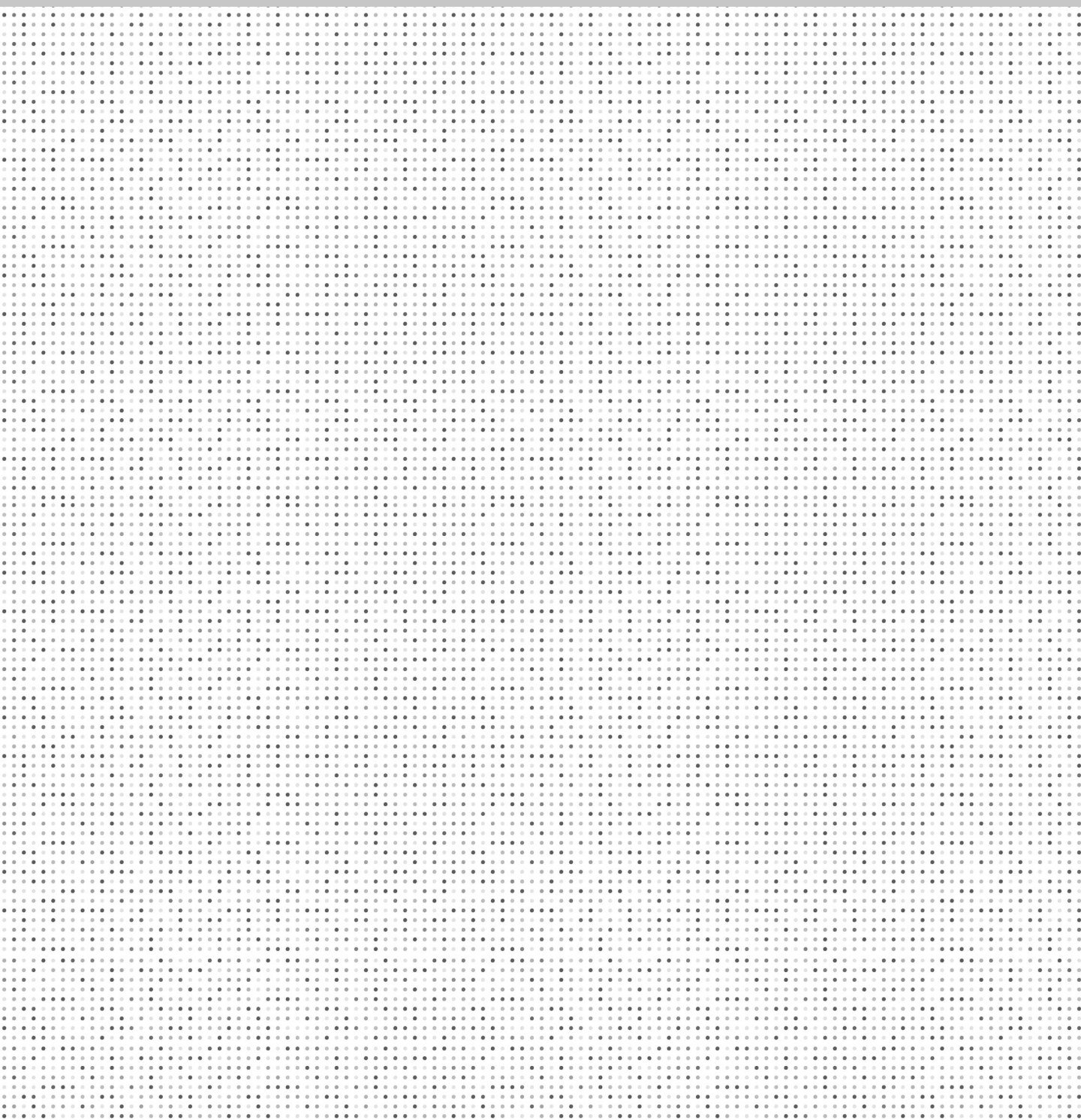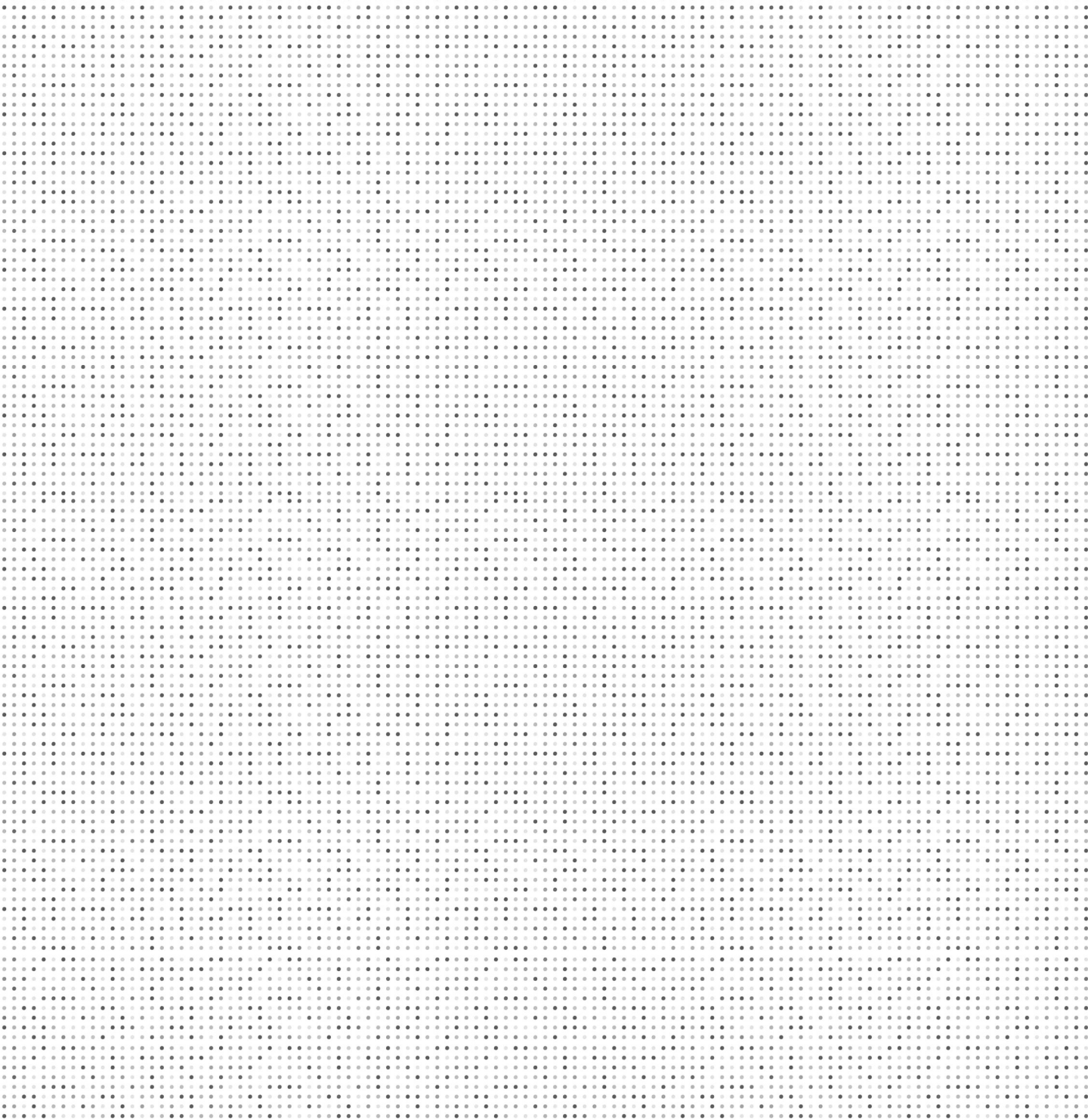# Financial and Investment Management and Business Feasibility Studies

A COMPARISON OF RETURN ON SUGER CANE PLANT BY WATER USING OF RAI DAN CHANG CO., LTD., SUPHANBURI PROVINCE

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Abstract

This independent study has objectives to study and compare cost and benefit on sugar cane production with three different irrigation methods in the experimental plot size of Rai Dan chang , Nong Makha Mong, Dan chang, Suphanburi that has an area of 443 rai. The entire area is divided to 3 parts according to different irrigation systems which are surface drip irrigation system (120 rai), Subsurface drip irrigation system (72 rai), and no-water system (251 rai). Tool that use in the study is the structured interview which interview and collect data about cost and benefit in sugar cane production. The statistic data that use in data analysis are Net Present Value: NPV, Benefit - Cost Ratio: BCR, Internal Rate of Return: IRR, Payback Period: PB, and Sensitivity Analysis. The result found that 1) The NPV of subsurface drip irrigation system is 15,673.43 baht / rai which is better than surface drip and no-water system. 2) The BCR of no-water system is 1.28 which is better than surface drip and subsurface drip irrigation system. 3) The IRR of no-water system has a percentage of 28 which is better than surface drip and subsurface drip irrigation system. 4) The payback period of surface drip and no-water system are 4.72 years which is better than subsurface drip irrigation system. 5) These three irrigation systems have low risk and worth to invest with the conclusion that said the best way for sugar cane production is by using subsurface drip irrigationsystem.

Keywords: Return on Investment (ROI) of Sugar cane production, different types of irrigation system

Introduction

Thai businesses in the past 3-5 years has been suffered from economic recession and also the rising cost of production. Especially the business segment which is considered as the main revenue of Thailand is an agricultural business. Sugar cane is a cash crop of Thailand. In the production year of 2013/14, Thailand produce 103.76 million tons of sugar cane [1], 11.29 million tons as sugar which consumed in the country for 2.50 million tons and the rest are exported. The export part created revenue of 180,000 million baht back to Thailand [1]. Besides, the higher amount of domestic sugar consumption continue to rise from last year's 2.50 million tons to 2.60 million tons [2]. However, the sugar cane supply in each year is uncertain which depends on cultivated area and yield. The overall cultivated areas in the country are 10.07 million rai. Most of sugar cane is cultivated in central, northeast, northern and eastern part of the country. The spreading of cultivated areas cause an income distribution to farmers and entrepreneurs. This help stimulate the economy which causing many industries to operate continuously.

Even though sugar cane is easy to grow but to get the high quality and also a high yield of sugar cane, Growers need to have certain amount of knowledge and funds. The factor of growing sugar cane are as following: preparation for sugar cane farming, space choosing, soil preparation, varieties preparation, growing method, irrigation, fertilizing, Ratoon cane care, and pest control [3]. All of these factors enhance the efficiency of sugar cane production. When sugar cane is in growth phase, the irrigation part is particularly significant because gaining a higher yield of sugar cane needs adequate amount of water throughout growing period. If sugar cane get proper amount of water, the yield can be about not less than 15 tons per rai. On average, sugarcane needs to water about 1500 mm. Higher Sugarcane yield needs extra water from the irrigation system. Irrigation for sugar cane allow better performance of Ratoon cane care. This helps in reducing production costs and revenue increase for farmers [4].

Another approach for reducing the cost of production of sugarcane farmers is gaining higher yield. In fact, sugar cane is a plant that needs large and consistent amount of water to help them grow. Therefore choosing an appropriate irrigation system is important. The current system used in both domestic and international are as follows; Furrow Irrigation, Sprinkler Irrigation and Drip Irrigation. The drip Irrigation is the most effective irrigation system. It can water only the area around the root zone while concurrently fertilize and give out the pesticides along with the water. Nowadays, there are 2 types of drip irrigation. The first is surface system. This system lay out the water line on surface in the middle groove of each line of sugar cane or it can lay out in spacing style. The second is subsurface system. This system has to lay out the water line before actually growing sugar cane. It can buried about 25 -30 cm. The water dripping line is underneath a sugar cane varieties for 10 cm [5]. However, choosing certain type of irrigation system has different cost of operation. To decide on investment for irrigation, there are various factors involving in the process which are financial factors, land ownership, water resource condition, and agricultural technology adoption. Return on investment is also considered as the essential factor.
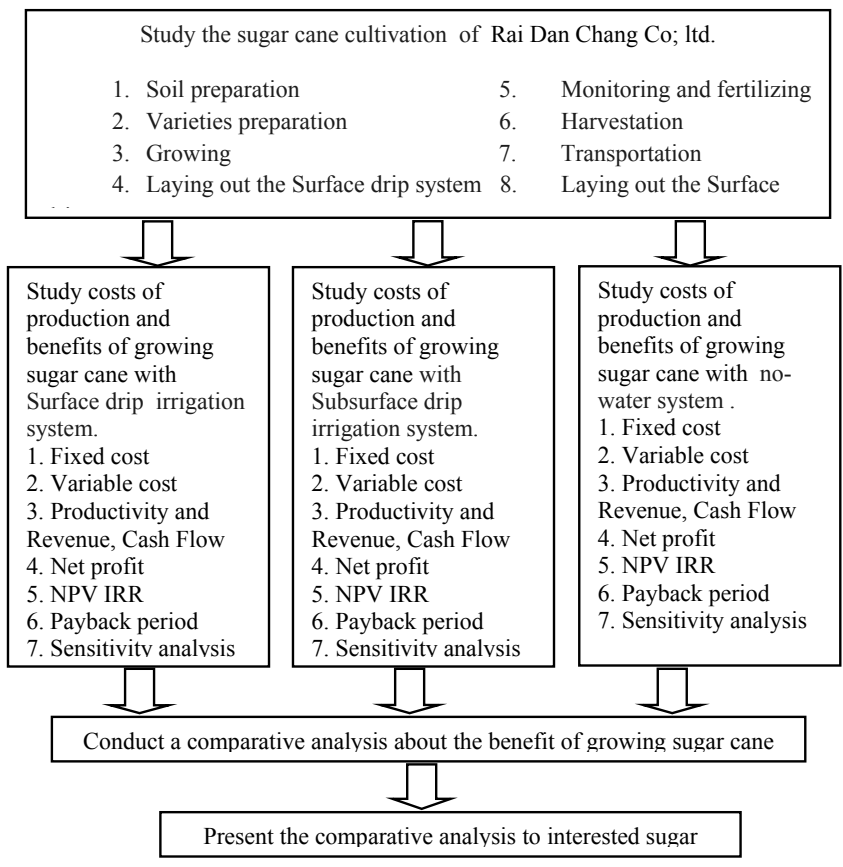
Mitr Phol Danchang in Suphanburi is one of the five of Mitr Phol sugar factories who has the most production capacity of 5 million tons of sugar cane/year. It needs sugar cane as a key material. However, in its past 4-5 years of production, this factory is the only one in Mitr Phol group who has a low yield of sugar cane due to drought and little water supply. Mitr Phol Danchang foresee this insight and want to build confidence to contract farmers .Thus, its affiliate, Rai Dan Chang Co; ltd. use the farm pond to make an experiment of different irrigation systems. The irrigation system has 3 different types which are surface drip system for 120 rai, subsurface drip system for 72 rai and no- water system for 251rai. This experiment cultivated area has an aim to study and collect data on costs and benefits. Also it serve as a useful resources to local sugar cane farmers.

Objectives

1.   To analyze costs and benefits in sugarcane production according to different types of irrigation system.

2.   To compare costs and benefits in sugarcane production according to different types of irrigation system.

Conceptual framework and methodology

Conceptual framework

Study the sugar cane cultivation of Rai Dan Chang Co; ltd.

1. Soil preparation
2. Varieties preparation
3. Growing
4. Laying out the Surface drip system

5. Monitoring and fertilizing
6. Harvestation
7. Transportation
8. Laying out the Surface

Study costs of production and benefits of growing sugar cane with Surface drip irrigation system.
1. Fixed cost
2. Variable cost
3. Productivity and Revenue, Cash Flow
4. Net profit
5. NPV IRR
6. Payback period
7. Sensitivity analysis

Study costs of production and benefits of growing sugar cane with Subsurface drip irrigation system.
1. Fixed cost
2. Variable cost
3. Productivity and Revenue, Cash Flow
4. Net profit
5. NPV IRR
6. Payback period
7. Sensitivity analysis

Study costs of production and benefits of growing sugar cane with no-water system.
1. Fixed cost
2. Variable cost
3. Productivity and Revenue, Cash Flow
4. Net profit
5. NPV IRR
6. Payback period
7. Sensitivity analysis

Conduct a comparative analysis about the benefit of growing sugar cane

Present the comparative analysis to interested sugar

Methodology

1. Defining data resources

The source of data ,comparative analysis about the benefit of growing sugar cane among 3 different irrigation systems to old farm pond at *Nong* Makha Mong, Dan chang, Suphanburi, is divided to 2 types which are as following; The data was collected form questionnaire of of Rai Dan Chang Co; ltd. The data is the actual data from a survey trip to a cultivated area that use drip irrigation systems which are operated at old farm pond at Nong Makha Mong , Dan chang, Suphanburi . And private sectors such as Office of the Cane and Sugar Board, Department of Agriculture, Office of Agricultural Economics and sugar factories.

2. Determination of population and samples.

The study population of this study use the method of Purposive Sampling. The sampling was intentional and motivational by choosing the samples according to the study objectives.   The samples are sugar cane cultivated area which is old farm pond at *Nong* Makha Mong , Dan chang, Suphanburi of Rai Dan Chang Co; ltd. The sugar cane cultivated area has 3 different irrigation systems which are the surface drip irrigation system, the subsurface drip irrigation system and the no- water system by using the whole area of 443 rai divided to 120 72 and 251 rai respectively.

3. The tools used in the study.

The tool that use in this study is a structured Interview. The set of objectives and framework for the study about costs of sugar cane production by using drip and non- drip irrigation system are the costs of growing, annual revenue, repairing equipments cost, others expenses and other suggestions.

4. Data collection

The author has asked for a cooperation in interviews and data collection of costs and return on sugarcane production that using non- drip and drip irrigation system of Rai Dan Chang Co; ltd. (surface drip, subsurface drip, and no-water system). The author is also an interviewer and observer himself.

5. Data analysis

Follow the conceptual framework and the study objectives, there are enquiries asking for fixed and variable costs in each production processes, including the products in order to analyze about benefits from sugar cane production with the three different irrigation systems. Using a discount rate of 7 percent. The tool that use for investment decision are as following;

5.1 Net Present Value: NPV

Is the number of net benefits received throughout the project by the decision rule that said whether the project is worth economically or not has to look at NPV value. If NPV is more than, equal to zero or has a positive value, that means the project is acceptable and worth economically to invest in. In other words, Present Value of Benefit – PVB is more than the Present Value of Cost – PVC.

5.2 Benefit - Cost Ratio: BCR

Is the present value of benefits divided by the total present value of the total cost. The decision rule that said whether the project is worth economically or not is when the BCR value is more than or equal to one.

5.3 Internal Rate of Return: IRR

Is the percentage return on the project. In other words, the discount rate that applied to make the present value equal to zero. The decision rule that said whether the project is worthy to invest is when IRR value is higher than Interest rates or the opportunity cost of capital.

5.4 Payback Period: PB

Is the time period set on the condition of cash flow gain from the project meet the point of an investment fund in order to evaluate the payback period.

5.5 Cash Flow: CF

The estimated cash flows are projected to see the implementation. The Company will have cash or a cash payment of cash received much more or much less than the

cash amount.

5.6 Sensitivity Analysis

Is the risk of the project that risen from change of revenue or from costs by analyzing according to following situation;

5.6.1 Case of the rise in an investment cost

5.6.2 Case of the drop in revenue

5.6.3 Case when it is not worth an investment.

Results

From the study of costs and benefits of investment in sugar cane cultivation by different irrigation system of old farm pond at *Nong* Makha Mong , Dan chang, Suphanburi , the area are divided to 3 types due to different irrigation system which are surface drip 120 rai, subsurface drip 72 rai and the rest of 251 rai belongs to no- water system. The data analysis for sugar cane cultivation by surface drip irrigation system are as following; NPV value is equal 13,355.19 baht/ rai , BCR value is 1.27, the IRR value is the percentage of 27 with the payback period (PB) of 4.72 years and the last is sensitivity analysis result which found that it is worth to invest and has low risk. However, if the price of sugar cane per ton is 870 baht, it will not worth an investment. The data analysis for sugar cane cultivation by subsurface drip irrigation system are as following; NPV value is equal 15,673.43 baht/ rai, BCR value is 1.26, the IRR value is the percentage of 26 with the payback period (PB) of 4.73 years and the last is sensitivity analysis result which found that it is worth to invest and has low risk. However, if the price of sugar cane per ton is 880 baht, it will not worth an investment.

The data analysis for sugar cane cultivation by no-water system are as following ; NPV value is equal 10,725.72 baht/ rai , BCR value is 1.28, the IRR value is the percentage of 28 with the payback period (PB) of 4.72 years and the last is sensitivity analysis result which found that it is worth to invest and has low risk. However, if the price of sugar cane per ton is 960 baht, it will not worth an investment.

Conclusions

1.1 Data for sugar cane cultivated area

The cultivated area is an old farm pond at Nong Makha Mong, Dan chang, Suphanbu-ri, the whole planting area of 443 rai are divided to 3 different types of irrigation system which are surface drip 120 rai, subsurface drip 72 rai and the no-water system of 251 rai. In sugar cane cultivation starts from soil preparation, sugar cane planting by plotting machine, the monitoring and maintenance part and the harvest part by using sugar cane cutting truck , including the transportation of sugar cane to the sugar factory.

1.2 Costs and benefit analysis in 3 years times.(Production year of 2011 / 12 – 2013 /14)

According to comparison among revenue from sales, costs of production and profit of sugar cane sales from 3 different types of irrigation system (surface drip, subsurface drip, and no-water system) for the past three planting years found that the sugar cane cultivation by subsurface drip irrigation system has the most total costs of production at 35,018.00 baht/rai. The second total costs of production is 29,043.38 baht/rai which belongs to sugar cane cultivation by surface drip irrigation system and the sugar cane cultivation by no-water system has the total costs of production at 21,874.81 baht/rai. This indicate that sugar cane cultivation by surface drip and subsurface drip irrigation system has the higher costs of production than no-water system as the amount of 13,143.19 baht/rai and 7,168.57 baht/rai respectively. Nevertheless, sugar cane cultivation by water drip will has higher amount of revenue from sales due to higher amount of yield, The revenue from sales of surface drip and subsurface drip are at 44,580.20 baht/rai and at 37,025.88 baht/rai respectively. The difference in revenue from sales of sugar cane with surface and subsurface drip has higher amount than the revenue from sales of sugar cane with no-water system at 15,581.40 baht/rai and 8,027.08 baht/rai respectively. The total profit of sugar cane sales with surface and subsurface drip per each rai are equal to 9,562.20 baht and 7,982.50 baht respectively. The difference in total profit of sugar cane sales with surface and subsurface drip have higher amount than sugar cane with no-water system are at 2,438.21 baht/rai and 858.51 baht/rai respectively. To sum up, the sugar cane with surface and subsurface drip has higher costs of production than sugar cane with no-water system. However, This reflects to higher yield of sugar canes and also to the higher profit from sales as well. Thus, the results should later be presented to interested sugar cane farmers for later decisions.

1.3 Financial Analysis of return in the past six years. (Production year 2011 / 12 – 2016 / 17)

1.3.1   Financial Analysis of sugar cane with surface drip irrigation system

The cost of sugarcane production throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 58,086.77 baht/rai. For the benefit of sugar cane throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 73,773.77 baht/rai. The result of financial analysis shown as following; the NPV value is 13,355.19 baht/rai, BCR is equal to 1.27 , and the IRR value is the percentage of 27 . Thus it can be concluded that sugar cane cultivation from surface drip irrigation system is considered low risk and is worth for investment.

1.3.2   Financial Analysis of sugar cane with subsurface drip irrigation system

The cost of sugarcane production throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 70,036.00 baht/rai. For the benefit of sugar cane throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 88,704.50 baht/rai. The result of financial analysis are shown as following; the NPV value is 15,673.43 baht/rai , BCR is equal to 1.26, and the IRR value is the percentage of 26. Therefore, it can be concluded that sugar cane cultivation from subsurface drip irrigation system is considered low risk and is worth for investment.

1.3.3   Financial Analysis of sugar cane with no-water system

The cost of sugarcane production throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 45,485.73 baht/rai. For the benefit of sugar cane throughout the project since year 1st-6th (Production year 2011 / 12 – 2016 / 17) is at 57,733.24 baht/rai. The result of financial analysis are shown as following; the NPV value is 10,725.72 baht/rai, BCR is equal to 1.28, and the IRR value is the percentage of 28. Hence, it can be concluded that sugar cane cultivation with no-water system is considered low risk and is worth for investment.

1.4 Sensitivity Analysis

To protect the risk from the rise in an investment cost and the drop in revenue, the sensitivity analysis need to be conducted. First, the process starts with setting 3 conditions 1) a cost increase by 10 percent with constant benefit, 2) a cost increase by 10 percent and the drop in benefit by 5 percent and 3) a constant cost and the drop in benefit by 10 percent. The result found that the project is low risk and is worth for investment. The concern is risen from following values; NPV is found to be greater than zero, BCR is greater than one and the IRR value is greater than the percentage of 7. For the case of not worth for an investment is the sugar cane production with surface drip irrigation system that has constant cost with the price of sugar cane per ton at 870 baht . The result of not worth for an investment reflects from NPV value is less than zero, BCR is less than one and the IRR value is lesser than the percentage of 7. For the case of not worth for an investment is the sugar cane production with subsurface drip irrigation system that has constant cost with the price of sugar cane per ton at 880 baht. The result of not worth for an investment reflects from NPV value is less than zero, BCR is less than one and the IRR value is lesser than the percentage of 7. For the case of not worth for an investment is the sugar cane production with no-water system that has constant cost with the price of sugar cane per ton at 960 baht. The result of not worth for an investment reflects from NPV value is less than zero, BCR is less than one and the IRR value is lesser than the percentage of 7.

Recommendations

1.   A further study on optimization value under the limitation of labor and machinery in the purpose of maximizing the result adaptation for future use of sugar cane cultivated area.

2.   A study on cost of production and product prices of sugar cane in each production year due to the Price volatility arise from pricing mechanism.

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