UNIVERSITY OF SOUTHEASTERN PHILIPPINES

SCHOOL OF APPLIED ECONOMICS

Bo. Obrero, Davao City

**RUBBER PRODUCTION**

**MALASILA, MAKILALA COTABATO**

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SURVEY QUESTIONNAIRE

**CHAPTER 1**

1. **Introduction**

The rubber tree is a robust, perennial crop scientifically known as *hevea brasiliensis*. Its product is called Natural Rubber (NR) which has elastic property. Natural rubber exists as latex, a milky white sap, which is a colloidal suspension of rubber particles in liquid form. The latex is extracted from the rubber tree and collected and is processed into a dry rubber or latex concentrate. The economic life of latex yielding trees ranges from 20 to 30 years.

Rubber is generally grown within the geographical zones lying 10°C to 15°C on either side of the equator. For optimum growth and productivity, it requires warm humid climate with temperatures ranging from 20°C to 35°C and a fairly-distributed rainfall throughout the year. In the Philippines, rubber production is concentrated in Mindanao, for instance, in Makilala, North Cotabato where rubber production is highly favorable.

The scope of this evaluation is limited only to the 16 hectares rubber production of Dr. Sandique, a well-known resident and owner of wide rubber plantation in Makilala, North Cotabato.

**Significance of Rubber Trees**

Rubber production is considered as one of the most profitable agro-industrial ventures in the country. Income may increase until the productive years of rubber (25-30 years after establishment). The substantial value of rubber wood produced at the end of tree’s economic life makes rubber farming much more attractive. At present, there are about 40,000 hectares of rubber which are more than 25 years old and considered no longer economically viable for latex production. On the environmental side, rubber as a reforestation crop can help control the level of carbon dioxide in the atmosphere, thus, combating the “greenhouse effect”.

According to the International Rubber Research and Development Board (IRRDB), Natural Rubber as a commodity is traded in the world market and its price is not related to the cost of production, but it is partly governed by the law of supply and demand.

Rubber considered to be a primary product is used for automotive, mining, agriculture, shipping, chemicals, pharmaceutical, and consumer industries. A secondary product of rubber is lumber. Other rubber products is manufactured for medical and consumer use such as inflatable, footwear, sporting goods, toys, bicycles and motorcycles tires, and latex products such as globes, prophylactics, medical tubing, and feeding bottle nipples.

**Externalities**

Like any other farm production, producing rubber also incurs externality. The rubber trees have an odor which is very unpleasant to the people living near the rubber trees, most especially to those tappers harvesting the latex of the rubber.

**Objectives**

The project evaluation of rubber farming’s main objective is to evaluate the total cost of an investment compared to the total benefits in order to determine whether it is efficient or not. Specifically, this comparative evaluation method aims:

1. To provide essential information of the development of rubber farming/production; and
2. To help the owner be aware how the project is going.

**CHAPTER 2**

**Results of the Study**

* 1. **Valuation of Cost**

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial Cost (0 Year)** | **Financial Cost** | **Conversion Factor** | **Economic Cost** |
|  |  |  |  |
| *Fixed Capital:* |  |  |  |
| Land | Php 3.4 M | 60% | Php 2.4 M |
| Seedlings | Php 144,000 | 90% | Php 129,600 |
| Mocona Grass | Php 360,000 | 1.20% | Php 432,000 |
|  |  |  |  |
| *Working Capital:* |  |  |  |
| Unskilled Labor (10 Laborers) | Php 561,600 | 60% | Php 336,960 |
| Skilled Labor (3 Drivers) | Php 19,890 | 100% | Php 19,890 |
| Machines | Php 195,000 | 90% | Php 175,500 |
| (Backhoe, Bulldozer & Tractor) |  |  |  |
| Equipments (Bolo, “Bara”, etc.) | Php 10,000 | 90% | Php 9,000 |
| TOTAL: |  |  | **Php 3,502,950** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Maintenance** **(1st Year to 5th Year)** | **Financial Cost** | **Conversion Factor** | **Economic Cost** |
|  |  |  |  |
| Fertilizers | Php 72,000 | 90% | Php 64,800 |
| Unskilled Labor (5 Laborers/Php180 each) | Php 280,800 | 60% | Php 168,480 |
| TOTAL: |  |  | **Php 233,280** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Gestation Period** **(6th Year to 17th Year)** | **Financial Cost** | **Conversion Factor** | **Economic Cost** |
| Skilled Labor (7 Tappers/Php255 each) | Php 556,920 | 1% | Php 556,920 |
| Fertilizers | Php 72,000 | 90% | Php 64,800 |
| Equipments:  |  |  |  |
| Tapping knife | Php 1,400 | 90% | Php 1,260 |
| Honing Stone | Php 700 | 90% | Php 630 |
| Acid | Php 33,600 | 90% | Php 30,240 |
| Metril | Php 14,400 | 90% | Php 12,960 |
| Round-up | Php 8,400 | 90% | Php 7,560 |
| Rubber spout\* | Php 4,320 | 90% | Php 3,888 |
| Rubber cup\* | Php 108,000 | 90% | Php 97,200 |
| Rubber wire\* | Php 1,000 | 90% | Php Php 900 |
| TOTAL: |  |  | **Php 776,358** |
|  |  |  | **Php 674,370** |
| Note: Equipments with asteries (\*) are accounted only in 6th year. |  |  |

**2.2 Valuation of Benefits**

|  |  |
| --- | --- |
| Latex (Php 17,390/day)  | Php 5,425,680 |
| Trilis (Php 1,974/day) | Php 615,888 |
| Scrap (Php 3,384/day) | Php 1,055,808 |
| TOTAL: | **Php 7,097,376** |

**­­­Market Feasibility**

 **T**he conversion of the financial cost of rubber production to its economic cost is presented below. The total land area devoted to the production is 16 hectares with a total of Php 7,097,376 approximate benefits a year assuming that the selling price is fixed at Php 47.

 Before the investment, the 16 hectares land area was planted with banana. The owner only has a gross benefit of Php 2, 400, 000 approximately at a selling price of Php 5 per kilo.

|  |  |
| --- | --- |
| **Without the Project** | **With the Project** |
| Average Yield of Banana7,500/ha. x 16 = 120,000 kls.Note: 1 kilo = Php 5 Harvest is every after 3 mos.120,000 kls. x 5= Php 600,000  x 4Revenue **Php 2,400,000/annum**LESS PRODUCTION COST Land Preparation = Php 15,000Seedlings = Php 28,000Fertilizer = Php 62,380Harvesting Expense = Php 16, 320TOTAL: **Php 121,700****Net Income: Php 2,278,300/annum** | Average Yield of Rubber9,438/ha. X 16 = 151,008 kls.Note: 1 kilo = Php 47151,008 kls. x 47 =  **Php 7,097,376/annum** LESS PRODUCTION COSTLand Preparation = Php 786,490Seedlings = Php 144,000Fertilizer = Php 72,000Harvesting Expense = Php 728,740TOTAL: **Php 1,731,230****Net Income: Php 5, 366,146/annum** |

* 1. **COST AND BENEFIT**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **0 Year** | **1st Year** | **2nd Year** | **3rd Year** | **4th Year** | **5th Year** | **6th Year** | **7th Year** | **8th Year** |
| **Benefit** |   |   |   |   |   |   | 7,097,376 | 7,097,376 | 7,097,376 |
| **Cost** | 3,502,950 | 233,280 | 233,280 | 233,280 | 233,280 | 233,280 | 776,358 | 674,370 | 674,370 |
| **Profit** | -3,502,950 | -233,280 | -233,280 | -233,280 | -233,280 | -233,280 | 6,321,018 | 6,423,006 | 6,423,006 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **9th Year** | **10th Year** | **11th Year** | **12th Year** | **13th Year** | **14th Year** | **15th Year** | **16th Year** | **17th Year** |
| **Benefit** | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 | 7,097,376 |
| **Cost** | 674,370 | 674,370 | 674,370 | 674,370 | 674,370 | 674,370 | 674,370 | 674,370 | 674,370 |
| **Profit** | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 | 6,423,006 |

* + 1. **NET PRESENT VALUE (NPV)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Profit** | **Discount Factor (@ 15%)** | **PV** | **Discount factor @18%** | **PV** |
| 0 | -3,502,950 | 1 | -3502950 | 1 | -3502950 |
| 1 | -233,280 | 0.86956522 | -202852.1739 | 0.847458 | -197694.915 |
| 2 | -233,280 | 0.75614367 | -176393.1947 | 0.718184 | -167538.064 |
| 3 | -233,280 | 0.65751623 | -153385.3867 | 0.608631 | -141981.41 |
| 4 | -233,280 | 0.57175325 | -133378.5971 | 0.515789 | -120323.229 |
| 5 | -233,280 | 0.49717674 | -115981.3888 | 0.437109 | -101968.838 |
| 6 | 6,321,018 | 0.4323276 | 2732750.516 | 0.370432 | 2341504.427 |
| 7 | 6,423,006 | 0.37593704 | 2414645.863 | 0.313925 | 2016342.372 |
| 8 | 6,423,006 | 0.32690177 | 2099692.055 | 0.266038 | 1708764.722 |
| 9 | 6,423,006 | 0.28426241 | 1825819.178 | 0.225456 | 1448105.697 |
| 10 | 6,423,006 | 0.24718471 | 1587668.851 | 0.191064 | 1227208.217 |
| 11 | 6,423,006 | 0.21494322 | 1380581.609 | 0.161919 | 1040006.964 |
| 12 | 6,423,006 | 0.18690715 | 1200505.747 | 0.13722 | 881361.8338 |
| 13 | 6,423,006 | 0.16252796 | 1043918.041 | 0.116288 | 746916.8083 |
| 14 | 6,423,006 | 0.14132866 | 907754.8182 | 0.098549 | 632980.346 |
| 15 | 6,423,006 | 0.12289449 | 789352.0158 | 0.083516 | 536424.022 |
| 16 | 6,423,006 | 0.10686477 | 686393.0573 | 0.070776 | 454596.6289 |
| 17 | 6,423,006 | 0.09292589 | 596863.528 | 0.05998 | 385251.3804 |
|   |   |   | **12,981,004.54** |   | **9,187,006.962** |
|   |   |   | **17%** |  | **14%** |

* + 1. **Risk Analysis (Sensitivity Scenario)**

**Base Case Scenario (15%)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Cost** | **Discount factor** | **Present Value** | **Benefits** | **Present Value** | **Incremental benefit** | **Present Value** |
| 0 | 3,502,950 | 1.00 | 3502950 |   | 0.00 | -3,502,950 | -3502950.00 |
| 1 | 233,280 | 0.87 | 202852.1739 |   | 0.00 | -233,280 | -202852.17 |
| 2 | 233,280 | 0.76 | 176393.1947 |   | 0.00 | -233,280 | -176393.19 |
| 3 | 233,280 | 0.66 | 153385.3867 |   | 0.00 | -233,280 | -153385.39 |
| 4 | 233,280 | 0.57 | 133378.5971 |   | 0.00 | -233,280 | -133378.60 |
| 5 | 233,280 | 0.50 | 115981.3888 |   | 0.00 | -233,280 | -115981.39 |
| 6 | 776,358 | 0.43 | 335640.9877 | 7,097,376 | 3068391.50 | 6,321,018 | 2732750.52 |
| 7 | 674,370 | 0.38 | 253520.6616 | 7,097,376 | 2668166.52 | 6,423,006 | 2414645.86 |
| 8 | 674,370 | 0.33 | 220452.7492 | 7,097,376 | 2320144.80 | 6,423,006 | 2099692.05 |
| 9 | 674,370 | 0.28 | 191698.0428 | 7,097,376 | 2017517.22 | 6,423,006 | 1825819.18 |
| 10 | 674,370 | 0.25 | 166693.9503 | 7,097,376 | 1754362.80 | 6,423,006 | 1587668.85 |
| 11 | 674,370 | 0.21 | 144951.2611 | 7,097,376 | 1525532.87 | 6,423,006 | 1380581.61 |
| 12 | 674,370 | 0.19 | 126044.5749 | 7,097,376 | 1326550.32 | 6,423,006 | 1200505.75 |
| 13 | 674,370 | 0.16 | 109603.9781 | 7,097,376 | 1153522.02 | 6,423,006 | 1043918.04 |
| 14 | 674,370 | 0.14 | 95307.80709 | 7,097,376 | 1003062.63 | 6,423,006 | 907754.82 |
| 15 | 674,370 | 0.12 | 82876.35399 | 7,097,376 | 872228.37 | 6,423,006 | 789352.02 |
| 16 | 674,370 | 0.11 | 72066.39477 | 7,097,376 | 758459.45 | 6,423,006 | 686393.06 |
| 17 | 674,370 | 0.09 | 62666.43024 | 7,097,376 | 659529.96 | 6,423,006 | 596863.53 |
|   |   | **NPV** |  **6,146,463.93**  | **NPV** | **19,127,468.47** | **NPV** | **12981004.54** |
|   |   |   |   |   |   | **IRR** | **17%** |
|   |   |   |   |   |   | **BCR** | **3.11%** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Increase cost by 10% |  |  |  |  |  |  |  |
| Cost | Year | Cost | Discount factor | Present Value | Benefits | Present value | Incremental benefit | Present value |
| 3,502,950 | 0 | 3853245 | 1.00 | 3853245 |   | 0.00 | -3853245.00 | -3853245 |
| 233,280 | 1 | 256608 | 0.87 | 223137.391 |   | 0.00 | -256608.00 | -223137.391 |
| 233,280 | 2 | 256608 | 0.76 | 194032.514 |   | 0.00 | -256608.00 | -194032.514 |
| 233,280 | 3 | 256608 | 0.66 | 168723.925 |   | 0.00 | -256608.00 | -168723.925 |
| 233,280 | 4 | 256608 | 0.57 | 146716.457 |   | 0.00 | -256608.00 | -146716.457 |
| 233,280 | 5 | 256608 | 0.50 | 127579.528 |   | 0.00 | -256608.00 | -127579.528 |
| 776,358 | 6 | 853993.8 | 0.43 | 369205.086 | 7,097,376 | 3068391.50 | 6243382.20 | 2699186.42 |
| 674,370 | 7 | 741807 | 0.38 | 278872.728 | 7,097,376 | 2668166.52 | 6355569.00 | 2389293.8 |
| 674,370 | 8 | 741807 | 0.33 | 242498.024 | 7,097,376 | 2320144.80 | 6355569.00 | 2077646.78 |
| 674,370 | 9 | 741807 | 0.28 | 210867.847 | 7,097,376 | 2017517.22 | 6355569.00 | 1806649.37 |
| 674,370 | 10 | 741807 | 0.25 | 183363.345 | 7,097,376 | 1754362.80 | 6355569.00 | 1570999.46 |
| 674,370 | 11 | 741807 | 0.21 | 159446.387 | 7,097,376 | 1525532.87 | 6355569.00 | 1366086.48 |
| 674,370 | 12 | 741807 | 0.19 | 138649.032 | 7,097,376 | 1326550.32 | 6355569.00 | 1187901.29 |
| 674,370 | 13 | 741807 | 0.16 | 120564.376 | 7,097,376 | 1153522.02 | 6355569.00 | 1032957.64 |
| 674,370 | 14 | 741807 | 0.14 | 104838.588 | 7,097,376 | 1003062.63 | 6355569.00 | 898224.038 |
| 674,370 | 15 | 741807 | 0.12 | 91163.9894 | 7,097,376 | 872228.37 | 6355569.00 | 781064.38 |
| 674,370 | 16 | 741807 | 0.11 | 79273.0342 | 7,097,376 | 758459.45 | 6355569.00 | 679186.418 |
| 674,370 | 17 | 741807 | 0.09 | 68933.0733 | 7,097,376 | 659529.96 | 6355569.00 | 590596.885 |
|   |   |   |   | **6761110.33** |   | **19127468.47** | **NPV** | **12366358.1** |
|   |   |   |   |   |   |   | **IRR** | **16%** |
|   |   |   |   |   |   |   | **BCR** | **2.83** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Increase Cost by 20%** |  |  |  |  |  |  |
| **Cost** | **Year** | **Cost** | **Discount factor** | **PV** | **Benefits** | **Present value** | **Incremental benefits** | **PV** |
| 3,502,950 | 0 | 4203540 | 1.00 | 4203540 |   | 0.00 | -4203540 | -4203540 |
| 233,280 | 1 | 279936 | 0.87 | 243422.6087 |   | 0.00 | -279936 | -243422.61 |
| 233,280 | 2 | 279936 | 0.76 | 211671.8336 |   | 0.00 | -279936 | -211671.83 |
| 233,280 | 3 | 279936 | 0.66 | 184062.464 |   | 0.00 | -279936 | -184062.46 |
| 233,280 | 4 | 279936 | 0.57 | 160054.3166 |   | 0.00 | -279936 | -160054.32 |
| 233,280 | 5 | 279936 | 0.50 | 139177.6666 |   | 0.00 | -279936 | -139177.67 |
| 776,358 | 6 | 931629.6 | 0.43 | 402769.1852 | 7,097,376 | 3068391.50 | 6165746.4 | 2665622.3 |
| 674,370 | 7 | 809244 | 0.38 | 304224.7939 | 7,097,376 | 2668166.52 | 6288132 | 2363941.7 |
| 674,370 | 8 | 809244 | 0.33 | 264543.2991 | 7,097,376 | 2320144.80 | 6288132 | 2055601.5 |
| 674,370 | 9 | 809244 | 0.28 | 230037.6514 | 7,097,376 | 2017517.22 | 6288132 | 1787479.6 |
| 674,370 | 10 | 809244 | 0.25 | 200032.7403 | 7,097,376 | 1754362.80 | 6288132 | 1554330.1 |
| 674,370 | 11 | 809244 | 0.21 | 173941.5133 | 7,097,376 | 1525532.87 | 6288132 | 1351591.4 |
| 674,370 | 12 | 809244 | 0.19 | 151253.4898 | 7,097,376 | 1326550.32 | 6288132 | 1175296.8 |
| 674,370 | 13 | 809244 | 0.16 | 131524.7738 | 7,097,376 | 1153522.02 | 6288132 | 1021997.2 |
| 674,370 | 14 | 809244 | 0.14 | 114369.3685 | 7,097,376 | 1003062.63 | 6288132 | 888693.26 |
| 674,370 | 15 | 809244 | 0.12 | 99451.62479 | 7,097,376 | 872228.37 | 6288132 | 772776.75 |
| 674,370 | 16 | 809244 | 0.11 | 86479.67373 | 7,097,376 | 758459.45 | 6288132 | 671979.78 |
| 674,370 | 17 | 809244 | 0.09 | 75199.71628 | 7,097,376 | 659529.96 | 6288132 | 584330.24 |
|   |   |   |   | **7375756.72** |   | **19127468.47** | **NPV** | **11751712** |
|   |   |   |   |   |   |   | **IRR** | **14%** |
|   |   |   |   |   |   |   | **BCR** | **2.59%** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Decrease in revenue 10%** |  |  |  |  |  |  |
| **Revenue** | **Year** | **Cost** | **Discount Factor** | **PV** | **Revenue** | **PV** | **Incremental Benefits** | **PV** |
|   | 0 | 3,502,950 | 1.00 | 3502950.00 | 0 | 0 | -3,502,950 | -3502950 |
|   | 1 | 233,280 | 0.87 | 202852.17 | 0 | 0 | -233,280 | -202852.174 |
|   | 2 | 233,280 | 0.76 | 176393.19 | 0 | 0 | -233,280 | -176393.195 |
|   | 3 | 233,280 | 0.66 | 153385.39 | 0 | 0 | -233,280 | -153385.387 |
|   | 4 | 233,280 | 0.57 | 133378.60 | 0 | 0 | -233,280 | -133378.597 |
|   | 5 | 233,280 | 0.50 | 115981.39 | 0 | 0 | -233,280 | -115981.389 |
| 7,097,376 | 6 | 776,358 | 0.43 | 335640.99 | 6387638.4 | 2761552 | 5,611,280 | 2425911.365 |
| 7,097,376 | 7 | 674,370 | 0.38 | 253520.66 | 6387638.4 | 2401350 | 5,713,268 | 2147829.211 |
| 7,097,376 | 8 | 674,370 | 0.33 | 220452.75 | 6387638.4 | 2088130 | 5,713,268 | 1867677.574 |
| 7,097,376 | 9 | 674,370 | 0.28 | 191698.04 | 6387638.4 | 1815765 | 5,713,268 | 1624067.456 |
| 7,097,376 | 10 | 674,370 | 0.25 | 166693.95 | 6387638.4 | 1578927 | 5,713,268 | 1412232.57 |
| 7,097,376 | 11 | 674,370 | 0.21 | 144951.26 | 6387638.4 | 1372980 | 5,713,268 | 1228028.322 |
| 7,097,376 | 12 | 674,370 | 0.19 | 126044.57 | 6387638.4 | 1193895 | 5,713,268 | 1067850.715 |
| 7,097,376 | 13 | 674,370 | 0.16 | 109603.98 | 6387638.4 | 1038170 | 5,713,268 | 928565.839 |
| 7,097,376 | 14 | 674,370 | 0.14 | 95307.81 | 6387638.4 | 902756.4 | 5,713,268 | 807448.5557 |
| 7,097,376 | 15 | 674,370 | 0.12 | 82876.35 | 6387638.4 | 785005.5 | 5,713,268 | 702129.1789 |
| 7,097,376 | 16 | 674,370 | 0.11 | 72066.39 | 6387638.4 | 682613.5 | 5,713,268 | 610547.1121 |
| 7,097,376 | 17 | 674,370 | 0.09 | 62666.43 | 6387638.4 | 593577 | 5,713,268 | 530910.5322 |
|   |   |   |   | **6146463.93** |   | **17214722** | **NPV** | **11068257.69** |
|   |   |   |   |   |   |   | **IRR** | 16% |
|   |   |   |   |   |   |   | **BCR** | 2.80% |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Decrease in revenue 20%** |  |  |  |  |  |  |
| **Revenue** | **Year** | **Cost** | **Discount Factor** | **PV** | **Benefits** | **PV** | **Incremental benefits** | **PV** |
|   | 0 | 3,502,950 | 1.00 | 3502950.00 | 0 | 0 | -3,502,950 | -3502950 |
|   | 1 | 233,280 | 0.87 | 202852.17 | 0 | 0 | -233,280 | -202852.17 |
|   | 2 | 233,280 | 0.76 | 176393.19 | 0 | 0 | -233,280 | -176393.19 |
|   | 3 | 233,280 | 0.66 | 153385.39 | 0 | 0 | -233,280 | -153385.39 |
|   | 4 | 233,280 | 0.57 | 133378.60 | 0 | 0 | -233,280 | -133378.6 |
|   | 5 | 233,280 | 0.50 | 115981.39 | 0 | 0 | -233,280 | -115981.39 |
| 7,097,376 | 6 | 776,358 | 0.43 | 335640.99 | 5677901 | 2454713 | 4,901,543 | 2119072.21 |
| 7,097,376 | 7 | 674,370 | 0.38 | 253520.66 | 5677901 | 2134533 | 5,003,531 | 1881012.56 |
| 7,097,376 | 8 | 674,370 | 0.33 | 220452.75 | 5677901 | 1856116 | 5,003,531 | 1635663.09 |
| 7,097,376 | 9 | 674,370 | 0.28 | 191698.04 | 5677901 | 1614014 | 5,003,531 | 1422315.73 |
| 7,097,376 | 10 | 674,370 | 0.25 | 166693.95 | 5677901 | 1403490 | 5,003,531 | 1236796.29 |
| 7,097,376 | 11 | 674,370 | 0.21 | 144951.26 | 5677901 | 1220426 | 5,003,531 | 1075475.04 |
| 7,097,376 | 12 | 674,370 | 0.19 | 126044.57 | 5677901 | 1061240 | 5,003,531 | 935195.683 |
| 7,097,376 | 13 | 674,370 | 0.16 | 109603.98 | 5677901 | 922817.6 | 5,003,531 | 813213.637 |
| 7,097,376 | 14 | 674,370 | 0.14 | 95307.81 | 5677901 | 802450.1 | 5,003,531 | 707142.293 |
| 7,097,376 | 15 | 674,370 | 0.12 | 82876.35 | 5677901 | 697782.7 | 5,003,531 | 614906.342 |
| 7,097,376 | 16 | 674,370 | 0.11 | 72066.39 | 5677901 | 606767.6 | 5,003,531 | 534701.167 |
| 7,097,376 | 17 | 674,370 | 0.09 | 62666.43 | 5677901 | 527624 | 5,003,531 | 464957.536 |
|   |   |   |   | **6146463.93** |   | **15301975** | **NPV** | **9155510.84** |
|   |   |   |   |   |   |   | **IRR** | **14%** |
|   |   |   |   |   |   |   | **BCR** | **2%** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Increase Cost by 10% and decrease revenue by 10%.** |  |  |  |  |  |
| **Revenue** | **Cost** | **Discount Factor** | **Year** | **Cost** | **PV** | **Revenue** | **PV** | **Incremental Benefits** | **PV** |
|   | 3,502,950 | 1.00 | 0 | 3853245 | 3853245 | 0 | 0 | -3853245 | -3853245 |
|   | 233,280 | 0.87 | 1 | 256608 | 223137.3913 | 0 | 0 | -256608 | -223137.3913 |
|   | 233,280 | 0.76 | 2 | 256608 | 194032.5142 | 0 | 0 | -256608 | -194032.5142 |
|   | 233,280 | 0.66 | 3 | 256608 | 168723.9254 | 0 | 0 | -256608 | -168723.9254 |
|   | 233,280 | 0.57 | 4 | 256608 | 146716.4568 | 0 | 0 | -256608 | -146716.4568 |
|   | 233,280 | 0.50 | 5 | 256608 | 127579.5277 | 0 | 0 | -256608 | -127579.5277 |
| 7,097,376 | 776,358 | 0.43 | 6 | 853993.8 | 369205.0865 | 6387638 | 2761552.353 | 5533644.6 | 2392347.267 |
| 7,097,376 | 674,370 | 0.38 | 7 | 741807 | 278872.7278 | 6387638 | 2401349.872 | 5645831.4 | 2122477.144 |
| 7,097,376 | 674,370 | 0.33 | 8 | 741807 | 242498.0242 | 6387638 | 2088130.324 | 5645831.4 | 1845632.299 |
| 7,097,376 | 674,370 | 0.28 | 9 | 741807 | 210867.8471 | 6387638 | 1815765.499 | 5645831.4 | 1604897.652 |
| 7,097,376 | 674,370 | 0.25 | 10 | 741807 | 183363.3453 | 6387638 | 1578926.521 | 5645831.4 | 1395563.175 |
| 7,097,376 | 674,370 | 0.21 | 11 | 741807 | 159446.3872 | 6387638 | 1372979.583 | 5645831.4 | 1213533.196 |
| 7,097,376 | 674,370 | 0.19 | 12 | 741807 | 138649.0324 | 6387638 | 1193895.29 | 5645831.4 | 1055246.257 |
| 7,097,376 | 674,370 | 0.16 | 13 | 741807 | 120564.376 | 6387638 | 1038169.817 | 5645831.4 | 917605.4412 |
| 7,097,376 | 674,370 | 0.14 | 14 | 741807 | 104838.5878 | 6387638 | 902756.3628 | 5645831.4 | 797917.775 |
| 7,097,376 | 674,370 | 0.12 | 15 | 741807 | 91163.98939 | 6387638 | 785005.5328 | 5645831.4 | 693841.5435 |
| 7,097,376 | 674,370 | 0.11 | 16 | 741807 | 79273.03425 | 6387638 | 682613.5068 | 5645831.4 | 603340.4726 |
| 7,097,376 | 674,370 | 0.09 | 17 | 741807 | 68933.07326 | 6387638 | 593576.9625 | 5645831.4 | 524643.8892 |
|   |   |   |   |   |  **6,761,110.33**  |   |  **17,214,721.62**  | **NPV** |  **10,453,611.30**  |
|   |   |   |   |   |   |   |   | **IRR** | **14%** |
|   |   |   |   |   |   |   |   | **BCR** | **2.55** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Increase Cost by 20% and decrease revenue 20%** |  |  |  |  |  |
| **Revenue** | **Cost** | **Discount Factor** | **Year** | **Cost** | **PV** | **Revenue** | **PV** | **Incremental Benefits** | **PV** |
|   | 3,502,950 | 1.00 | 0 | 4203540 | 4203540 | 0 | 0 | -4203540 | -4203540 |
|   | 233,280 | 0.87 | 1 | 279936 | 243422.6 | 0 | 0 | -279936 | -243423 |
|   | 233,280 | 0.76 | 2 | 279936 | 211671.8 | 0 | 0 | -279936 | -211672 |
|   | 233,280 | 0.66 | 3 | 279936 | 184062.5 | 0 | 0 | -279936 | -184062 |
|   | 233,280 | 0.57 | 4 | 279936 | 160054.3 | 0 | 0 | -279936 | -160054 |
|   | 233,280 | 0.50 | 5 | 279936 | 139177.7 | 0 | 0 | -279936 | -139178 |
| 7,097,376 | 776,358 | 0.43 | 6 | 931629.6 | 402769.2 | 5677901 | 2454713 | 4746271.2 | 2051944 |
| 7,097,376 | 674,370 | 0.38 | 7 | 809244 | 304224.8 | 5677901 | 2134533 | 4868656.8 | 1830308 |
| 7,097,376 | 674,370 | 0.33 | 8 | 809244 | 264543.3 | 5677901 | 1856116 | 4868656.8 | 1591573 |
| 7,097,376 | 674,370 | 0.28 | 9 | 809244 | 230037.7 | 5677901 | 1614014 | 4868656.8 | 1383976 |
| 7,097,376 | 674,370 | 0.25 | 10 | 809244 | 200032.7 | 5677901 | 1403490 | 4868656.8 | 1203458 |
| 7,097,376 | 674,370 | 0.21 | 11 | 809244 | 173941.5 | 5677901 | 1220426 | 4868656.8 | 1046485 |
| 7,097,376 | 674,370 | 0.19 | 12 | 809244 | 151253.5 | 5677901 | 1061240 | 4868656.8 | 909986.8 |
| 7,097,376 | 674,370 | 0.16 | 13 | 809244 | 131524.8 | 5677901 | 922817.6 | 4868656.8 | 791292.8 |
| 7,097,376 | 674,370 | 0.14 | 14 | 809244 | 114369.4 | 5677901 | 802450.1 | 4868656.8 | 688080.7 |
| 7,097,376 | 674,370 | 0.12 | 15 | 809244 | 99451.62 | 5677901 | 697782.7 | 4868656.8 | 598331.1 |
| 7,097,376 | 674,370 | 0.11 | 16 | 809244 | 86479.67 | 5677901 | 606767.6 | 4868656.8 | 520287.9 |
| 7,097,376 | 674,370 | 0.09 | 17 | 809244 | 75199.72 | 5677901 | 527624 | 4868656.8 | 452424.3 |
|   |   |   |   |   | **7375757** |   | **15301975** | **NPV** | **7926218** |
|   |   |   |   |   |   |   |   | **IRR** | **11%** |
|   |   |   |   |   |   |   |   | **BCR** | **2.07%** |

**Conclusions and Recommendations**

The rubber farming/production has a net present value of 12, 981, 004.54 when the discount rate is 15% and 9, 187, 006.962 with the 18% discount rate. The Internal Rate of Return is 17% and 14% respectively which means that the investor’s loanable amount should not exceed 17% and 14% of their income to refrain from any losses. If the cost will increase by 20%, the IRR becomes 14% which is still tolerable for the project. However, if the cost will increase and the revenue will decrease by 20% at the same time, the IRR becomes 11%. The owner should not let this situation come since it can be crucial for the investment. If they will increase their cost, the revenue should also increase proportionate to the cost in order for them to gain the same amount of profit. They should increase their production to have an increase in their revenue.

 In getting the benefit-cost ratio, the total discounted benefits are divided to total discounted costs of production which yields to a value of 3.11. This indicates that in every peso increase of the cost, there is a 3.11 pesos benefit that the owner derived.

 After doing the evaluation of this project, the authors therefore recommend that this project should be continued since it is more efficient when the project was made. However, it is still important for the owner to be aware of the possible variations of the project’s NPV and IRR due to the changes in costs and revenues. The more aware the owner will be, the lesser probability that the project will collapse.