GNG2101 Deliverable F.2

Economics Report

Introduction to Product Development and Management

GNG 2101

July 2nd, 2023

Group Z13

François-Nasr Kharrat 300315604

Nusaibah Rashid 300334452

Justin Saikali 300072671

Jieying Yang 300103978

Jessica Young Spice 300160284

Abstract

This report analyzes the economics of a business involved in manufacturing and selling a product. It includes a comprehensive list of variable and fixed costs, direct and indirect costs, as well as material, labour, and overhead costs associated with the business. A 3-year income statement is developed, encompassing sales revenue, costs of units sold, gross profit, operating expenses, and operating income. Additionally, a break-even point is determined using a NPV analysis, considering present value and comparing costs and profits over multiple years. Assumptions made in the report are justified based on preliminary market research.

Table of Contents

List of Tables

List of Figures

Introduction

In this deliverable, we will evaluate the economic side of our product to see what type of business could be generated from our product. This will require a deep analysis of multiple factors that are required to be analyzed in a business to see if ultimately it is beneficial and operable. Notably, we will be creating a cost classification matrix, a 3-year income statement, net present value (NPV) analysis and finally some of our assumptions regarding our business.

Cost Classification

Table 1. Cost Classification Matrix

	Basic Cost Type		
Category	**Material**	**Labour**	**Overhead**
Variable	- Aluminum flat bar - Aluminum c-channel - ABS plastic - M3 screws - 1/4-20 bolt - Threaded swivel head - Thumb screw grip - Rubber sheets - Magnets	- Workers' salaries	- Electricity and heating bill for the production
Fixed			- Manufacturing equipment - Rent* - Marketing*
Direct	- Aluminum flat bar - Aluminum c-channel - ABS plastic - M3 screws - 1/4-20 bolt - Threaded swivel head - Thumb screw grip - Rubber sheets - Magnets	- Workers' salaries	- Electricity and heating bill for the production
Indirect			- Rent* - Marketing*

Income Statement

Position #	Description	2023	2024	2025
10	sales	$ 37,500.00	$ 75,000.00	$ 150,000.00
10.1	**total revenue**	**$ 37,500.00**	**$ 75,000.00**	**$ 150,000.00**
20	Operating Expenses			
20.1	Components & Materials	$ 15,888.19	$ 15,888.19	$ 15,888.19
20.2	Equipment			
20.2.1	Injection Moulder	$ 3,000.00	$ -	$ -
20.2.2	Mill	$ 5,000.00	$ -	$ -
20.2.3	Metal chop saw	$ 500.00	$ -	$ -
20.2.4	Misc. tools	$ 1,000.00	$ -	$ -
20.3	Marketing	$ 3,750.00	$ 3,750.00	$ 7,500.00
20.4	Electricity	$ 3,600.00	$ 3,600.00	$ 3,600.00
20.5	Salaries	$ 80,000.00	$ 80,000.00	$ 80,000.00
20.7	Rent	$ 24,000.00	$ 24,000.00	$ 24,000.00
20.8	Depreciation Allowance	$ 475.00	$ 475.00	$ 475.00
20.9	**Total Operating Expense**	**$ 137,213.19**	**$ 127,713.19**	**$ 131,463.19**
30	**Operating income**	**$ (99,713.19)**	**$ (52,713.19)**	**$ 18,536.81**

Figure 1. 3-Year Income Statement for Secure Cup Holder Company

NPV Analysis

Cash Flow for Expenses (Present Value)			
	Total Cost	**PV**	**NPV**
1st Year (2023)	137,213.19	137,213.19	341,531.52
2nd Year (2024)	127,713.19	105,548.09	
3rd Year (2025)	131,463.19	98,770.24	

Cash Flow for Incomes (Present Value)			
	Total Revenues	**PV**	**NPV**
1st Year (2023)	37,500.00	37,500.00	212,180.69
2nd Year (2024)	75,000.00	61,983.47	
3rd Year (2025)	150,000.00	112,697.22	

Cash Flow for Net Income (Present Value)			
	Total Revenues	**Total Cost**	**Net Income**
1st Year (2023)	37,500.00	137,213.19	(99,713.19)
2nd Year (2024)	61,983.47	105,548.09	(43,564.62)
3rd Year (2025)	112,697.22	98,770.24	13,926.98

Figure 2. Cash Flow Statement with Present Value

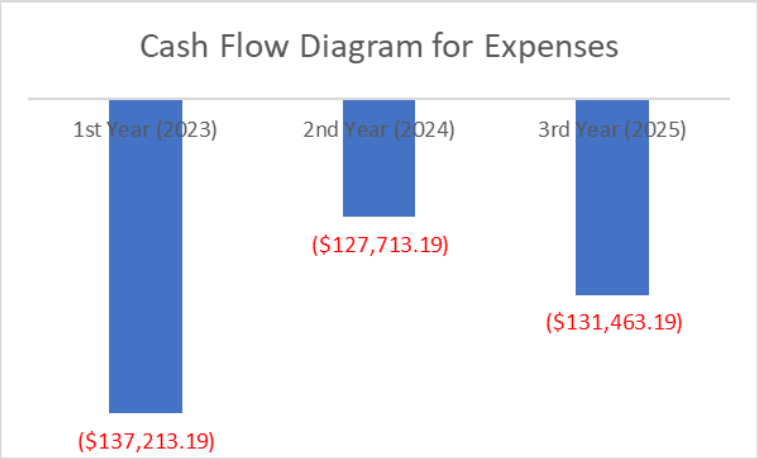

Figure 3. Cash Flow for Expenses

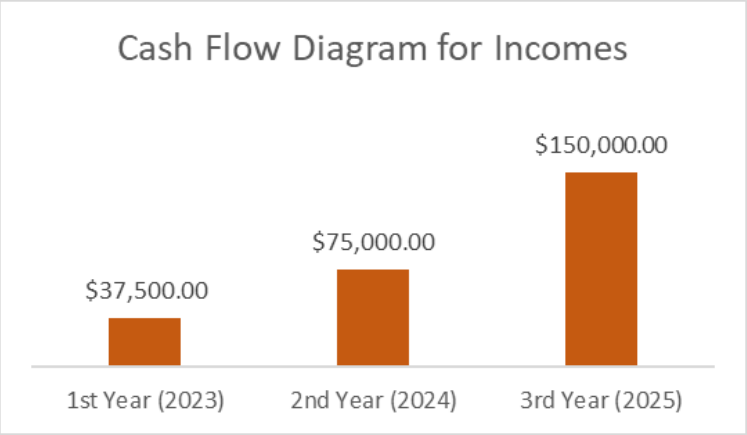

Figure 4. Cash Flow for Incomes

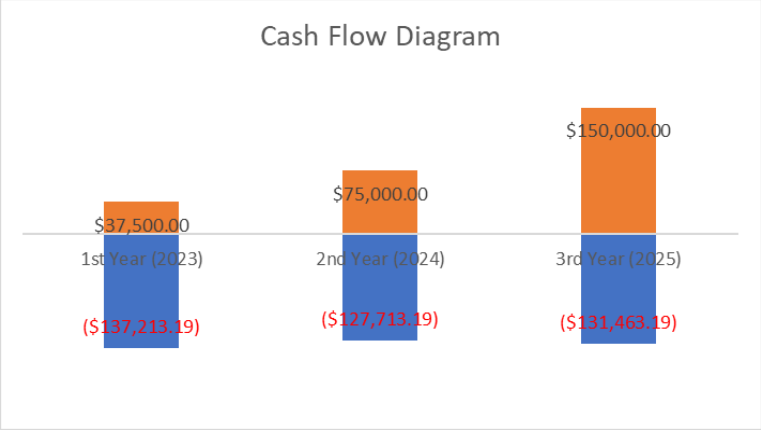

Figure 5. Cash Flow Diagram

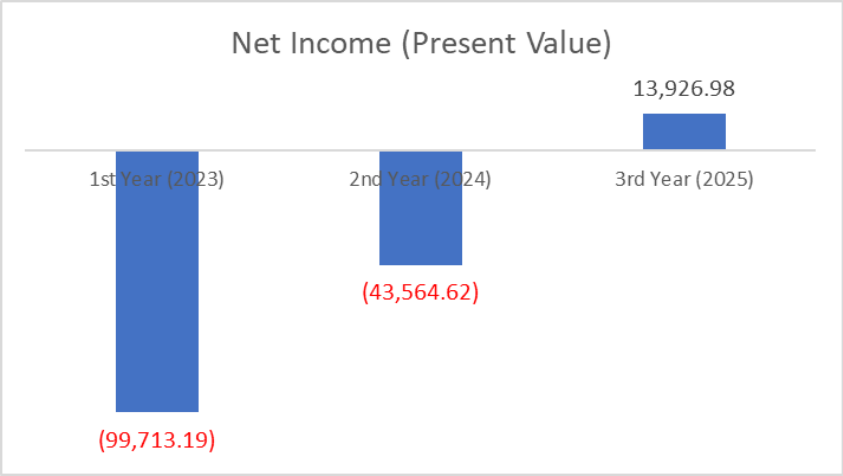

Figure 6. Net Income Diagram with Present Value

After considering the analysis of all costs and benefits for the next 3 years, we conclude that the company is essentially in a break-even position in terms of inputs and earnings in the third year. However, following our assumptions, the company is still in a loss making position after three years with an net present value of $ -129,350.83.

To calculate the break-even point, we need to determine the units sold when the company's total revenue equals its total cost, so that the net income is zero. However, in the case with our assumptions, if we consider three years as a periode, the company is still in the red after three years with a net present value (NPV) of $ -129,350.83, which indicates that the cumulative cash expenses have exceeded the cumulative cash revenues during the three-year period. In this case, there is no break-even point because the company could not reach the point where revenues equal costs.

If we take each year as an independent cycle, the company still has not reached a profitable state in the first two years, because the cost is still greater than the sales revenue. However, the sales in the next three years will show an increasing trend. Until the third year (2025), the company's sales revenue in the third year will exceed the cost in the third year and

reach a balance of payments. So in the third year of operation with a Net Present Value of $ 13,926.98, to reach the break-even point, 400 units of product must be sold.

To achieve a three-year overall view of the company's sales to break even, then we need to analyze and evaluate the various influencing factors and explore strategies to improve profitability and achieve positive net income, such as reducing costs, increasing sales, improving pricing strategies, or modifying business models to achieve profitability.

Assumption Justification

During the making of the income statement and other economic reports, many assumptions were made. These assumptions were based on research and our own critical thinking of how they would apply to our situation. To first establish the cost of materials to build our product, all components are assumed to be purchased from McMaster Carr, while the aluminum is to be purchased from metal pros in Ottawa, and the price for ABS plastic would be assumed by dollars per kg. The result of this is that to build one (1) of our secure cup holders, it would cost $9.08 of materials and components (See Appendix A for cost tables). For the equipment, we assumed that we would only need a mill, a small injection molding machine, a metal chop saw, and other miscellaneous tools. Based on our research, a suitable mill cost around $5000 [1], a suitable injection molding machine cost around $3000 [2], a metal chop saw cost around $500 [3], and other miscellaneous tools would cost around $1000.

Electricity was estimated to be around $300 per month, equating to $3600 per year [4]. Salaries were estimated to be around $80000 per year. This equates to having 2 machinist/manufacturing employees working for $40000 per year each [6]. Rent for a facility that would suit our small operation was found to be around $2000 per month, equating to around

$24000 per year [5]. Marketing expenses are typically budgeted for 5-10% of revenue for companies selling products to customers[7]. Therefore, we decided to budget 10% of our estimated revenue for the first year to get our product well marketed from the beginning, then budgeted 5% of our revenue for subsequent years. Lastly, as seen in class, a depreciation of our equipment would be estimated at 5% of the original value per year, which equates to $475 per year.

The pricing strategy used for our product is based on our cost of materials, and our total operating expense for a given year (See Appendix B). In year 2 (2024), our operating expenses minus the cost of materials is estimated to be at $111,825. If we estimate to sell 3000 products in that year, our cost from operating expense minus cost of materials is $37.28. If we add our cost of materials per product of $9.08, we get a total cost of our product to be $46.36. In year 3 (2025), our operating expenses minus the cost of materials is estimated to be at $115,575. If we estimate to sell 4000 products in that year, our cost from operating expense minus cost of materials is $28.89. If we add our cost of materials per product of $9.08, we get a total cost of our product to be $37.97. Therefore, in year 3 (2025), we can put a markup of 30% on top of our cost of the product to get our price to be sold at. This gives us $49.37, which we can round to $50. We find this to be a fair price for a quality, long lasting product like this. As business years go on, the price per product will consistently reduce, increasing our margins.

Another assumption made is that for the first three (3) years, we will produce 1750 units per year. This gives us a material cost of $15888.19 per year. We deemed this to be a realistic amount to manufacture given a small facility with 2 manufacturing employees. However, as seen in the income statement, we are not selling all of those products manufactured each year. In the first year (2023), 1750 units are manufactured, but only 750 units are sold. In the second year

(2024), 1750 units were also manufactured but now our sales increased to 1500 units sold. In the third year, 1750 units were manufactured, but 3000 units were sold. Therefore, after three years of consistent manufacturing numbers, but increasing sales, we end up selling all of our manufactured units. This means that after three years, if our sales continue to rise, we will need to increase manufacturing capabilities to meet demand.

To justify these sales figures, preliminary market research was conducted to find that the global cup holder market is anticipated to have a value of US$ 337.32 million in 2023[8]. This shows that the demand in the market is enormous. Given these vast numbers in the global market, we can deem the market to be significantly smaller in Canada however. Therefore, our annual sales in Canada being in the few thousands of cup holders per year is a realistic figure to shoot for, while also being competitive and taking a reasonable amount of the market share. We can estimate our market share to be around 5% in Canada, and of course much smaller globally [8].

Conclusion

In conclusion, this deliverable presents a comprehensive analysis of the economics surrounding a business engaged in the manufacturing and sale of our cup holder . By examining various cost categories, including variable and fixed costs, direct and indirect costs, as well as material, labour, and overhead costs, a clear understanding of the business's financial landscape is obtained. The 3-year income statement provides insights into sales revenue, costs of units sold, gross profit, operating expenses, and operating income. The NPV analysis helps determine the break-even point and assess the business's profitability over multiple years. The report's assumptions are justified based on preliminary research, ensuring a realistic assessment of

market demand, expected market share, and a sound pricing strategy. Overall, this analysis serves as a valuable tool for understanding and evaluating the economic viability of our business.

Appendix A: Cost of Goods Sold

Mcmaster Parts	Cost	Quantity per pack	Quantity per product	# of products to be purchased	Total Cost
91290a115	$ 9.54	100	3	52.5	$ 500.85
6103k71	$ 4.08	1	1	1750	$ 7,140.00
94052a153	$ 10.47	50	1	35	$ 366.45
90044A127	$ 15.53	25	1	70	$ 1,087.10
					$ 9,094.40
# of products manufactured	1750	2023		Cost per product	$ 5.20

Aluminum	Length needed (Inches)	Price (per Inch)	Total Cost		
Flat bar	8050	$ 0.21	$ 1,717.33		
C-channel (from tube)	1750	$ 2.51	$ 4,398.33		
			$ 6,115.67	Cost per product	$ 3.49

ABS Plastic	Weight needed (kg)	Price (per kg)	Total Cost		
For cup holder	271.25	$ 2.50	$ 678.13	Cost per product	$ 0.39

	Total Cost per Product	**$ 9.08**
Total Cost (based on # of products manufactured)		**$ 15,888.19**

Appendix B: Justification of Selling Price

	2024	2025
Operating Expense (minus cost of materials)	$ 111,825.00	$ 115,575.00
Cost per product (minus cost of materials)	$ 37.28	$ 28.89
Material cost per product	$ 9.08	$ 9.08
Total Cost per Product	$ 46.36	$ 37.97

References

[1] *KAKA INDUSTRIAL DP-32 DRILLING AND MILLING MACHINE.220V-60HZ-1PH.* (2020, May 20). -KAKA metal-working machinary. Retrieved July 2, 2023, from *https://www.kakaindustrial.ca/products/kaka-industrial-dp-32-drilling-and-milling-machine?variant=12342247161934&currency=CAD&utm_medium=product_sync&utm_source=google&utm_content=sag_organic&utm_campaign=sag_organic&srsltid=ASuE1wRhXkTGn1a-AqMwZcWa0v_1Va8i0SQE6EucCTxeGmg1pSiMsZ6gwmM*

[2] 220V Manual Vertical Injection Molding Machine Small Desktop Plastic Molding Machine Injection Molding Machine for PVC PP PE ABS. Retrieved July 2, 2023, from https://www.aliexpress.com/item/1005005073559371.html?pdp_npi=2%40dis%21CAD%21C%243%2C264.72%21C%241%2C926.18%21%21%21%21%21%402103146c16882247546647916e3871%211120000031531795840%21btf&_t=pvid:5f7840c8-7667-4033-8813-01732d9e899d&afTraceInfo=1005005073559371__pc__pcBridgePPC__xxxxxx__1688224754&spm=a2g0o.ppclist.product.mainProduct

[3] *Evolution Power Tools 14 Inch Steel Cutting Chop Saw | The Home Depot Canada*. (n.d.). Home Depot. Retrieved July 2, 2023, from https://www.homedepot.ca/product/evolution-power-tools-14-inch-steel-cutting-chop-saw/1001706322

[4] *Electricity Bill Calculator (customer choice | small business)*. (n.d.). Ontario Energy Board. Retrieved June 29, 2023, from https://www.oeb.ca/_html/calculator/en/electricity/smallbusiness/#Compare

[5] *Industrial Space | For Lease | Ottawa, Ontario*. (n.d.). Spacelist. Retrieved June 29, 2023, from https://www.spacelist.ca/listings/on/ottawa/industrial/for-lease

[6] *Salary: Machine Operator in Canada*. (2020, May 20). YouTube. Retrieved June 29, 2023, from https://www.glassdoor.ca/Salaries/machine-operator-salary

[7] *What is an average marketing budget for a small business?* (n.d.). BDC. Retrieved June 29, 2023, from https://www.bdc.ca/en/articles-tools/marketing-sales-export/marketing/what-average-marketing-budget-for-small-business

[8] *Cup Holder Market Size, Share, Forecast & Trends by 2033*. (n.d.). Future Market Insights. Retrieved July 2, 2023, from https://www.futuremarketinsights.com/reports/cup-holder-market