Project Deliverable H: Economics Report and 1 Minute Video Pitch

GNG2101 [A03] – Professor Hanan Anis

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1 Introduction

In this deliverable, Team 2 explores the economic situation of our project in further depth while providing a 1-minute pitch video for future investors. The cost of mass-manufacturing our product is investigated and an analysis of long-term income was developed based on it. NPV was used to develop a clear understanding of the requirements towards ensuring a successful business. To assist in this, real world data was collected and used to ensure assumptions made on customer size and similar, were within a reasonable margin of error.

2. Economics Report

2.1. Question 1: Lists

Classification of costs associated with our business for the manufacturing and sales of our product, the “NiCaBell”. The table below comes from our Bill of Materials in deliverable D. This table helps determine the cost of producing a unit of product, which will be used to calculate the total cost (material cost) of manufacturing the product in a desired volume.

Item name and description	Cost per unit - ($) (CAD)	High volume costs (taken from alibaba)	Classification of costs: direct or indirect	Classification of costs: fixed or variable
Raspberry PI Zero kit	32.95	Negligible (Not needed for production)	Direct	Variable
Raspberry PI Zero W board	12.95	11.51	Direct	Variable
SD card	9.00	3.01	Direct	Variable
Buttons - Tactile button switch	15.00	0.20	Direct	Variable
Resistors	0.00	0.05 per 5 units	Direct	Variable
Batteries (9V)	4.98	0.56	Direct	Variable
Protoboard	0.00		Direct	Variable
LEDs	3.00	0.13	Direct	Variable
Battery connector	0.00	0.26	Direct	Variable

PCB mount mini speaker	4.00	1.96	Direct	Variable
Vibrating motor	0.00		Direct	Variable
Microphone	9.00	5.36	Direct	Variable
Total	90.88	23.04 (excluding shipping and other fees)	**Note:** This is the total cost per unit. It goes down depending on the number of units to be manufactured. It is the cost of material / unit.	

Table 1: Material Costs

The table below shows the **annual** costs associated with our business and their classifications.

Item name and description	Cost - $ (CAD)	Classification of costs: direct or indirect	Classification of costs: fixed or variable
Rent (office)	1,200	indirect	fixed
Utilities/Electricity	3,500	indirect	variable
Salaries	16,500	indirect	fixed
Depreciation	10,000	indirect	fixed
Marketing	1,000	indirect	fixed
Insurance	1,000	indirect	fixed
Packing supplies	1,500	indirect	variable

Table 2: Other Related Costs

Note: information in blue is not included in the calculations below. This information can be included in the calculations or simply discarded. But, it is important to consider in our business.

2.2. Question 2: 3 – Year Income Statement

2 methods of payment were described: “10 easy bi-weekly payments of $19.99 CAD or $174.99 CAD” Considering a 50-50 split on these payment methods:

Year	Units sold (yearly)	Earnings	Material Cost

1	500	93745	50000
2	1000	187490	100000
3	2000	374980	200000

Table 3: Earnings Per Year Based Assumptions

Income statement based on assumptions and calculated values:

Description for year 1	**Type**	**Value**
Revenue		
Earnings		+$93745
Operating expenses		
Marketing	Indirect	-$1000
Manufacturing (includes electricity and salary)	Semi-variable + fixed	-$20,000
Materials	variable	-$50,000
Depreciation	indirect	-$10000
Rent	indirect	-$100*12 = -$1200
Debt	fixed	-$1000
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Totals		
Gross profit		$43,745
Operating income		$10545
Net income (after tax)		$7908.75

Table 4: Year 1 Income Statement

Description for year 2	**Type**	**Value**
Revenue		
Earnings		+$187490
Operating expenses		

Marketing	Indirect	-$1000
Manufacturing (includes electricity and salary)	Semi-variable + fixed	-$20,000
Materials	variable	-$100,000
Depreciation	indirect	-$10000
Rent	indirect	-$100*12 = -$1200
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Totals		
Gross profit		$87490
Operating income		$55290
Net income (after tax)		$41467.5

Table 5: Year 2 Income Statement

Description for year 3	**Type**	**Value**
Revenue		
Earnings		+$374980
Operating expenses		
Marketing	Indirect	-$1000
Manufacturing (includes electricity and salary)	Semi-variable + fixed	-$20,000
Materials	variable	-$200,000
Depreciation	indirect	-$10000
Rent	indirect	-$100*12 = -$1200
---	---	---
Totals		
Gross profit		$174980
Operating income		$142780

Net income (after tax)		$107085

Table 6: Year 3 Income Statement

Overall a majority of our fees comes from the materials of the goods. Our company is going to be relying on a website and simple marketing tools so related fees are relatively low. Thus, after 3 years the company would have a net income of $156,461.25 CAD.

2.3. Question 3: NPV – Analysis

Total Cost **84.88 -> $100 extra costs and shipping fees**

$$\mathrm{NPV} = \frac{R_t}{(1+i)^t}$$

First year:

NPV = 187.45/(1+0.1)

= $170.41

$1000(marketing)

$20,000(manufacturing)

$10000(deprecation)

$100*12(Rent)

$1000(debt)

187.45 avg selling price

Break even point = Fixed costs/ SP-VC

= $33200/$170.41-$100

= 471.5

= around 472 units need to be sold

Second year:

NPV = 187.45/(1.1)^2

=$154.92

$1000(marketing)

$20,000(manufacturing)

$10000(deprecation)

$100*12(Rent)

Break even point= Fixed costs/ SP-VC

32200/1.1 = 29272.72

100/1.1 = $90.91

=$29272.72/$154.92-$90.91

=457.3

Around 458 units need to be sold

Third year:

NPV = 187.45/(1.1)^3

= $140.83

$1000(marketing)

$20,000(manufacturing)

$10000(deprecation)

$100*12(Rent)

Break even point = Fixed costs/ SP-VC

32200/1.1^2 = $26611.57

100/1.1^2 = $82.64

= $26611.57/$140.83-$82.64

= 457.3

Around 458 units need to be sold

Using the NPV analysis we figured out that after one year we need to sell 472 units in order to break even. As well, we took into account we paid off our debt in the first year, therefore after every year after the first a total of 458 units need to be sold in order to break even

2.4. Question 4: Assumptions

The first assumptions made were in terms of taxes and rates. Income tax was set at 25%, and interest rates for the NPV calculations and debt were set at 10%.

The next assumption made was the cost we are charging the customers at remaining the same. Not all of the $100 CAD manufacturing cost comes from purely parts. Shipping fees were included in this as well (as shipping from china would be reliant on the amount/weight of product). If we were to manufacture this on a larger scale, then these fees would likely shrink. The cost of buying parts in bulk, as shown above, would likely decrease the cost per individual part as well. We keep the manufacturing cost the same because other fees would be introduced upon the move to larger scale production. Fees such as ones for: storage fees, shipping fees to customers, and future prototyping costs. These would negate the money we'd originally save but would not be included as operating expenses due to its possible value varying considerably. Not having to worry about these new fees could be considered another assumption as well.

The following assumption considered was that of the general fees included in calculations of operating expenses and similar. Electricity is bundled together with manufacturing and being outsourced

to companies in this industry. Overall, the assumption was made that it would cost us roughly $20000 CAD a year to produce the devices including salaries as well. Based on real world data from spacelist.ca, a small office room goes for about $100/month which we assumed as our required working space for any business meetings or similar. Marketing was considered a minor fee as the team would be mainly using a website. A small cost of $1000 was added in the case of using online targeted ads. Debt was assumed to proceed in the following manner: In the first year of operation, the team would take on a debt of $10000 CAD to pay for early expenses. By the end of the year, the debt is fully paid off using net income of the year. Thus, only the 10% interest is added as a cost. Depreciation was assumed at an approximated value for this product. Unless damaged by external forces the device is assumed to have a lifespan of 10 years as there are few sources of wear on the device aside from the LEDs and buttons (easily replaceable). Thus, a value of $10000 is associated with it per year.

Earnings calculated were based on assumptions as well. According to the Ontario long term care association, as of February 2019, Ontario had 626 licensed long-term care homes with 77,257 long term beds in total. And according to the Canadian institute for health information, this has yet to change as of September 24, 2020. While the OLTC has it listed that wait times for a bed average 161 days, due to current world events, for these calculations, it was assumed that these locations are running at 90% capacity. This results in a total of roughly 70,000 possible customers amongst the long-term care homes. Then, other potential customers than can be considered include those in private housing and short-term patients in hospitals (roughly 400 in Ontario). With these in mind, to simplify future calculations, the estimated possible customer count is rounded up to 100,000. With this in mind, the estimated sales per year becomes:

1st year: 0.5% of the market or 500 units

2nd year: additional 1% of the market or 1000 units

3rd year: additional 2% of the market or 2000 units

The first year is expected to have lower units due to the company being new. It is then assumed that there won't be too many problems regarding the technology and popularity will increase. However, farther down the line, increase in purchases isn't expected unless new features are added. This is due to the nicheness of the market and how slowly the customer population grows.

3 Pitch Presentation

Please refer to the MakerRepo for Team 2's Pitch Presentation.

4 Conclusion

Overall, a plan to develop Team 2's product into a successful business was created through the usage of real-world data. Taking low debt, while relying on online marketing tools and marketing throughout Ontario would allow for a slightly profitable first year, along with more profitable years following. Along with this, a 1-minute pitch video was created for outside investor visibility and the project plan was updated according to any changes necessary.

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