University of Ottawa

Faculty of Engineering

GNG2101 Introduction to product Development and management for Engineers

Project Deliverable G

Submitted by

Talk Box. C01, Team C13

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1 Introduction

In this deliverable, group C13 breaks down the business structure of the TalkBox project. We have explored different cost classifications, business model, and present & future revenue breakdowns. We have clearly defined who the clients/ end users are and how they will use the services, delve into the key aspects of the project such as resources, partners, and activities, and label the possible costs of the project while classifying revenue sources. Furthermore, the current project cost and values are broken down into fixed, variable, direct and indirect costs associated. The costs are also categorized based on whether they are labor or material cost. Finally, the present net value of the project is clarified as to what the cash inflows and outflows are, plus the overview of future plans for the next 3 years.

2 Business Model

A business model plays a vital role in the success of a startup as it describes the rationale of how the company creates, delivers and captures value. Some of which include but are not limited to economic, social, and cultural benefits. Developing a business model forces one to think about the step-by-step plan of action to profitably deliver these values in a specific marketplace. A strong business model answers the questions: Who is the customer? And what does the customer appreciate? How do we make money in this business? What is the underlying economic logic that explains how we can deliver such benefits to customers at an appropriate cost?

After careful analysis and review, the business model chosen for our product is the "product platforms that enable third party services" model. This model is commonly utilized

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when one wants to enable third party service providers as an addition to the functionalities of the original device. In our case, it allows our business to optimize already existing technologies and models to upgrade the capabilities of TalkBox. In our business model we are depending on the user to use home assistive technology to communicate with smart devices around their living environment. We are also depending that the user's caregiver also uses their wifi and personal laptop, desktop, or smartphone to update the talk box database.
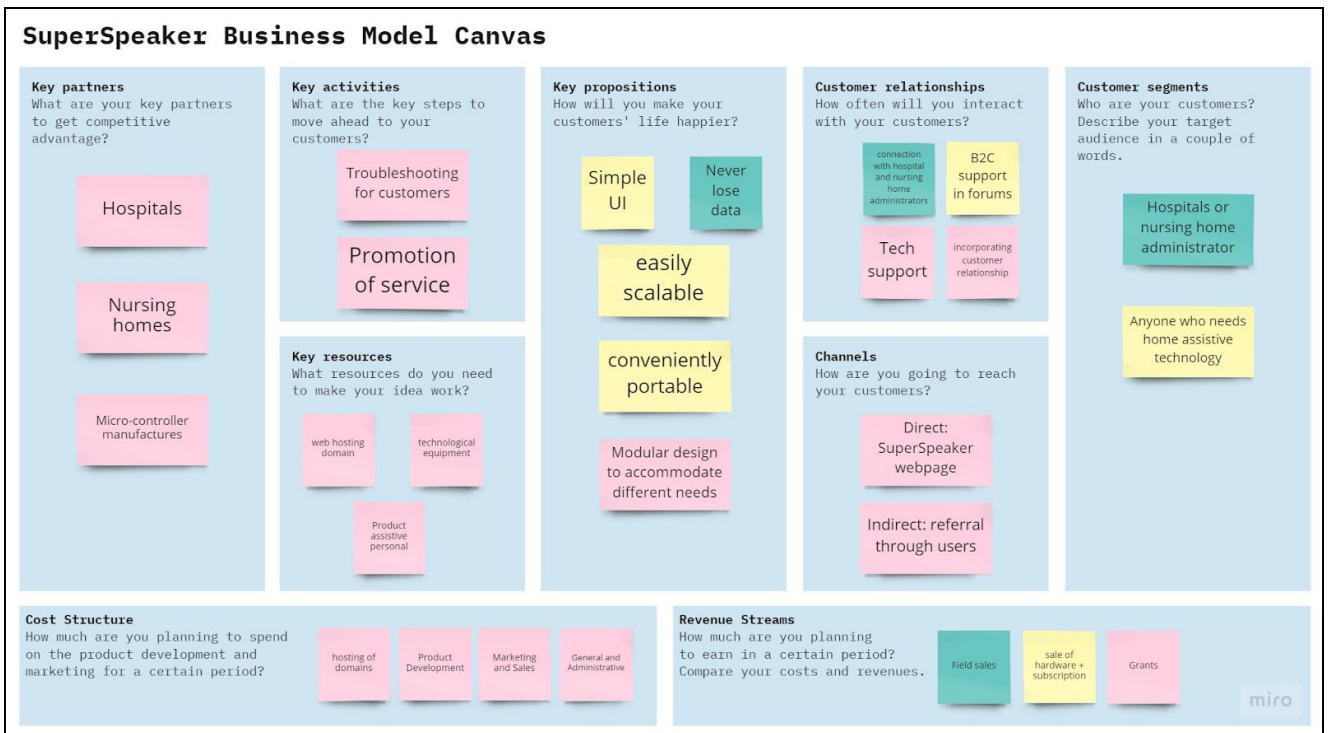

Figure 1: Business Model Canvas

Key partners:

Partnering with nursing homes and hospitals will help as a promotion to our device to be used with their residence and patients. In addition partnering with a reliable microcontroller manufacturing company could help us reduce our material costs and potentially provide a relatable supply.

Key activities:

The business key activities throughout the customer journey is to troubleshoot and help the users with any technical issues and questions. Sales and promotions of the talkbox will also be one of the main activities of the company to ensure there is enough revenue.

Key resources:

Resources, in this case, may be attributed to both human, software, and material objects. Human resources are product assistive personals that are very knowledgeable with the device manufacturing processes and capabilities. Should the company be flourishing, it would be appropriate to consider an accounting team as well. Software resources included database storage and a web hosting domain. Material resources consist of all the technological equipment needed for the TalkBox to fully function.

Key propositions:

Our company aim is to provide a device that can assist people with cognitive and dexterity disabilities communicate with people around them as well as to home assistive devices. Hence, we are working on providing a solution that is easily scalable and conveniently portable for the user. The caregiver uses a simple UI to update the TalkBox, the data that is updated by the carviger is never lost as it is stored in an online database. Finally, the device consists of a modular design as it allows the user to configure the joystick to accommodate different user needs.

Customer relationships:

Useful connections with hospital and nursing homes administrators helps the company gain general insight on the users and the caregiver needs of TalkBox. A direct relationship is built with the customer through forms and support center.

Channels:

The company will reach its customers through two channels: TalkBox webpage for details about the services, prices, company mission, and customer service forms. In addition, we aim to have a relationship with hospitals and nursing home staff that can refer our device to customers and users.

Customer Segments:

Our customer segments fall into two groups: hospitals and nursing homes administrators which can introduce the TalkBox device to many patents and residents rapidly. Additionally, anyone who needs home assistive technology.

Cost Structure:

In order to provide a great device and service, the company will send on hosting domains to market the TalkBox as well and allow the user's caregiver to update the TalkBox functionality. The company also plans to spend on product development to ensure that technology used is functioning flawlessly. Finally, there is a budget allocated to marketing and sales and administration costs.

Revenue Streams:

The main two revenue streams are the field sales made for hospitals and nursing homes as it will allow us to sell multiple devices to one entity, and the sales of a single TalkBox + a subscription for maintenance purposes for individual users. Lastly the company will also apply for grants to help increase the capital in the early stages of the company.

3 Assumptions and Feasibility

One assumption that we have made in choosing the "product platforms that enable third party services" is that our SuperSpeaker device will optimize smart home assistive devices like (google home and alexa) to communicate to devices. This model is ideal to allow the user to easily update the list of phrases stored in the SuperSpeaker database. Additionally, the caregiver is able to use their own device (such as laptop, or smartphone) to update the database used in TalkBox.

4 Costs and Income Statement

Table 1:

Cost	Variable/Fixed	Direct/Indirect	Expense/Labour/Material
*Raspberry Pi 3 - Model A+	Semi	Direct	Material
*USB Powered Speakers	Semi	Direct	Material
*I2C IIC Analog-to-Digital	Semi	Direct	Material
*Raspberry Pi Touchscreen	Semi	Direct	Material
*Samsung EVO Plus 32GB sd card	Semi	Direct	Material
*I2C LCD screen	Semi	Direct	Material
*HDMI cable	Semi	Direct	Material
*Keyboard	Semi	Direct	Material
*Mouse	Semi	Direct	Material
*Monitor screen	Semi	Direct	Material

*Joystick	Semi	Direct	Material
*Arcade low force push button	Semi	Direct	Material
*Jumper cables	Semi	Direct	Material
*PLA and 3D printing	Semi	Direct	Material
*Elastic straps	Semi	Direct	Material
Marketing	Fixed	Indirect	Labour
Assembly labour	Fixed	Direct	Labour
Overhead	Fixed	Indirect	Expense
Depreciation	Fixed	Indirect	Expense
Rent	Fixed	Indired	Expense

* These are production materials required to make the device.

3-year income statement:

Since there isn't any interest or taxes, the operating income acts as the net income.

Overview of Year 1

COST NAME	UNIT COST	NUMBER OF UNITS/NUMBER OF HOURS	YEARLY COST	APPLIED VOLUME DISCOUNT
Direct Material Costs (Variable)				
Raspberry Pi 3 - Model B+	35.95	100	3235.5	
USB Powered Speakers	13.95	100	1255.5	
I2C IIC Analog-to-Digital	7.99	100	719.1	
Raspberry Pi Touchscreen	23.99	100	2159.1	when getting a 100 units we can get a 10% discount
Samsung EVO Plus 32GB sd card	11.99	100	1079.1	
I2C LCD screen	10	100	900	
Joystick	5	100	450	
Arcade low force push	2	100	180	

button				
Jumper cables	10	600	5400	
PLA and 3D printing	6	100	540	*30$/KG of PLA
Elastic straps	5	20	90	
HDMI cable	6	1	5.4	
Keyboard	7	1	6.3	Equipment (one time purchase)
Mouse	5	1	4.5	
Monitor screen	100	1	90	
Total Material Costs	131.87	1524	16114.5	
Direct Labour Costs (Variable)				
Assembly Costs	15	2	30	
Total Direct Labour costs	15		30	
Indirect Labour Costs (Variable)				
Gernal, Sales, Admin	18	150	2700	35$/hour
Total Indirect Labour costs	18		2700	
Indirect General Costs (Fixed)				
Building/Office Lease	500	12	6000	700$/month
Total Indirect General costs	500		6000	
Direct Production Cost(Fixed)				
Equipement	106.2			
Units Sold This Year	90			
Price Per Unit	325			
Cost Per Unit	131.87			
Total expenses for the first year	36819			
Total sales for the first year	29250			

Revenue Sales = # of devices sold x cost of 1 device
Revenue Sales = 90 units x $325
Total Year 1 Revenue = $29250

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Operating Expenses = materials cost + # of units * direct labour cost + indirect labour cost + general cost
Operating Expenses = $16114.5 + 100 * $30 + $2700 + $6000
Operating Expenses = $36819

Gross Profit = Revenue sales - Operating Expenses
Gross Profit = $29250 - $36819
Gross Profit = ($7569)

Overview of Year 2

COST NAME	UNIT COST	NUMBER OF UNITS/NUMBER OF HOURS	YEARLY COST	APPLIED VOLUME DISCOUNT
Direct Material Costs (Variable)				
Raspberry Pi 3 - Model B+	35.95	200	5392.5	
USB Powered Speakers	13.95	200	2092.5	
I2C IIC Analog-to-Digital	7.99	200	1198.5	
Raspberry Pi Touchscreen	23.99	200	3598.5	when getting a 200 units we can get a 25% discount
Samsung EVO Plus 32GB sd card	11.99	200	1798.5	
I2C LCD screen	10	200	1500	
Joystick	5	200	750	
Arcade low force push button	2	200	300	
Jumper cables	10	1200	9000	
PLA and 3D printing	6	200	900	*30$/KG of PLA
Elastic straps	5	40	150	
HDMI cable	6	0	0	Equipment (one time purchase in first year)
Keyboard	7	0	0	
Mouse	5	0	0	
Monitor screen	100	0	0	
Total Material Costs	131.87	3040	26680.5	
Direct Labour Costs (Variable)				
Assembly Costs	15	1	15	staff is more trained hence it takes less time to assemble

Total Direct Labour costs	15		15	
Indirect Labour Costs (Variable)				
Gernal, Sales, Admin	18	150	2700	35$/hour
Total Indirect Labour costs	18		2700	
Indirect General Costs (Fixed)				
Building/Office Lease	500	12	6000	700$/month
Total Indirect General costs	500		6000	
Direct Production Cost(Fixed)				
Equipement	0			
Units Sold This Year	200			
Price Per Unit	325			
Cost Per Unit	131.87			
Total expenses for the first year	64754.5			
Total sales for the first year	65000			

Revenue Sales = # of devices sold x cost of 1 device
Revenue Sales = 200 units x $325
Total Year 2 Revenue = $65000

Operating Expenses = materials cost + direct labour cost + indirect labour cost + general cost
Operating Expenses = $26680.5 + # of units * $15 + $32700 + $6000
Operating Expenses = $64754.5

Gross Profit = Revenue sales - Operating Expenses
Gross Profit = $65000 - $64754.5
Gross Profit = $245.5

Overview of Year 3

COST NAME	UNIT COST	NUMBER OF UNITS/NUMBER OF HOURS	YEARLY COST	APPLIED VOLUME DISCOUNT
Direct Material Costs (Variable)				
Raspberry Pi 3 - Model B+	35.95	300	7549.5	when getting a 300 units we

USB Powered Speakers	13.95	300	2929.5	can get a 30% discount
I2C IIC Analog-to-Digital	7.99	300	1677.9	
Raspberry Pi Touchscreen	23.99	300	5037.9	
Samsung EVO Plus 32GB sd card	11.99	300	2517.9	
I2C LCD screen	10	300	2100	
Joystick	5	300	1050	
Arcade low force push button	2	300	420	
Jumper cables	10	1800	12600	
PLA and 3D printing	6	300	1260	*30$/KG of PLA
Elastic straps	5	60	210	
HDMI cable	6	0	0	Equipment (one time purchase in first year)
Keyboard	7	0	0	
Mouse	5	0	0	
Monitor screen	100	0	0	
Total Material Costs	131.87	4560	37352.7	
Direct Labour Costs (Variable)				
Assembly Costs	15	0.5	7.5	
Total Direct Labour costs			7.5	
Indirect Labour Costs (Variable)				
Gernal, Sales, Admin	18	150	2700	35$/hour
Total Indirect Labour costs	18		2700	
Indirect General Costs (Fixed)				
Building/Office Lease	500	12	6000	700$/month
Total Indirect General costs	500		6000	
Direct Production Cost(Fixed)				
Equipement	0			
Units Sold This Year	300			
Price Per Unit	325			
Cost Per Unit	131.87			
Total expenses for the first year	87863.7			

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Total sales for the first year	97500			

Revenue Sales = # of devices sold x cost of 1 device
Revenue Sales = 300 units x $325
Total Year 2 Revenue = $97500

Operating Expenses = materials cost + # of units *direct labour cost + indirect labour cost + general cost
Operating Expenses = $37352.7 + 300*$10 + $2700 + $6000
Operating Expenses = $87863.7

Gross Profit = Revenue sales - Operating Expenses
Gross Profit = $97500 - $87863.7
Gross Profit = $9636.3

Total after 3 years:

Total Revenue = Revenue year 1 + Revenue year 2 + Revenue year 3
Total Revenue = $29250 + $65000 + $97500
Total Revenue = $191750

Operating Expenses = Expense year 1 + Expense year 2 + Expense year 3
Operating Expenses = $36819 + $64754.5 + $87863.7
Operating Expenses = $189437.2

Gross Profit = profit year 1 + profit year 2 + profit year 3
Gross Profit = ($7569) + $245.5 + $9636.3
Gross Profit = $2312.8

5 NPV and Break-Even analysis

Net Present Value $= \frac{Present\ cash\ (inflow - outflow)}{(1 + i)^{t}}$
i: discount rate
t: number of time period

Based on the foreshadowing done in the 3-year income statement, it appears that the

break-even point will occur some time after the third year. In order to find the appropriate

investment needed for covering the business operation cost and to cover the profit loss that

was projected in the 3-year income statement plan, using the NPV will help find the right value according to the predictions made for the future income statements:

$$\sum_{1}^{i=3} PV_i = \frac{\$36819+7569}{(1+0.10)^1} + \frac{\$64754.5}{(1+0.10)^2} + \frac{\$64754.5}{(1+0.10)^3} = 145,867.03$$

To break even, we would need to know how many units need to be sold, Each unit costs $325 and so it can be found that approximately 449 units have to be sold to pay back the investment. With a discount rate of %10, it's possible to do a discounted cash flow analysis:

$$\sum_{1}^{i=3} PV_i = \frac{\$29250}{(1+0.10)^1} + \frac{\$65000}{(1+0.10)^2} + \frac{\$97500}{(1+0.10)^3} = 180,691.21$$

The production limit is increased to over 400 in the third year, and so the prediction can be made that the business would break even during the third year of its cash flow, and start to gain profit from the product.

6 Conclusion

The business and economical standards of this project were figured out and organized appropriately with regards to the TalkBox project progress. Based on the estimations and foreshadowing done, this project as a product would start being profitable sometime around its second period of selling, based on the trend that was declared in the income statement. Approximately 200 units would have to be sold to be able to start breaking even and making profit from this business. It was realised that the business model for this project synergises quite well with the healthcare systems, leading to the idea that it can be used for other clients with other various disabilities that impairs their speech capabilities. Also with the help of having subscription services, the device can be maintained consistently with updates, meanwhile offering a steady case of cash flow.