Deliverable F: Business Constraints

GNG 2101– Introduction to project management and development

Group Z25

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Introduction:

In the journey of developing our final prototype into an actual product, it becomes crucial to envision a potential business model that can effectively commercialize the product. This is the focus of Project Deliverable F. The objective of this deliverable is to identify a suitable business model, create a business model canvas, and evaluate the social, environmental, and economic impacts of the product. Additionally, the deliverable requires the development of a forecasted income statement and an exploration of intellectual properties that may act as legal constraints. By undertaking these tasks, the project aims to provide a comprehensive understanding of the business constraints associated with transforming the prototype into a successful product.

1. Business Model and Sustainability Report:

A. Type of business model

The voice-controlled fix for Dany's recliner would be well-suited for commercialization using a subscription-based service business model in combination with a starting fee. This model would entail providing ALS patients and possibly other people with mobility issues with the voice-controlled remote-control system as a service. Customers would have to pay a recurring fee to use the voice-controlled system, which the company would be responsible for updating and maintaining.

Choosing the subscription-based service model for the following reasons:

a. **Long-Term Relationship:** Dany and other ALS patients need constant care and assistance. A subscription-based business model makes it possible to maintain a relationship with the clients while offering them updates, enhancements, and support over an extended period.

b. **Recurring subscription fees:** Produce a consistent and predictable revenue stream that can fund ongoing product development, maintenance, and support.

c. **Flexibility and Scalability:** To accommodate various customer needs, the subscription model allows for flexibility in pricing and service tiers. By focusing on a larger market and accommodating more users as the service expands, it also offers scalability.

d. **Continuous Improvement**: The subscription model encourages the company to make improvements to the voice-controlled system on a continuing basis in response to customer feedback and changing needs, resulting in high levels of customer retention.

B. Triple Bottom Line Business Model Canvas:

How:

Offer a voice-controlled system with a subscription-based service.

Continually update and improve the system in response to user feedback.

Offer assistance and support to customers.

What:

remote control for recliners that can be operated by voice.

Service model based on subscriptions.

Updates and improvements to the product are ongoing.

assistance and support for customers.

Who:

ALS patients and individuals with mobility limitations.

Caregivers of ALS patients.

How Much:

depending on the service tiers and features, recurring subscription fees.

Pricing that is reasonable for the quality and convenience offered to the target market.

generating income to support product development, upkeep, and support.

C. Core Assumptions and Feasibility:

Core Assumptions:

The voice-controlled solution will primarily appeal to ALS patients and people with mobility issues.

Involvement of ALS patients' carers in decision-making and subscription procedures is planned.

The target customer base will be able to afford the subscription pricing at a fair level.

Patients with ALS have a market need for a voice-controlled option for recliners.

High levels of customer satisfaction and retention will be the result of ongoing improvements and updates.

Feasibility:

The size and willingness of the identified target market to pay for the service determine the viability of the business model.

The assumptions about market demand and pricing sensitivity can be confirmed by conducting surveys and market research.

The right customer base can be targeted by working together with ALS associations and healthcare professionals, who can offer insights and support.

Continuous improvement and high customer satisfaction can be ensured through regular customer feedback loops and communication.

D. Sustainability Report:

Product's Major Social Impact:

Positive Impact: ALS patients and people with mobility issues will be more independent and comfortable, which will improve their quality of life and self-esteem.

Limited accessibility for people without internet access or experience using voice-activated technology.

Product's Major Environmental Impact:

Positive Impact: The reclining chair will require less physical interaction and manual control, which could save energy and prevent mechanical wear and tear.

Increased electronic waste as a result of the voice-controlled system's ongoing maintenance and updates.

E. Product's Major Economic Impact:

Positive effects include the creation of jobs and increased financial opportunities for developers, customer service agents, and maintenance specialists.

Negative impact: Access to the voice-controlled system may be restricted due to potential affordability issues for people with limited financial resources, for which exceptions can be made.

With the help of this analysis, the business model canvas' triple bottom line can be filled out with precise information and metrics concerning the effects of the product and its associated subscription-based service on the social, environmental, and economic spheres.

2. Economics

A. Include a list of variable/fixed, direct/indirect, and material/labour/overhead costs associated with your business, based on the manufacturing and sale of your product. Make sure that you distinguish between price and cost and realize that prototyping and higher-volume manufacturing costs will probably be different.

A) Raspberry Pi 4B 2GB

B) PLA filament

C) Wires

D) SD card 32 GB

E) Microphone

F) Fasteners

G) 4-Channel relay

H) Stand-offs

I) Heat Shrink

J) Monthly server fee

K) Printing fee

L) Income tax

	Basic Cost Type		
Category	Material	Labour	Overhead
Variable	A, D, E		
Fixed	B, C, F, G, H, I		J
Direct	A - I		
Indirect			J

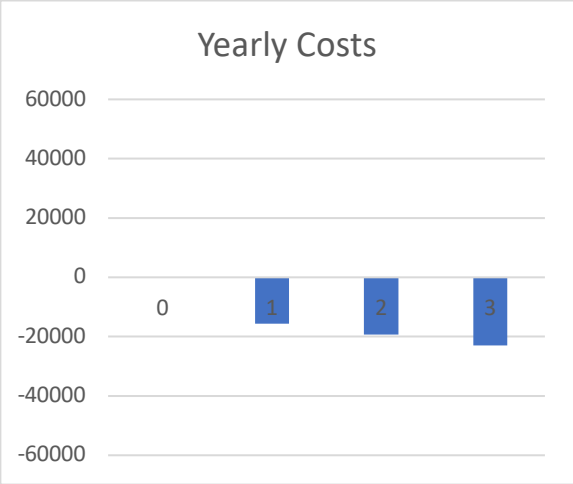
Other Cost Type (Special Cost)	
Opportunity cost	
Sunk cost	
Tax cost	L
Depreciation cost	
Financial cost	K

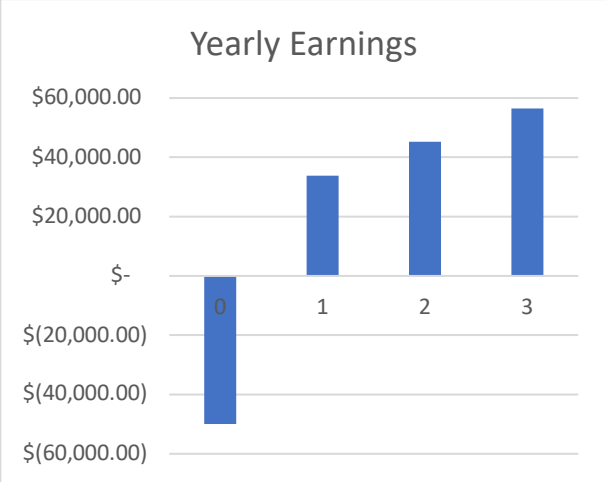
B. Develop a 3-year income statement, which includes sales revenue and costs of units sold for each year, gross profit, operating expenses and operating income (no need to include interest and taxes).

	ITEM	COST (CAD)	NOTES
10	Unit Sales	$ 60,000.00	300 remotes at 200 CAD
10.2	Subsricptions	$ 75,600.00	300 subscriptions at 7 CAD a month
11	Sales Tax	$ 17,628.00	Ontario HST is 13%
12	Cost of Goods	$ 44,760.00	300 remotes at 149.2 CAD
13	Gross Profit	$ 90,840.00	
14	Operating Expenses	$ 1,906.92	Cost of server is 52.97 CAD per month
20	Operating Income	$ 88,933.08	
30	Interest Expense	$ 11,250.00	With a 10k loan at 7.5% a year for 3 years
40	Earning Before Tax	$ 77,683.08	
50	Income Tax	$ 6,991.48	Small business tax is at 9% thanks to rebates
60	Net Income	$ 70,691.60	

C. Using a NPV analysis, determine the break-even point (i.e. number of units that must be sold for your business to become profitable). Note: It is highly unlikely that your operating income will be positive in the first year because of fixed costs. Therefore, you must use a NPV analysis to compare costs and profits over multiple years based on present value. Draw two cash flow diagrams of the expenses and incomes for the next three years. Calculate the NPV value of each expense/income and determine the differences and then the break-event point.

Using an NPV analysis, we can determine that the break-even point will occur on the end of year 3. After 2 years, the debt that will have been paid will be a little over 40k CAD. The NPV after 3 years will be a little over 10.8k CAD.





More detailed calculations can be found in the attached excel document. An excel function was used to find the NPV. To determine the cashflow of each year the costs and the earnings

Discount rate	12%	
Initial Investment	$ (50,000.00)	
Year 1	$ 18,324.36	75 remotes
Year 2	$ 25,894.36	100 Remotes
Year3	$ 33,464.36	125 Remotes
NPV	$10,823.13	

D. Describe and justify all assumptions that you have made in developing your economics report. The assumptions must be factual based on a preliminary market research that you conduct in order to determine the amount of demand in your target market, the expected % of the market that you would own, and the unit price of your product based on a sound pricing strategy.

Some assumptions taken for the calculations: 5.2 out of 100,000 people have ALS. If we only consider them as the target audience for our product (neglecting every other person with mobility issues) to be conservative in estimates, the amount of people in Canada would be under 2000. However, over 540 000 Canadians considered themselves homebound in 2020. It is highly likely that a portion of this demographic would benefit from this product. Using this data, we estimate that approximately 300 controllers will be purchased over a 3-year period. Nonetheless, it would be fair to assume that there would be a significantly higher number of consumers, making our current estimate rather conservative. Furthermore, this analysis only considers domestic sales. Assuming a substantial level of growth is achieved, it would be reasonable to move beyond purely domestic sales.

Assuming we take a loan for 50 000 CAD at a 7.5% interest rate (rates in Canada range from 5.11%-10.46%) to make 300 controllers, for a cost of a little over 44K and to cover for marketing, servers, and other expenses. Assuming that these are all sold and no new costs are accrued, we would begin to turn a profit at the end of the 3-year period.

In terms of the market price of a single unit, we are currently assuming that a single remote will sell for $200, with a $7/month subscription fee. However, it would be possible to sell units at a much higher price, potentially up to $450, depending on current market value of materials and the reception of our product by its user base. This is because the other products that we benchmarked are all over 600 CAD, and perform much worse in general.

We assumed a yearly depreciation value (discount rate) of 12%, which is an acceptable number for business reports and similar economic analysis per Mercer Capital. As for the assumption of sales, we assumed a that 75 controllers would be sold in the first year, 100 on the second and 125 on the thirds. We assumed an increase in volume of sales throughout the years, but it all really depend on the popularity of the product.

Lastly, taxes and interest were included in all calculations in order to make them as precise as possible and since neglecting them could paint a misleading picture.

3. Intellectual Property

Patent EP3348173A3 is about smart chairs with actuators that can be operated by voice commands.

Patent US20050288930A1 relates to a computer speech recognition apparatus and method for converting speech input into data and retrieving corresponding data from a database to provide as speech output.

Patent US4776016A relates to a voice control system adaptable to existing computers, with keyboard control means and priority switches connected to the computer itself and controlled by software[7].

These intellectual properties play an important role in the development of our product and business. This is because these patents utilize speech recognition and speech synthesis technologies to enable users to operate various functions and services with voice commands. Our voice-activated Raspberry Pi that controls a recliner could be developed based on these patents. These patents also impose legal restrictions on product and business development. This is because these patents are the exclusive rights of the patentee, and if they are used by others without their permission, they will constitute patent infringement and may be subject to legal action such as compensation for damages and an injunction. is. It should be noted that the patents are either expired, abandoned or non-active and do not affect our product in today's market.

Our implementation is using open an open-source voice recognizer named Mycroft Precise. Precise allows for commercial license uses of their software without having to pay a fee or get approval. Precise itself operates on Google's Tensorflow which also operates on the same open Apache License 2.0

Conclusion:

In conclusion, Project Deliverable F has provided valuable insights into the business constraints involved in the development and commercialization of the final prototype. The chosen business model has been described and justified, highlighting its compatibility with the product's commercialization. The business model canvas has been completed, incorporating core assumptions and evaluating the feasibility of the model. Moreover, the sustainability report has shed light on the social, environmental, and economic impacts of the product, aiding in the assessment of its triple bottom line. The economics report has presented a comprehensive income statement, allowing for a thorough analysis of costs, revenues, and profitability. Through the NPV analysis, the break-even point has been determined, enabling a better understanding of the product's financial viability. Finally, the intellectual property report has explored relevant databases, identifying and discussing the legal constraints associated with intellectual properties. By considering all these factors, the project has provided a holistic view of the business constraints that need to be considered for the successful commercialization of the product.

Project Management:

Wrike Snapshot

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=YuqR7hmJAvNlsyEHPGwN0uzoellPZVZA%7CIE2DSNZVHA2DELSTGIYA

Sources

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