GNG2101

Introduction to Product Development and Management for Engineers and

Computer Scientist

Course Professor: Dr. Emmanuel Bouendeu

Deliverable G

Business Model and Economics Report

Presented to: Melika Ataebi

Prepared by Group B12

Team Members:

Family Name, Name:	Student ID:
Keryakes, Laura	300265134
Balachandiran, Vivethen	300245080
Ouloum, Yassine	300263213
Ma, Jiayi	300263220
Vadakkeveettilan Hilariyos, Chelse Rose	300214163

Date: November 20, 2022

Introduction

Business models are important for both new and longstanding businesses. In the scenario that we have started a company built around the conception of our product, it is important that we have a business model to ensure the viability in our company in terms of economics as well as employment. Furthermore, economics reports are also important to be aware of how our financial investments will perform. It allows an overview on the success (or even the downfall) of our company in this economy.

G.1. Business Model

1. Choice of Our Business Model

   Firstly, we have agreed that our model must constitute a business to consumer model as our company, PreRackFormance, is selling our product directly to the consumer, such as athletes and coaches, who are the end users of the product.

   More specifically, we have chosen the Manufacturer Business model to be the most suited business model for our company PreRackFormance. We think this is the most suited model because as the definition states, we are using prefabricated components that cannot stand as a product on their own to make a new product. In fact, we are combining many Arduino components, such as the BLE Arduino nano (microcontroller and bluetooth module) and the MPU6050 IMU (6 axis gyroscope-accelerometer) to create a functional product that can accurately measure the performance of an athlete playing a racket sport. We are also using raw materials, such as PLA plastic filament which is utilized in 3D printing to mold the case required to hold our components together.

2. Triple Bottom Line Business Model Canvas

   We based our following triple bottom line business model on the canvas below (Figure 1).

   How?

   Key Partners:

   Suppliers:

   - Arduino authorized distributors (main component of our product)

- Amazon (where we can get our components in bulk)

<u>Partners:</u>
- Tennis brand partnerships.
- University/ College Varsity Tennis Teams
- Arduino

Key Activities:
- Appearances at university varsity teams to showcase our products to them.
- Being active on social media, ensuring that we are attracting the right kind of audience.
- Being open to partnerships and deals with other brands. For example, if we were to partner with Amazon, it would facilitate the shipping as well as widen our audience to a more worldwide base.

Key Resources:
- To have a precise understanding of the economy our product will be placed in. For example, when is it the right time to place our product in the market or when is it the right time to install a new version.
- To have experts on our team or at least have a team of experts that we can go to if there are any issues with the business placement of our product. For example, a financial advisor that can guide us towards the right components for our product.

What?
Value Propositions:
- The needs we are addressing are based on our problem statement:
    "Athletes and coaches **playing tennis** are looking for a portable, durable and waterproof product that effectively measures their performance and outputs it via a user-friendly platform that allows constant comparison of statistics amongst themselves and their team."

- Customers, especially athletes and coaches, will be interested in our products because as the problem statement describes, they will be able to monitor and track their performance to essentially improve their skills and weaknesses.

Who?

Customer Segments:
- We are creating value to sport athletes and showing valuable interest in their performance, as we wish to improve it to the best quality.
- We wish to reach out to any athletes, regardless if they are in a recreational team or going pro, as it would allow us to expand our audience. Plus, since every athlete is looking to improve their performance, our product would be the best fit for them.
- The most important athletes would have to be the pro athletes as they have a higher possibility in exposing our product to the media and therefore reaching out to more athletes who may have a higher importance and exposure in the sport.

Customer Relationships:
- Since we have not commercialized our product, we do not have a direct customer relation. However, we have had three client meetings in which our client gave us feedback on our product and we have modified our product's components accordingly.
- We wish to have a good relation with our customers as it will allow a greater development of our product in the market economy.

Channels:
- We will be delivering our product to a certified distribution company (e.g., Amazon). To allow for better exposure of our product, we will be active on social media and even partnering with athletes who can try our product and let out reviews.
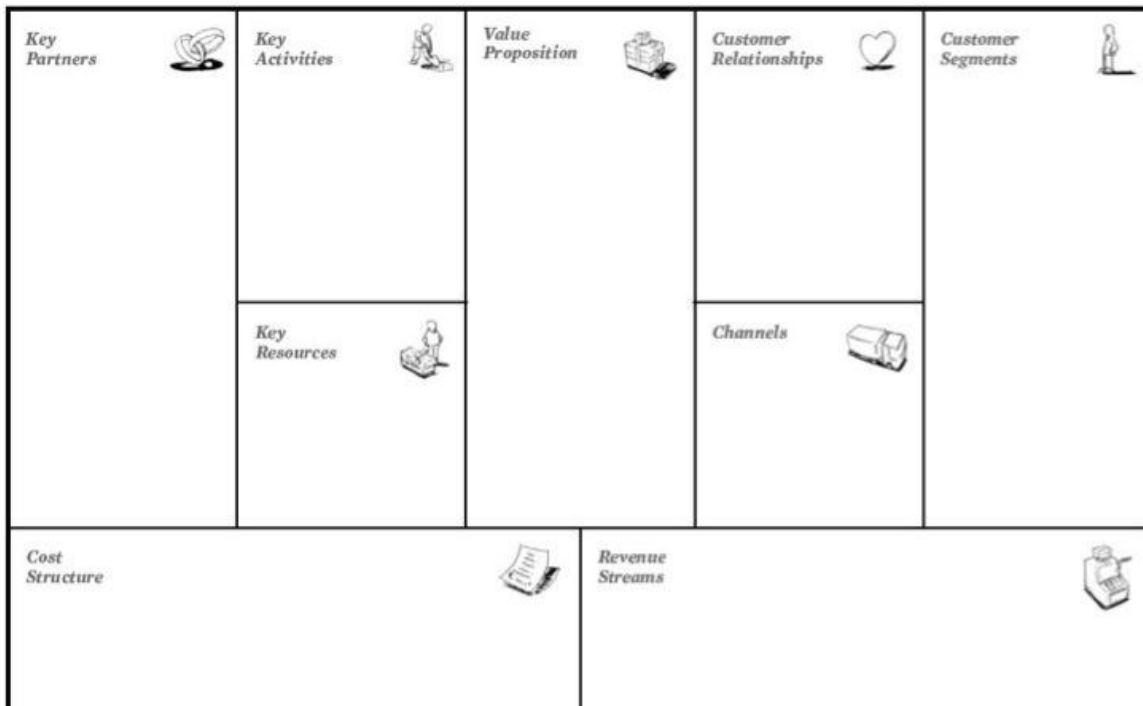
How Much?

Cost Structure:

- Based on the economics report:
  - Variable: Arduino Nano Components $17 500, 9 Volt Batteries $300, 3D Printable Plastic $60, Metal Wires (for soldering) $30
  - Fixed: Rent $12 000
  - Direct: Arduino Nano Components $17 500, 9 Volt Batteries $300, 3D Printable Plastic $60, Metal Wires (for soldering) $30, Rent $12 000
  - Indirect: Marketing $500

Revenue Streams:
- We will be setting the pricing of our product based on the list of costs we will have to be purchasing for the manufacturing process of one PreRackFormance. We are not envisioning that much profit in the first year as we will only have started our business and may not have reached a sufficient number of athletes to try our product.
- We are basing our revenue system on the sales of our product which will provide the greatest exposure.
- As stated above, we plan on making the most money by being active on all platforms of social media and having a greater commitment in advertisement.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure		Revenue Streams		

Figure 1. Triple Bottom Line Business Model Canvas

3. Core Assumptions

We are assuming that our product will be used by anyone interested in sports, therefore, the cost should be affordable for recreational sportsmen and professional athletes and sports teams. We are also assuming that the users will be using the product in public which would give our brand more exposure and more potential clients. Additionally, we think that our device's portability, affordability, ease of use and analytical value would give our brand the edge over already established and maybe more accurate solutions, especially for college teams and recreational users. Another condition is that our parts' suppliers agree to sell us items in bulk and in the numbers we want, and that there will be no shortage.

G.2. Economics Report

1. List of variable, fixed, direct and indirect costs associated with our business
- Variable: Arduino Nano Components $17 500, 9 Volt Batteries $300, 3D Printable Plastic $60, Metal Wires (for soldering) $30
- Fixed: Rent $12 000
- Direct: Arduino Nano Components $17 500, 9 Volt Batteries $300, 3D Printable Plastic $60, Metal Wires (for soldering) $30, Rent $12 000
- Indirect: Marketing $500

1 Time purchase items: 3D printers $1 000 each, Soldering Machines $100 each

https://all3dp.com/2/how-much-does-a-3d-printer-cost/

https://www.homedepot.com/b/Tools-Welding-Soldering-Brazing-Soldering-Equipment-Soldering-Irons/N-5yc1vZ1z18gw8

Price to create 1 product: $35 + $0.60 + $0.02 + $0.01 = $35.63

Sources: (put as a comment once done)

Assuming Inventory of parts is 500 (arduino can probably be purchased cheaper in bulk)

100 Batteries for $59.88 = $0.60 per battery https://www.amazon.com/PKCELL-Battery-Long-Lasting-Leak-Proof-Detectors/dp/B07FX6F192

Arduino Nano (Price we purchased was $34.99 for 1 arduino nano)

3D Printable Plastic (per kg) is $20 https://all3dp.com/2/3d-printer-material-cost-the-real-cost-of-3d-printing-materials/#:~:text=PLA%20also%20comes%20in%20different,something%20like%20%2440%20per%20kg.

Soldering Wire (per roll) is $10

2. 3-year Income Statement
   - Assuming the first year, the product is expected to be sold 500 items; in the second year, due to the good customer feedback and marketing, the product sales is expectedly increase by 150% in the first year; and in the third year, ideally the product can be promoted on a wider scale, and the sales volume is expected to be 2000 items.
   - According to the tips in the manuals of general 3D printers and soldering machines, a machine can be used for up to 5 years. Assuming that each machine can be used to the maximum service life.
   - According to the corporation tax rates on the Government of Canada website, the lower rate of the federal small business in Ontario is 3.2%, which is the standard for our calculation.
   https://www.canada.ca/en/revenue-agency/services/tax/businesses/topics/corporations/corporation-tax-rates.html

Position#	Description	1st Year	2nd Year	3rd Year
1	**Revenue**			
1.1	Sales	500*$46.99 =$23 495	750*$46.99 =$35 243	2000*$46.99 =$93 980
2	**Operating Expenses**			
2.1	Arduino Nano Components	$17 500	$17 500	$17 500
2.2	9 Volt Batteries	$300	$300	$300
2.3	3D Printable Plastic	$60	$60	$60
2.4	Metal Wires	$30	$30	$30
2.5	Rent	$12 000	$12 000	$12 000
2.6	Depreciation	$220	$220	$220
2.7	Marketing	$500	$500	$500

	Total(OE)	$30 610	$30 610	$30 610
3	**Operating Income**	- $7 115	$4 633	$63 370
4	**Pre-Tax Income**	$0	$4 633	$63 370
5	Taxation cost	$0	$148	$2 028
6	**Net Income**	- $7 115	$4 485	$61 342

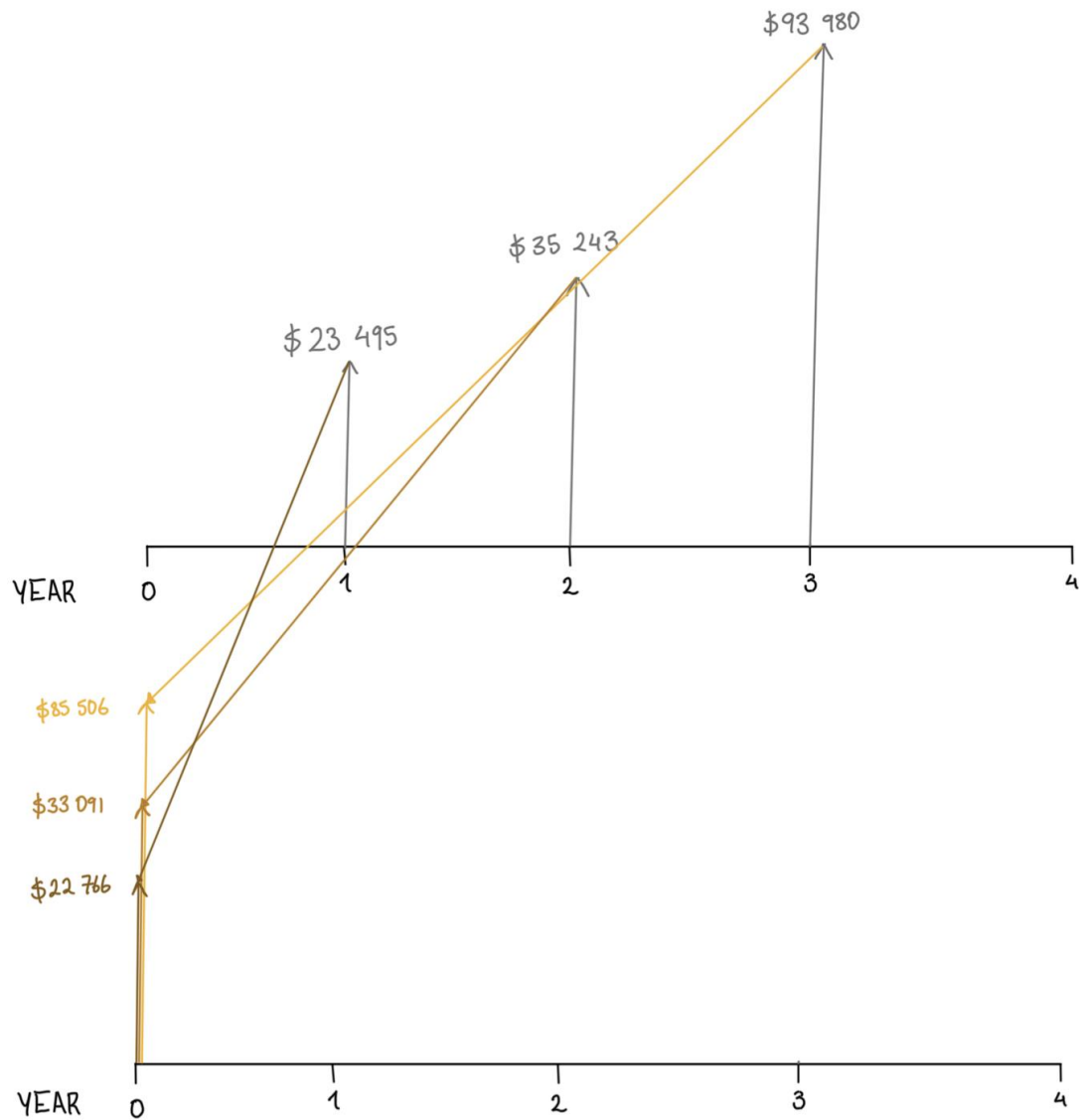3. NPV Analysis and Break-Even Point

$$PV \;=\; \Sigma \frac{FV}{(i+1)^{\,n}} \qquad i = 3.2\% = 0.032$$

Cash Flow Diagram for Expenses:
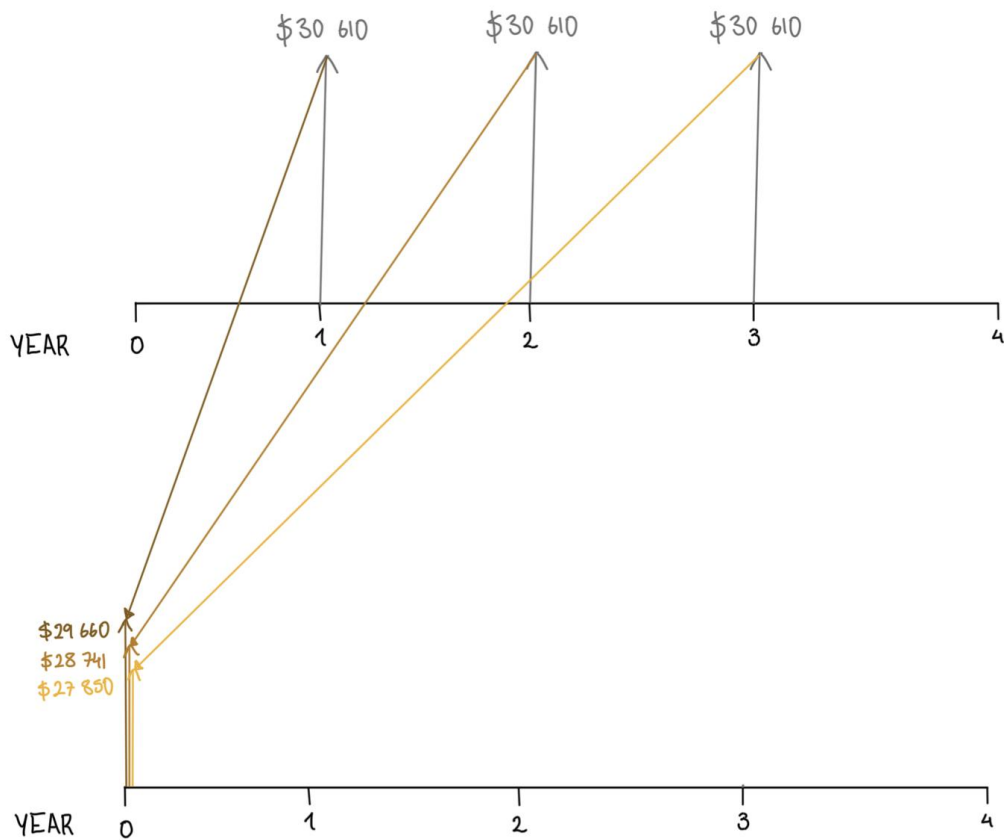
Cash Flow Diagram for Income:

Profit made year one in present value = 22 766 - 29 660 = - $6894 = $6894 loss

Profit made year two in present value = 33 091 - 28 741 = $4350

Profit made year three in present value = 85 506 - 27 850 = $57 656

Net Present Value Profit = - 6894 + 4350 + 57 656 = $55 112

Break-Even Point Analysis:

Total Operating income = Sales
x = Number of units sold

$30 610 = x($46.99)
x = 651 units

The break even point will be reached when 651 units are sold.

4. Assumptions

The main assumption here is that we will be mass producing our device, in numbers that would significantly lower the materials and production cost. Moreover, we are counting on other brands support because we assume that they will find value in partnering with us (recurrent orders, long term deals,...). We also need to secure an initial investment fund to start the project and cover the initial costs before the first sells.

Our team is going to be a startup of 5 people, for the first years we will not be having any salaries nor workplace until we make significant growth, our profit (if we make any) is going to be reinvested in production and marketing. The only other expense is going to be the rent of a storage room. Our team is also assuming that the variable costs of materials will be around the same value every year as we are buying them in bulk.

Conclusion

We have therefore learned the importance of both the business models and economic reports in this deliverable. If we were to follow what we have instilled in this deliverable, it would ensure the viability of our new company in the present economy and allow for obstacles or threats to be overcome.

Snapshot Wrike Link

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=UB5wLu4SidQ8uGsCiVo3jwXyOvR4AjSW%7CIE2DSNZVHA2DELSTGIYA