

PEDAL LIFTING MECHANISM:

DELIVERABLE G

Submitted by

B01, Team 11

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ABSTRACT

This is a technical document that informs the reader about the deliverable G for the project of student engineers in the class GNG2101 section B1. In this deliverable and document, the main purpose is to come up with a business model and create an economic report for the product.

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1. INTRODUCTION

Business models are used in all businesses and industries and are chosen carefully as per what the company is offering to their users/clients. This document will describe the business model and how it was constructed for the product in development over the last few months. This document will also contain the economics surrounding this business model over the next 3 years.

2. BUSINESS MODEL

This section of the document discusses the business model the team agreed upon.

Table I: SWOT Analysis Table

Strengths	Weaknesses
<ul style="list-style-type: none">• Highly customizable• Button operated• Durable• Safe	<ul style="list-style-type: none">• Wheelchair specific• Cost
Opportunities	Threats
<ul style="list-style-type: none">• Very little competition	<ul style="list-style-type: none">• Niche market• Emerging market if successful

After performing a SWOT analysis, the team decided to go with a combination of a razor-blade model and a subscription model. The subscription model being via a subscription for customer maintenance and support.

What this business aims to sell is the circuit along with the linear actuator at a cheap price, then the customization needed to properly affix the device would cost extra. Along with that, any modifications that would be made to accommodate the client. The subscription aspect would be included for any maintenance or modifications that would need to be made later.

2.1 Business Model Canvas

This section goes over the how, what, who and how much of the team's chosen business model. Below is the business model canvas.

Table II: Business Model Canvas

Key Partners	Key Activities	Value Propositions	Relationships	Customer Segments
<ul style="list-style-type: none"> Manufacturers of all the products needed to make the circuit. Wheelchair manufactures; good relationship with theses partners will increase our market reach. Investors 	<ul style="list-style-type: none"> Designing custom components to attach the design to each client's chair. This includes modifications as well to accommodate each client. Customer support line to initially interact with the clients, and to communicate to subscription users. 	<ul style="list-style-type: none"> This business provides a custom service to clients which the wheelchair manufactures may not. Customers value solutions tailored to their wheelchair. Clients will have a direct line of communication with the business to assist them with their wheelchair solution. 	<ul style="list-style-type: none"> Frequent interaction with the customer to ensure the product is made specially for their needs Customers who have access to the subscription will be able to reach the company through email or by phone 	<ul style="list-style-type: none"> Wheelchair manufactures Wheelchair users Advertisers and marketers
	Key Resources		Channels	
	<ul style="list-style-type: none"> Skilled Employees Available Technology 		<ul style="list-style-type: none"> Can be found online Over the phone Through wheelchair providers 	

Cost Structure	Revenue Streams
<p>Fixed costs:</p> <ul style="list-style-type: none"> • Salaries • Rent (after 3rd year) • Overhead • Depreciation <p>Variable Costs:</p> <ul style="list-style-type: none"> • Production Materials • Marketing Campaigns 	<ul style="list-style-type: none"> • The business will earn money initially by first selling and customizing our product to the individual client. • Continue to earn money with the subscription model, which the client would pay yearly to cover maintenance

2.2 Assumptions and Feasibility Study

This section outlines the core assumptions while developing the business model canvas.

- Since the team has access to a 3D printer at one of the team member's homes, this business will be fully online based. Therefore, rent costs can be cut.
- Rent will be paid on a facility for storage, desk space, and manufacturing space.
- Electricity costs are calculated based on an Ender 5; the 3D printer used to produce the parts, running cost.
- The unit cost per Ender 5 is roughly \$530.
- Based on market research, no other company makes an additional custom product to move the pedals on a chair. Some chairs have this feature included but many do not.
 - For the models that do not have a switch to move their pedals, no company currently exists to create this mechanism.
- Unit cost is \$500 with annual repair fee of \$150.
- The team based the price off the fact that this device is custom to each client and their needs, along with the fact that the design is meant to be durable and weatherproof.
 - Since each design is custom to an extent some design work may need to be done on many models.
- Yearly salary is \$55,000.
- Business insurance is \$500 annually and \$636 annually with property.
- The Break Even Point for each year can be seen in the tables for each year.
- It was assumed that the subscriptions from the previous year carried over into the following year.
- Sell 2900 units over 3 years as this business is targeting about 1% of wheelchair users in Canada as the team found that there were approximately 239,920 wheelchair users. [1]

2.2.1 Year 1

- Units: 500
- Marketing: \$1000
- Number of Employees: 5
- Initial Equipment cost
 - Five 3D printers (Ender 5)
 - Fusion 360 license (3 years, \$1740)

2.2.2 Year 2

- Units: 800
- Marketing: \$1000
- No overhead
- Number of Employees: 5

2.2.3 Year 3

- Units: 1600
- Marketing: \$1000
- Renting manufacturing space
 - From research, 1 ft² approximately costs \$25/ft² per year. Therefore, a 1,200 ft² workspace costs roughly \$30,000 per year.
- Hire additional employees
- Purchased two more 3D printers
- Reevaluate business model and make changes if necessary
- Develop income statements for the next few years.

3. ECONOMICS REOPRT

This section of the document contains the economics related to the first 3 years of this business startup.

3.1 Costs Classification

Table III: Cost Classification

Cost Classification	Production Materials	Marketing Campaigns	Electricity	Salary	Overhead	Depreciation
Fixed			√	√	√	√
Variable	√	√ (*)				
Direct	√	√				
Indirect			√	√	√	√

Note^(*): Marketing Expenses are in general fixed costs because they are allocated ahead of time in the company yearly marketing budget. Marketing campaigns are marketing activities, their allocation within the marketing budgeted expenses could be adjusted according to sales revenue. Therefore, marketing campaigns are variable costs.

3.2 Income Statement Over 3 Years

The below is the income statement for the first 3 years.

Table IV: Income Statement over 3 years

INCOME STATEMENT			
Sales			\$2,155,000
Cost of Goods Sold			\$705,000
<i>Production Materials</i>	\$660,000		
Gross Profit on Sales			\$1,575,000
Operating Expenses			\$428,982
<i>Marketing Expenses</i>			\$3,000
<i>Marketing Campaigns</i>	\$3,000		
<i>General & Admin (G&A) Expenses</i>			\$923,982
<i>Electricity</i>	\$730		
<i>Salary</i>	\$880,000		
<i>Rent</i>	\$30,000		
<i>Equipment</i>	\$5,450		
<i>Depreciation</i>	\$1,802		
<i>Overhead</i>	\$3,000		
Operation Income (EBIT)			\$651,774

While it is shown to be a profitable business currently, it does not take into account tax or interest on loans which would reduce the business' net income.

3.2.1 Income Statement: Year 1

Find assumptions for year one in section 2.1.

Table V: Year 1 Income Statement

INCOME STATEMENT			
Sales			\$325,000
Cost of Goods Sold			\$100,000
<i>Production Materials</i>	\$100,000		
Gross Profit on Sales			\$225,000
Operating Expenses			\$281,785
<i>Marketing Expenses</i>			\$1,000
<i>Marketing Campaigns</i>	\$1,000		
<i>General & Admin (G&A) Expenses</i>			\$280,785
<i>Electricity</i>	\$365		
<i>Salary</i>	\$275,000		
<i>Overhead</i>	\$500		
<i>Equipment</i>	\$4,390		
<i>Depreciation</i>	\$530		
Operation Income (EBIT)			\$ -56,029
Break Even Units			625

As seen in the tables above, the business will not be profitable for the first year. The company will start to gain profit starting from the second year.

3.2.2 Income Statement: Year 2

Find assumptions for year two in section 2.1.

Table VI: Year 2 Income Statement

INCOME STATEMENT			
Sales			\$595,000
Cost of Goods Sold			\$160,000
<i>Production Materials</i>	\$ 160,000		
Gross Profit on Sales			\$360,000
Operating Expenses			\$277,395
<i>Marketing Expenses</i>			\$1,000
<i>Marketing Campaigns</i>	\$1,000		
<i>General & Admin (G&A) Expenses</i>			\$276,395
<i>Electricity</i>	\$365		
<i>Salary</i>	\$275,000		
<i>Overhead</i>	\$500		
<i>Depreciation</i>	\$530		
Operation Income (EBIT)			\$ 157,605
Break Even Units			450

$$0 = (((x \cdot 500) + (150 \cdot x)) - (200 \cdot x)) + (500 \cdot 150) - 277395$$

To calculate the number of units to break even, the above equation was calculated. The equation takes into account the number of units sold in the previous years with the subscription. X in the equation is the number of units, and the value on the far right is the cost of running the operating the business given all the expenses made.

3.2.3 Income Statement: Year 3

Find assumptions for year three in section 2.1.

Table VII: Year 3 Income Statement

INCOME STATEMENT			
Sales			\$1,235,000
Cost of Goods Sold			\$400,000
<i>Production Materials</i>	\$320,000		
Gross Profit on Sales			\$915,000
Operating Expenses			\$364,802
<i>Marketing Expenses</i>			\$1,000
<i>Marketing Campaigns</i>	\$1,000		
<i>General & Admin (G&A) Expenses</i>			\$364,802
<i>Overhead</i>	\$2,000		
<i>Salary</i>	\$330,000		
<i>Rent</i>	\$30,000		
<i>Equipment</i>	\$1,060		
<i>Depreciation</i>	\$742		
Operation Income (EBIT)			\$550,198
Break Even Units			377

4. PROJECT PLAN UPDATE

This section contains the status of Wrike. Following prototype two, the next large focus for the project will be deliverable G which discusses the business and economics side of the project. Following deliverable H, the group will spend time creating the mechanical components to simulate the pedals in motion on the chair.

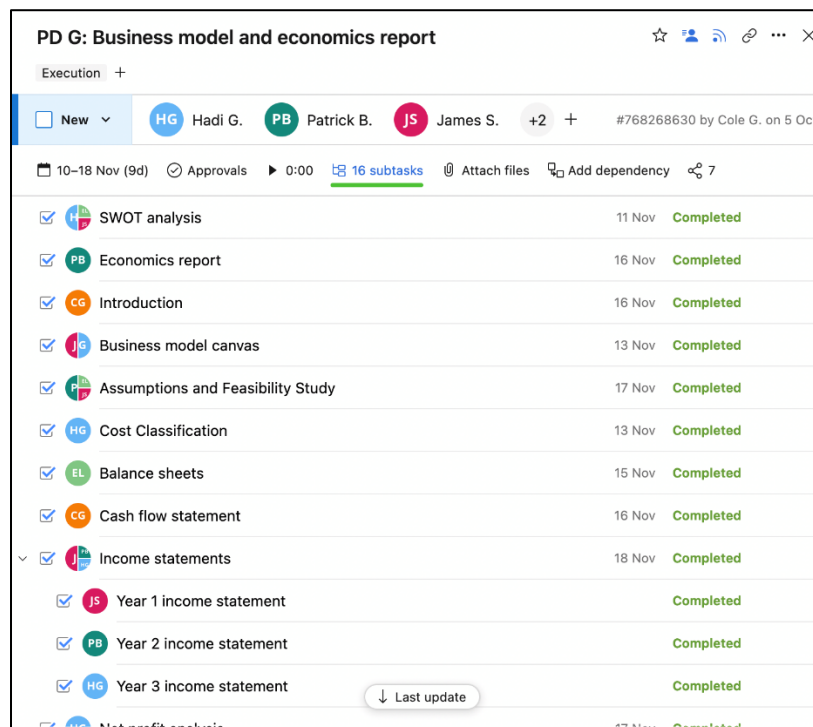


Figure 1: Wrike screenshot 1

The figure above, *Figure 1*, shows our execution folder from Wrike. The part to the right shows a maximized view of our project deliverable, *PDG: Business Model and Economics Report*. For this project deliverable, the team divided our tasks into 15 main tasks. Some of the main tasks were then divided further into some subtasks. These divisions and subdivisions help the group stay on track by micromanaging the deliverable. Moreover, by following this methodology, the group was able to finish this deliverable on time, while leaving no details unaccounted for.

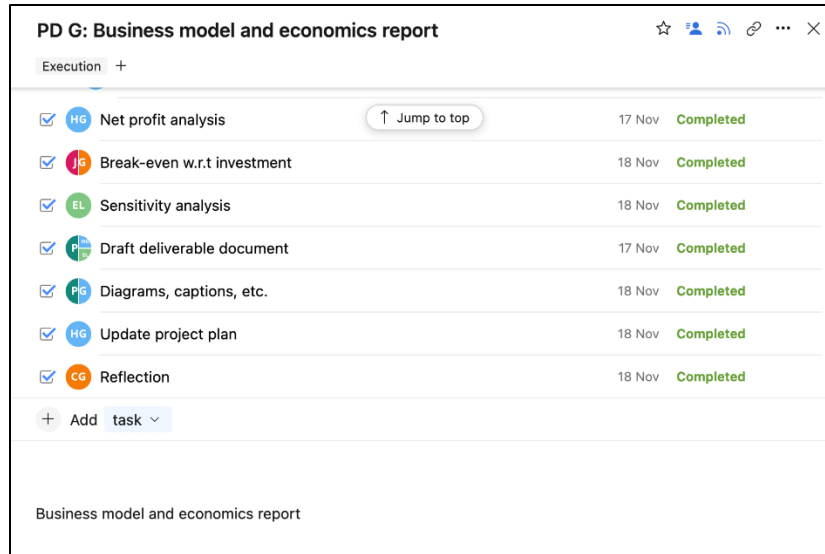


Figure 2: Wrike screenshot 2

The figure above, *Figure 2*, shows the rest of the tasks the team had, since the tasks did not fit in one screenshot.

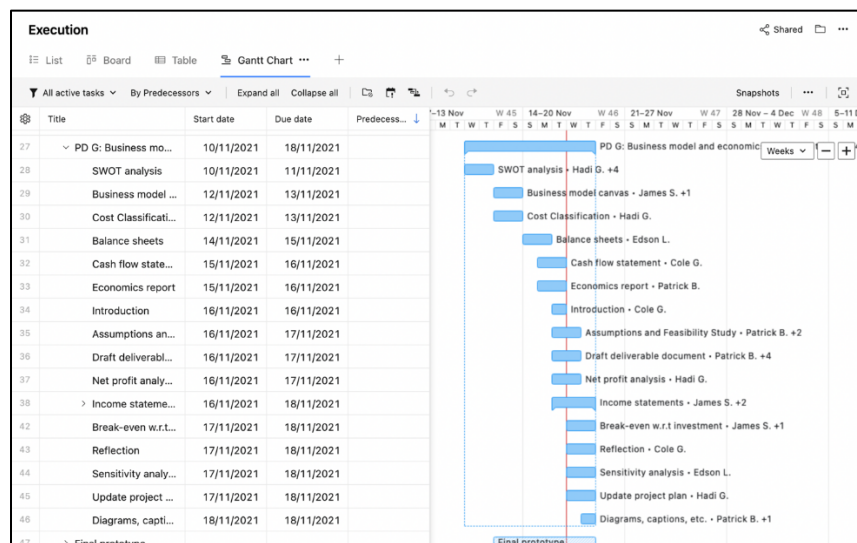


Figure 3: Wrike screenshot 3

The figure above, *Figure 3*, shows a Gantt chart view of our progress for *PDG: Business Model and Economics Report*.

5. REFLECTION

Given that the future labs and most of the lectures are dedicated to project work, there should be ample amounts of time to finish any remaining design work moving forward during these periods. With the product design almost finalised, the focus for the remaining of the project will be on both building the final prototype as well as preparing for design day.