GNG 2101 Project Report

Project Deliverable G: Business Model and Economics Report

Submitted by

GNG 2101 - Lab C 02, Group 2.4

Avery Lai, 300224907

Kenneth Lorbetskie, 300013409

Dongyu Wang, 300114760

Zhema Wen, 300087146

March 20 / 2022

University of Ottawa

Table of Contents

List of Figures

List of Tables

Abstract

This deliverable is intended to cover the business model and economics report for the "Dynamically Polarizing Glasses" project. Also, Deliverable G discusses the predicted income statement for our product based on the selected business model. The project plan (Wrike) is updated in this document as well.

1. Business Model

1.1 Business model & Justification.

Our team would use a hybrid business model when it comes time to commercialize the product. The business model would consist of some direct sales and some sales from "brick and mortar" retailers.

A direct sales model is different from traditional "brick and mortar" retail since the product would be demonstrated and sold directly to the customer. Incorporating this approach into our business model would be very advantageous since there would be no intermediaries between our company and the consumer. As a result, our company would yield higher profit. Such a direct sales business model can be facilitated using a custom e-commerce website that would allow customers to learn about the product as well as purchase it online. Another means enabling this direct sales model would be to list the product on an online retailer like Amazon.

While a direct sales model would be beneficial for reducing costs, one disadvantage is that the customer does not manipulate the product in person. For this reason our company would also seek to sell our product to traditional "brick and mortar" retailers like Walmart and Best buy. This approach would allow the customer to try on the product and test it before buying it. The

downside of relying on traditional “brick and mortar” retailers is that it would reduce the profit margin of the product.

Overall, we would adopt a hybrid business model consisting of direct sales, as well as traditional “brick and mortar” retailers. This strategy will help maximize the benefits associated with both business models.

1.2 Business Model Canvas

Table 1. Business Model Canvas

<table>
<tr>
<td rowspan="2">Key Partners

- Electronics Suppliers
  - Microprocessors
  - Power supplies
  - Electrochromic displays
  - Miscellaneous

- Plastic suppliers
  - PLA plastic
  - ABS plastic</td>
<td>Key Activities

- Research & development

- Manufacturing</td>
<td rowspan="2">Value Proposition

- All-in-one solution

- Hands-free

- Fast response time</td>
<td>Customer Relationships

- Customer service
- Sales representatives
- Ratings and customer feedback</td>
<td rowspan="2">Customer Segments

- Individuals with light sensitivity

- Vehicle drivers</td>
</tr>
<tr>
<td>Key Resources

- Engineers
- Patents</td>
<td>Channels

- Brick and mortar
- E-commerce platforms
  - Amazon
  - Shopify site
- Social media marketing</td>
</tr>
<tr>
<td colspan="3">Cost Structures

- Manufacturing
- R&D Costs
- Employees
- Website hosting
- Cost of Materials</td>
<td colspan="2">Revenue Streams

- Sales</td>
</tr>
</table>

1.2.1 Business Model Canvas - How

Key Partners

The key partners that our company will rely on to help create our product consist of electronics suppliers and plastic suppliers. These companies will provide us with the raw materials and components needed to create our product. For example, our company will have partnerships with suppliers such as Adafruit, who provide the microcontrollers, electrochromic displays, and power supplies for the production of our glasses.

Key Activities

In order for our company to deliver on our value proposition, the key activities that our company will perform are manufacturing, and research and development. Our manufacturing would consist of taking the raw materials and components from our suppliers and then producing the frames (via 3D printing) and assembling the electronics.

Our research and development will be crucial to continue to iterate and innovate on our product's design.

Key Resources

The key resources that will be crucial for our value proposition is human capital, in the form of engineers, and patents. Good engineers are important, so that the company can continue to innovate. Moreover, patents for our product is a vital asset of the business in order to prevent intellectual property theft.

1.2.2 Business Model Canvas - What

Value Proposition

Our product aims to deliver value to the customer by reducing the number of sunglasses they need to carry. The customer would no longer need to carry three different pairs of sunglasses with varying tint. Moreover, the product delivers value since the tint can be automatically adjusted, making the product hands-free. Finally the product delivers value with its rapid response time. The tint adjusts to the ambient light in a fraction of a second.

1.2.3 Business Model Canvas - Who

Customer Relationships

The main way that our company will interact with customers is through customer service, sales representatives and through ratings and feedback. Our company will have a customer service hotline that customers can use to help troubleshoot issues that they are encountering with the product. Next, sales representatives will communicate with customers in order to teach them about the product. Finally, our company will have a forum where customers can leave feedback about the product. This is essential for our company to learn which aspects of the product need to be improved.

Channels

In order to reach customers, our company will use a combination of online retailers like Amazon as well as traditional “brick and mortar” retailers like BestBuy.

Our company will use social media marketing and use platforms such as Google Ads to market our product to customers. This is a cost effective strategy because it will enable our company to specifically target our desired customer segment.

Customer Segments

The main customer segment that we are seeking to provide value for are individuals who have extreme light sensitivity. This decision is based on the fact that the client that is helping us design this product has this condition. However, our product also has the ability to provide value to other customer segments. For example, automobile drivers have to operate their vehicles under dynamic lighting conditions. This segment would benefit from a pair of sunglasses that can automatically adjust their tint in response to lighting conditions.

1.2.4 Business Model Canvas - How Much

Cost Structures

The cost structure of the company will be divided between the key activities and the key partnerships. For example our key activities will have costs associated with material and equipment for manufacturing and R&D. We will also have labour costs for our engineers.

Revenue Streams

The main stream of revenue for our company will be through the sale of our product.

1.3 Core Assumptions

The first core assumption that was made for our business plan is that our primary customer segment will be individuals with extreme light sensitivity. This assumption was based on the fact that the client who is helping our team build the product has this condition

Another core assumption that was made in the business model is that all of the manufacturing will be conducted by our company. This means that our company is responsible

for producing the sunglasses frames and assembling the electronics. As a result, our company will need to buy equipment like 3D printed to manufacture the frames.

2. Economics Report

2.1 Types of cost

Table 2. A list of costs for the product with classifications of costs

Item	Type of Cost	Comments
Salary	Fixed, direct cost	Researchers / Engineers
Unit cost of the product (glasses)	Fixed, direct cost	$ 169.99 CAD per unit (one pair of polarizing glasses)
Marketing Campaigns	Variable, direct cost	$ 20,000 CAD (estimated)
Material cost	Variable, direct cost	The parts included are microcontroller (Adafruit Trinket M0), controllable shutter glass, anti-fogging coating, rubber temple tip, lithium ion polymer battery. The glasses' frame is also categorized under the required materials.
Electricity	Semi-variable, indirect cost	$ 10,000 CAD
Rent	Fixed, indirect cost	$ 21,000 CAD
Overhead	Semi-variable, indirect cost	$ 25,000 CAD
Depreciation	Variable, indirect cost	$ 10,000 CAD

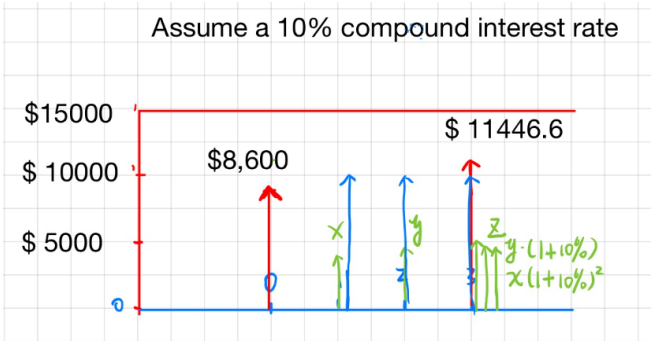
2.2 Three year income statement

Assume we sell pairs of glasses, without any debt or interest							
Column1	Accounting	Unit Price	Units sold in three years	Tax Rate	Average salary per employee per year	years	employees
Revenue	$611,964.00	$169.99	3600				
TYPES OF COSTS							
Material cost	$181,224	$50.34	3600				
Marketing campaigns	$20,000						
Electricity	$10,000						
Total salary	$300,000				$25,000	3	4
Overhead	$25,000						
Rent	$21,000						
Depreciation	$10,000						
Operating income	$44,740						
Interest	$0						
Earning before tax	$44,740						
Net Income	$33,555			25%			

2.3 NPV analysis

Except material costs and salary	
Costs in first year	**Salary per year (Assume no growth nor decay)**
$86,000	$100,000

Figure 1. NPV analysis, excluding material costs and salary.



*Notes: Blue line is the salary. Red lines are other costs. Green line is the (unit price of products-unit price of raw materials) * units sold.*

Figure 2. NPV analysis (continued).

Therefore, the overall salary in the third year is

$ 25000*4 + $ 25000*4*(1+10%) + $25000*4*(1+10%)^2=$331000

The X, Y, and Z variables represent (product unit price-raw material unit price) * units sold in the first, second, and third years, respectively. Then, since the equation has three variables, we assume that x, y, and z are identical. As a result, the total value of sales equals

x*(1+10%)^2 + y*(1+10%) + z where x = y = z

	Cash in		Cash out	
	Sales	x*(1+1.1+1.1^2)	Salaries	$331,000.00
			Other costs except material costs and salary	$11,446.60
Net flow Cash	3.31X-342446.6			

3.31x - 342446.6=0
x = 103458.1873
And
x = unit price of products-unit price of raw materials) * units sold

Units sold per year = x / (unit price of products-unit price of raw materials)
Units sold per year = 864.6735254 = 865
Units sold in three years = 2594.020576 = 2595

Therefore, we should sell 2595 units over the next three years to reach the break-even point, or 865 units each year, assuming the same unit sales every year.

2.4 Assumptions for economics report

Regarding operating income, our company is assuming that there are not many fluctuations in electricity costs, salaries and rent. On the other hand, marketing campaigns, overhead and depreciation amounts may not be in our hands since those are reliant on the market price. Notably, we exclude that the material costs in the first year is $ 86,000 CAD, while the annual salary $ 100,000 is excluded. For the assumptions regarding salary, it is assumed that nobody on the team leaves, no changes in salary. Also, it is assumed that there is a 10% compound interest rate. Moreover, we estimate that 2595 units would be sold over the next three years to achieve the break-even point, which means that our company has to sell 865 units annually.

3. Project Plan

GNG 2101 C#02 Group 2.4

List | Table | Gantt Chart

All tasks | By Priority | Expand/Collapse

	Title	Assignee	Status	Start date	Due date	Duration
1	GNG 2101 C#02 Group 2.4	Dongyu Wang	In Progress			
2	Closing					
	PD I: User manual		New	04/04/2022	04/10/2022	7d
4	PD J: Final presentation		New		04/05/2022	
5	Execution					
6	PD A.2: Client meeting preparation	Avery Lai, Dongyu Wang, Ken Lorbetskie, zhema wen	Completed	01/10/2022	01/16/2022	7d
7	PD A submission	Avery Lai	Completed		01/16/2022	
8	Client meet 1	Avery Lai, Dongyu Wang, zhema wen, Ken Lorbetskie	Completed		01/17/2022	
9	PD B: Needs	Ken Lorbetskie, Dongyu Wang, zhema wen, Avery Lai	Completed	01/17/2022	01/23/2022	7d
12	PD C: Concepts	zhema wen, Avery Lai, Dongyu Wang, Ken Lorbetskie	Completed	01/24/2022	01/30/2022	7d
15	Client meet 2	Dongyu Wang, zhema wen, Ken Lorbetskie, Avery Lai	Completed		01/31/2022	
16	PD D: Detailed design	Dongyu Wang	Completed	01/31/2022	02/06/2022	7d
22	PD E: Project progress presentation	Dongyu Wang, zhema wen, Avery Lai, Ken Lorbetskie	Completed	02/07/2022	02/17/2022	11d
23	Client meet 3	Avery Lai, Ken Lorbetskie, zhema wen, Dongyu Wang	Completed		02/28/2022	
24	PD F: Prototype 2	Ken Lorbetskie, Dongyu Wang, Avery Lai, zhema wen	Completed	02/28/2022	03/06/2022	7d
29	PD H: Design day		In Progress		03/30/2022	

Initiation					
PD A.1: Team contract	Ken Lorbetskie, Avery Lai, zhema wen	Completed	01/10/2022	01/16/2022	7d
Monitoring and Control					
PD A quality check	Avery Lai	Completed	01/10/2022	01/16/2022	7d
PD B quality check	Ken Lorbetskie	Completed	01/17/2022	01/23/2022	7d
PD C quality check	zhema wen	Completed	01/24/2022	01/30/2022	7d
PD D quality check	Dongyu Wang	Completed	01/31/2022	02/06/2022	7d
PD D projet plan update	Dongyu Wang	Completed	01/31/2022	02/06/2022	7d
PD E quality check	Avery Lai	Completed	02/18/2022	03/01/2022	12d
PD E project plan update	Dongyu Wang	Completed	02/07/2022	02/17/2022	11d
PD F quality check	Ken Lorbetskie	Completed	03/07/2022	03/23/2022	17d
PD F project plan update	Dongyu Wang	Completed	02/18/2022	03/06/2022	17d
PD G quality check	zhema wen	Completed	03/14/2022	03/20/2022	7d
PD G project plan update	Dongyu Wang	Completed	03/14/2022	03/20/2022	7d
PD H quality check	Dongyu Wang	In Progress	03/21/2022	03/30/2022	10d
PD I quality check	Avery Lai	New	04/11/2022	04/11/2022	1d
PD J quality check	Ken Lorbetskie	New	03/28/2022	04/05/2022	9d
PD J project plan update	Dongyu Wang	New	03/30/2022	04/05/2022	7d
Planning					
PD A.3: Project skeleton	Dongyu Wang	Completed	01/10/2022	01/16/2022	7d
PD C.2: Project plan	Dongyu Wang	Completed	01/24/2022	01/30/2022	7d
PD D.1.8: BOM	Dongyu Wang, zhema wen, Ken Lorbetskie, Avery Lai	Completed	01/31/2022	02/06/2022	7d
PD G: Business model and economics report	Ken Lorbetskie, Dongyu Wang, zhema wen, Avery Lai	Completed	03/14/2022	03/20/2022	7d

4. Conclusion

In summary, the Dynamically Polarizing Glasses, which is the newly-created product, is sold in the business model of direct selling and Bricks and Mortar. In the project, the electronic suppliers and plastic suppliers are the key partners since they provide the raw materials needed in

the product manufacture. The key activities involve manufacturing, research, and development which is the usual process for a product to be designed and promoted in the market. At the same time, the essential resources refer to the human capital, which can make the whole process successful. Moreover, the customer relationships and channels should be managed and maintained through the value proposition expression. In addition, the costs of the products should be calculated and controlled. The costs guarantee the product quality, and the over costs should also be a heavy burden for the brands. Thus, a product designed and manufactured should undergo a completed process, and a variety of fields should be focused on and managed.

5. Personal Ethics Statement

a) *I participated in formulating the standards, roles, and procedures as stated in this contract.*
b) *I understand that I am obligated to abide by these terms and conditions.*
c) *I understand that if I do not abide by these terms and conditions, I will suffer the consequences as stated in this contract.*

Signatures - - - - - - - - - - - - - - - - - - Date: March 20 / 2022

Avery Lai: 	Kenneth Lorbetskie: 
Dongyu Wang: 	Zhema Wen: