Deliverable G: Other Considerations

Group 2.3: Zachary Chaloux, Steven Dunbar, Farah El Siss, Valentin Mugabo, Aaditya Shah

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Introduction

This report presents a comprehensive economic analysis and intellectual property considerations for our FitClip renal care device project. It outlines the projected expenses, revenue, net present value (NPV), and break-even analysis over a three-year period, emphasizing the careful planning and strategic decision-making that underpins our business model. The report also delves into the intellectual property aspects that are crucial for the legal and competitive positioning of FitClip in the market. By examining these elements, the report aims to provide a clear and informed view of the economic viability and intellectual property landscape surrounding our innovative healthcare product.

G.1 Economics

G.1.1 List of Expenses

Based on our research we came up with the following table of values to determine yearly expenses.

Variable Costs	Cost	Type/Classification
Material	$62,500	Material, Direct
Labor	$455,000	Labour, Direct
Shipping	$18,083	Expense, Direct
Marketing	$78,125	Expense, Indirect
Fixed Costs		
Rent	$24,000	Expense, Indirect
Overhead	$50,000	Expense, Indirect
Utilities	$10,000	Expense, Indirect
Insurance	$5,000	Expense, Indirect
Machinery	$250,000	Expense, Direct

Material cost:

312,382 registered nurses in Canada, assume 5% market share (first year) 9% second year 15% third year. Source Link.

Year 1

312,382 * 0.05 ~ 15,619 units sold

Year 2

312,382 * 0.09 ~ 28,114 units sold

Year 3

312,382 * 0.15 ~ 46,857 units sold

$1.90 (plastic) +$0.1 (elastic) = $2.00 of material per unit

num units * $/unit = $ Material Cost

Year 1

15,619 (units) x 2 = $31,238 Material Cost

Year 2

28,114 (units) x 2 = $56,228 Material Cost

Year 3

46,857(units) x 2 = $93,714 Material Cost

To make our product our company would use an injection molding machine. These machines cost around $100,000 to $200,000 plus the cost of the mold for our specific product our machinery cost will be around $250,000.

Sources:

https://formlabs.com/blog/injection-molding-cost/

https://electricityplans.com/landing/

Labor:

Five employees who are paid $19 dollars an hour; 3 of them for machine operation and 1 for packaging, with one manager to oversee operations.

Shipping cost:

$10.85 per 1 pound (450 g) for cross country shipping to British Columbia from Ottawa, Ontario.

Source: https://www.shipbob.com/ecommerce-shipping/calculate-shipping-costs/#calculator

Assuming we ship 80% of product.

Year 1

15,619 units sold

15,619*80% ~ 12500 units

Assuming 15 can fit in a package (Dimensions do allow)

12500 /15 * 10.85 ~$9,040 shipping

Year 2

28,114 units sold

28,114*80% ~ 22500 units

22500 /15 * 10.85 ~$16,268 shipping

Year 3

46,857 units sold

46,857*0.8= 37,000 units

37,000/15 * 10.85 ~= $26,760 shipping

Utilities

Estimated around 1000 dollars a month given low production requirements for our product.

Marketing cost

10% of revenue for marketing costs. Source Link to why we decided this: https://blog.hubspot.com/marketing/marketing-budget-percentage.

Our Target Product Cost on Market: 25$ per unit

Year 1

15,619 units sold

15,619 x 25 = $390,475

$390,475 x 10% = $39,047 Marketing Cost

Year 2

28,114 units sold

28,114 x 25 = $702,850

$702,850 x 10% = $70,285 Marketing Cost

Year 3

46,857 units sold

46,857 x 25 = 1,171,425

1,171,425x10% = $117,142 Marketing Cost

The above includes the wage of a marketing employee.

Insurance

What our insurance entails for our company:

In Ontario, small business insurance costs differ based on your business's specific factors, typically ranging from $450 to $2,000 annually for a general liability policy with $2M coverage.

Source: https://www.zensurance.com/ontario-busines.

G.1.2 3-Year Income Statement

FitClip Income Statement			19/11/2023
Revenue	**Year 1**	**Year 2**	**Year 3**
Net Sales	$390,475.00	$702,850.00	$1,171,425.00
Cost of Goods Sold			
Material	$31,238.00	$56,228.00	$93,714.00
Overhead	$20,000.00	$35,000.00	$40,000.00
Total Cost of Goods Sold	$51,238.00	$91,228.00	$133,714.00
Gross Profit	$339,237.00	$611,622.00	$1,037,711.00
Operating Expenses			
Labour	$193,800.00	$232,560.00	$232,560.00
Marketing	$39,047.00	$70,285.00	$117,142.00
Rent	$24,000.00	$30,000.00	$36,000.00
Shipping	$9,040.00	$16,268.00	$26,760.00
Utilities	$12,000.00	$20,000.00	$24,000.00
Insurance	$5,000.00	$7,000.00	$7,000.00
Machinery	$250,000.00	$0.00	$0.00
Total Operating Expenses	$532,887.00	$376,113.00	$443,462.00
Operating Income	-$193,650.00	$235,509.00	$594,249.00

Link to google sheet:
(https://docs.google.com/spreadsheets/d/10h9kQgq1l7MF6uGN0HuhKWHm-leBfdBs_Bsw2jflCp4/edit?usp=sharing)

Net Sales:

Year 1: Assuming the product is sold to 5% of nurses the first year, 15,619 units sold and 25$ per unit and $390475 made.

Year 2: Assuming the product is sold to 9% of nurses the second year, 28,114 units sold and $702850 made.

Year 3: Assuming the product is sold to 15% of nurses the third year, 46,857 units sold and $1171425 made.

This is a fair assumption of product grown give the goal is to have a FitClip in the hands of every nurse in Canada.

Material:

Assuming the price of material in plastic is $1.90 per FitClip and $0.1 for each elastic, it costs a total of $2 per unit sold.

Labour:

Year 1: 5 employees.

Year 2: Company will expand to six employees.

Year 3: Company will stay at six employees.

Marketing

10% of the net sales (price will increase as sales increase.

Rent

Small office building assuming $2000 a month with an additional $500 per month with every passing year due to expansions for improved room and quality of life.

Shipping

Shipping is $10.85 per pound, and there are 15 FitClips per pound. (Units sold/15)*10.85

Utilities

Year 1: Assuming $1000 a month.

Year 2: Due to expansions, assuming $1,666 a month.

Year 3: Due to further expansions, assuming $2,000 a month.

Insurance

Year 1: $5,000 spent on insurance.

Year 2: Due to expansions, $7,000 per year.

Year 3: Continued $7,000 per year.

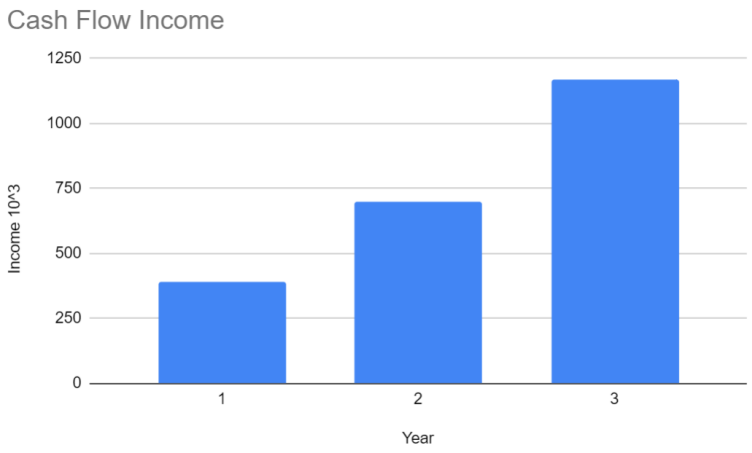
Machinery

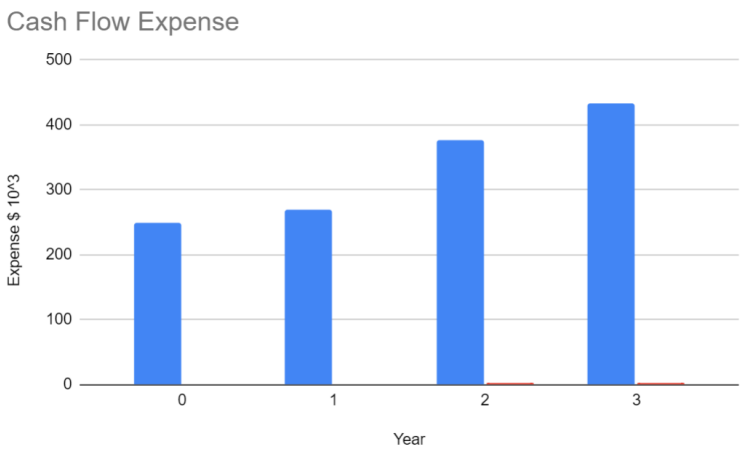
Year 1: As mentioned, the price of an injection molder is roughly $250,000, there no no need to purchase any additional machines in later years.

G.1.3 NPV Analysis and Break Even Point

Cash Flow Charts

The following charts were based on the three year income statement:





NPV value of each expense/income

$$\mathrm{NPV} = \frac{R_t}{(1+i)^t}$$

NPV = net present value
R_t = net cash flow at time t
i = discount rate
t = time of the cash flow

Discount Rate 10% = 2.75% +8.25%

Source Link: (https://www.tpsgc-pwgsc.gc.ca/recgen/txt/taux-rates-eng.html)

Year	Expense Net	PV
0	$ 250,000.00	250,000.00
1	$ 270,899.00	246,271.82
2	$ 376,113.00	310,837.19
3	$ 443,462.00	333,179.56
NPV (expense)		1,140,288.57

Year	Income Net	PV
1	$ 390,475.00	354,977.27
2	$ 702,850.00	580,867.77
3	$1,171,425.00	880,108.94
NPV (income)		1,815,953.98

NVP = NPV (income) - NPV (expense)

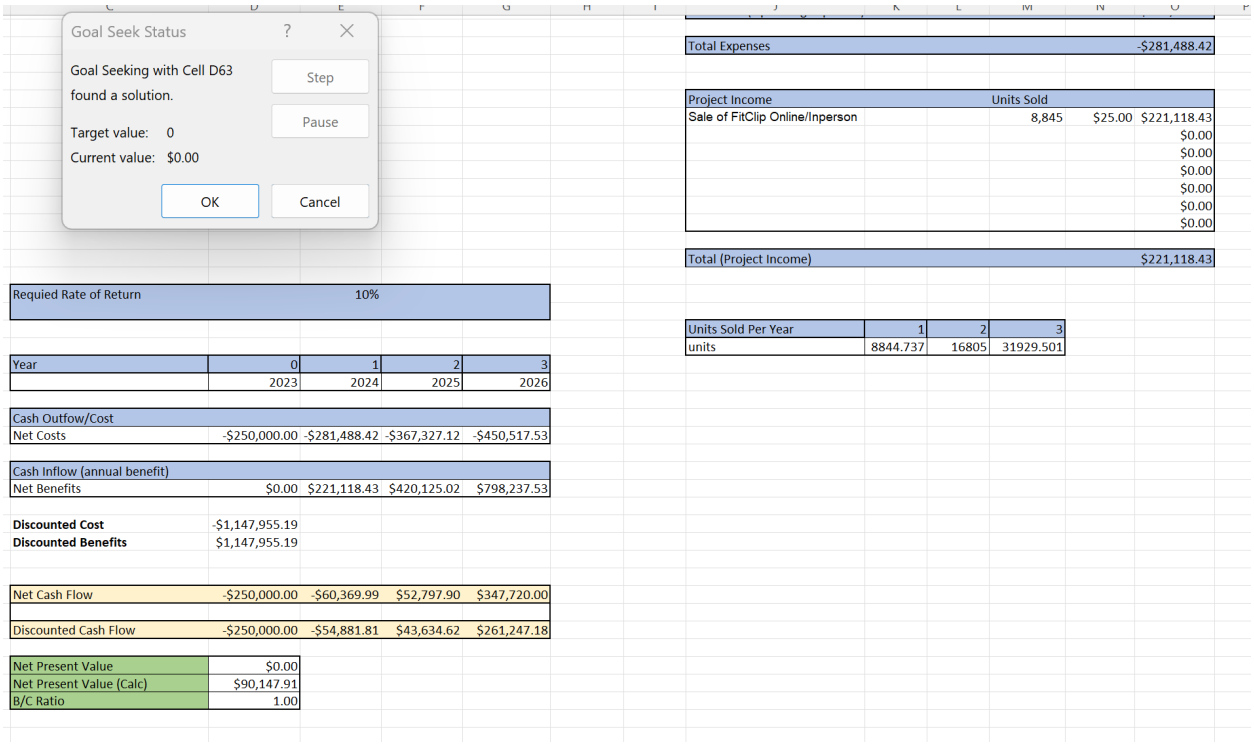
Net NVP 675,665.41

Break Even Point

Because our break even point is dependent on how many units we sell in a year we decided to use excel to determine an accurate break even point. The excel sheet works by listing the expected expenses and income (units time price). Then we calculate the NPV value of the first three years. Then in a “What if Analysis' ' on excel we are able to find the quantity of units that we sold in year one in order to break even. Additionally we could change the search to find the needed sale price of the device in order to break even for a given quantity of devices sold. Please find an excel link attached for further examination of formulas and methods used.

First we found a break even point over the course of the three year term. This means that we would break even on the third year. Are values indicated that we needed to sell approximately 8500 units the first year 16000 the second year and 32000 the third year at the selling price of 25 dollars. As shown by the B/C Ratio would be a 10% return on

investments. Looking at our initial sale projections this estimation is greatly under our predicted 17,000 units sale in the first year so there is still room to find the optimal value of units sold and price. Thus, at sale price of $25 we will break even after selling 8845 units in the first year with expected growth sales for years 2 and 3. Any additional units sold thorough this time will be profit.



Total Expenses	-$281,488.42

Project Income	Units Sold		
Sale of FitClip Online/Inperson	8,845	$25.00	$221,118.43
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
Total (Project Income)			$221,118.43

Requied Rate of Return	10%

Units Sold Per Year	1	2	3
units	8844.737	16805	31929.501

Year	0	1	2	3
	2023	2024	2025	2026
Cash Outfow/Cost				
Net Costs	-$250,000.00	-$281,488.42	-$367,327.12	-$450,517.53
Cash Inflow (annual benefit)				
Net Benefits	$0.00	$221,118.43	$420,125.02	$798,237.53
Discounted Cost	-$1,147,955.19			
Discounted Benefits	$1,147,955.19			
Net Cash Flow	-$250,000.00	-$60,369.99	$52,797.90	$347,720.00
Discounted Cash Flow	-$250,000.00	-$54,881.81	$43,634.62	$261,247.18

Net Present Value	$0.00
Net Present Value (Calc)	$90,147.91
B/C Ratio	1.00

Project Costs - ProClip	Unit	Quanity	$/Unit	Total Cost
Initial Set up				
Injection Plastic Molding Machine		1	$200,000	-$200,000
Plastic Mold		2	$25,000	-$50,000
				$0
				$0
				$0
Total Cost (Set Up)				-$250,000

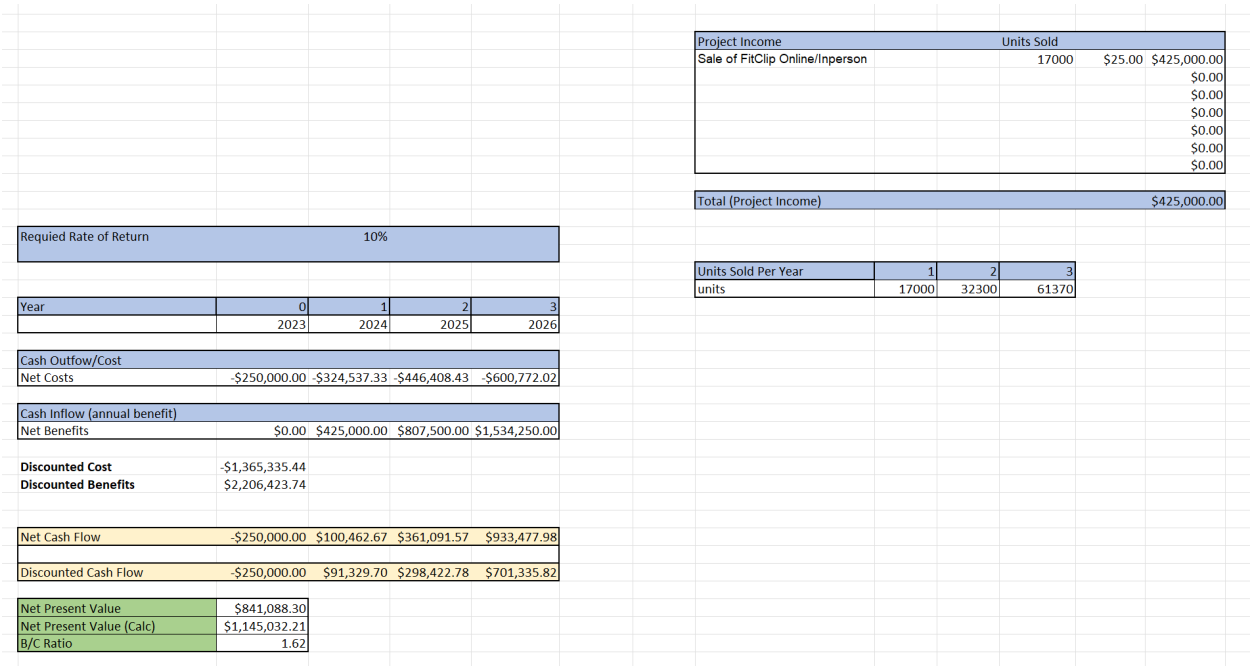
Year One Expences/Income	Unit	Quanity	$/Unit	Total Cost
ABS Plastic		8450	$1.90	-$16,055.00
Elastic		8450	$0.10	-$845.00
Overhead		8450	20%	-$1,690.00
				$0.00
				$0.00
Total Cost (Goods)				-$18,590.00
Operating Expenses				
Labour		5	$38,760.00	-$193,800.00
Marketing		$211,250.00	10%	-$21,125.00
Rent		12	$2,000.00	-$24,000.00
Shipping		8450	$10.85	-$4,889.73
Utilities		12	$1,000	-$12,000.00
Insurance		12	$417	-$5,000.00
				$0.00
				$0.00
				$0.00
Total Cost (Operating Expenses)				-$260,814.73
Total Expenses				-$279,404.73
Project Income	Units Sold			
Sale of FitClip Online/Inperson			$25.00	$211,250.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total (Project Income)				$211,250.00

Year One Expences/Income	Unit	Quanity	$/Unit	Total Cost
ABS Plastic		16055	$1.90	-$30,504.50
Elastic		16055	$0.10	-$1,605.50
Overhead		16055	2.5%	-$401.38
				$0.00
				$0.00
Total Cost (Goods)				-$32,511.38
Operating Expenses				
Labour		6	$38,760.00	-$232,560.00
Marketing		$401,375.00	10%	-$40,137.50
Rent		12	$2,500.00	-$30,000.00
Shipping		16055	$10.85	-$9,290.49
Utilities		12	$1,000	-$12,000.00
Insurance		12	$583	-$7,000.00
				$0.00
				$0.00
				$0.00
Total Cost (Operating Expenses)				-$330,987.99
Total Expenses				-$363,499.37
Project Income	Units Sold			
Sale of FitClip Online/Inperson		16055	$25.00	$401,375.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total (Project Income)				$401,375.00

Year One Expences/Income	Unit	Quanity	$/Unit	Total Cost
ABS Plastic		30504.5	$1.90	-$57,958.55
Elastic		30504.5	$0.10	-$3,050.45
Overhead		30504.5	2.5%	-$762.61
				$0.00
				$0.00
Total Cost (Goods)				-$61,771.61
Operating Expenses				
Labour		6	$38,760.00	-$232,560.00
Marketing		#########	10%	-$76,261.25
Rent		12	$3,000	-$36,000
Shipping		30504.5	$10.85	-$17,651.94
Utilities		12	$1,000	-$12,000.00
Insurance		12	$583	-$7,000.00
				$0.00
				$0.00
				$0.00
Total Cost (Operating Expenses)				-$381,473.19
Total Expenses				-$443,244.80
Project Income	Units Sold			
Sale of FitClip Online/Inperson		30504.5	$25.00	$762,612.50
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total (Project Income)				$762,612.50

We then found a break even point for the three year period by varying the cost of the product.

If we set our first year sales to 17000 units at 25 dollar sale price the B/C ratio increases and the overall profits look more enticing. However this means that we would be projecting 61370 units to be sold in the third year of business requiring the need of accessing hospitals. This cost projection could be seen as a riskier business model since the third year sales is dependent on the implementation of the device in hospitals.



Project Income	Units Sold		
Sale of FitClip Online/Inperson	17000	$25.00	$425,000.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
Total (Project Income)			$425,000.00

Requied Rate of Return	10%

Units Sold Per Year	1	2	3
units	17000	32300	61370

Year	0	1	2	3
	2023	2024	2025	2026
Cash Outfow/Cost				
Net Costs	-$250,000.00	-$324,537.33	-$446,408.43	-$600,772.02
Cash Inflow (annual benefit)				
Net Benefits	$0.00	$425,000.00	$807,500.00	$1,534,250.00
Discounted Cost	-$1,365,335.44			
Discounted Benefits	$2,206,423.74			
Net Cash Flow	-$250,000.00	$100,462.67	$361,091.57	$933,477.98
Discounted Cash Flow	-$250,000.00	$91,329.70	$298,422.78	$701,335.82

Net Present Value	$841,088.30
Net Present Value (Calc)	$1,145,032.21
B/C Ratio	1.62

The next test we did was check what would happen if we increased the price to 50 dollars. Given that this device is for hospital use this price would still maintain this tool on the more affordable spectrum of hospital devices. The B/C ratio of this projecting shows that this would be an extremely beneficial business venture. However, the increased price of the device to 50 dollars could subtract from the initial startup of the business since we need to first expose the device to the medical industry.

Project Income	Units Sold		
Sale of FitClip Online/Inperson	10,000	$50.00	$500,000.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
Total (Project Income)			$500,000.00

Requied Rate of Return	10%

Units Sold Per Year	1	2	3
units	10000	19000	36100

Year	0	1	2	3
	2023	2024	2025	2026
Cash Outfow/Cost				
Net Costs	-$250,000.00	-$312,586.67	-$426,029.67	-$562,052.37
Cash Inflow (annual benefit)				
Net Benefits	$0.00	$500,000.00	$950,000.00	$1,805,000.00
Discounted Cost	-$1,308,538.59			
Discounted Benefits	$2,595,792.64			
Net Cash Flow	-$250,000.00	$187,413.33	$523,970.33	$1,242,947.63
Discounted Cash Flow	-$250,000.00	$170,375.76	$433,033.33	$933,844.95

Net Present Value	$1,287,254.04
Net Present Value (Calc)	$1,704,331.30
B/C Ratio	1.98

Excel link: Deliverable G.xlsx

The final Unit price that we determined was to sell the device for $30 CAD. This will cause the product to be affordable to the average nurse while not undercutting our market value in the health care. Because Health care products are generally marked up in price we did not want to go to low on our product price ($20-25) since it could limit the option of increasing the price down the road. However, if we charged $50 dollars for our device the product could be hard to introduce into the system since nurses could be deterred by the large price tag. By using the excel modeling and industry price points we determined that the best market price would be $30 which equates to a 93% mark up (not including labor).

G.1.4 Discussion of Assumptions Made with Economics Analysis

- **Net Sales:**
    - Assumption: The assumption is that the product will be sold to 5% of nurses in Canada for the start up year and have a 6-8% increase in sales each sequential year.

    - Justification: This is based on the goal of having a FitClip in the hands of every renal nurse in Canada. The percentages are reasonable estimates, indicating a gradual increase in market penetration over the years. Also FitClip's final goal is to have the device be supplied to nurses directly through the hospital creating a solid revenue stream.

- **Material:**
    - Assumption: Material cost is assumed to be $2 per unit, considering $1.90 for plastic and $0.10 for each elastic.
    - Justification: This assumption is grounded in the assumed cost of materials required to manufacture one FitClip. This cost is determined by calculating the cost of ABS injection plastic and the standard cost for elastics. This cost does not factor in the discount that would be applicable if bought in bulk.
- **Labour:**
    - Assumption: The number of employees will increase from 5 to 6 in the second year and remain constant thereafter.
    - Justification: This assumption is based on the company's expansion plans. The additional employee is expected to handle increased production and other operational demands.
- **Marketing:**
    - Assumption: 10% of net sales will be allocated to marketing, with an increasing budget as sales grow.
    - Justification: This is a common approach where marketing expenses are a percentage of net sales. The increase reflects the need for more marketing efforts as the business expands.
- **Rent:**
    - Assumption: Rent starts at $2000 per month and increases by $500 per month with every passing year.
    - Justification: This is based on the assumption that the company will need more space as it expands, leading to increased rent expenses. In addition, rental landlords can increase rent depending on how successful the business is. The increase in space would be to accommodate a second injection machine.

- **Shipping:**
  - Assumption: Shipping cost is calculated at $10.85 per pound, with 15 FitClips per pound.
  - Justification: This is a straightforward calculation based on the weight of the product and the cost per pound for shipping.
- **Utilities:**
  - Assumption: Utilities expenses will increase with expansions, reaching $2000 per month in the third year.
  - Justification: As the company grows, the assumption is that it will consume more utilities, leading to increased monthly costs. Values were based on average small business utilities cost.
- **Insurance:**
  - Assumption: Insurance costs will increase from $5000 in the first year to $7000 in subsequent years due to expansions.
  - Justification: Expansions typically lead to increased insurance costs, reflecting the higher value of assets and potential risks.
- **Machinery:**
  - Assumption: The cost of an injection molder is $250,000, and the final unit price is set at $30 CAD.
  - Justification: The assumption is grounded in the industry's price points, ensuring a balance between affordability for nurses and a reasonable markup for the company. This price was determined using break even analysis modeling.
  - Assumption: The chosen price point of $30 CAD is based on a careful consideration of market dynamics, aiming for a 93% markup to cover costs and ensure profitability.

G.2 Intellectual Property

For the Intellectual Properties, there were two important patents identified that could cause legal constraints with our product:

PLA Material For 3D Printing and It’s Preparation

This patent outlines the PolyLactic 3D printing material which will be used in 3D printing FitClip renal care device. This PLA material is different from the others in such a way that it has a better aging resistance property than the other commonly made PLAs and is made by selecting and using two kinds of PolyLactic acids with different optical purities as raw materials. This patent was filed in the US by Kingfa Science and Technology Co Ltd on 25th of May in 2019, was granted and is active and will expire on the 13th of April in 2040 thus developing the FitClips with this PLA or producing this PLA would be in direct infringement of this patent.

(https://patents.google.com/patent/US11453776B2/en?q=(Polylactic+acid+3D+printing)&oq=Polylactic+acid+3D+printing&clustered=true)

Method for Producing PLA

This patent defines the method for producing polylactic acid easily and efficiently from a lactide by ring-opening polymerization by using a catalyst consisting of an Alkyl-Magnesium compound and a calcium or magnesium compound as a green ring-opening polymerization compound. While producing the FitClips renal care devices, the buying and manufacturing costs of PLA would vary as it would be more convenient to buy the PLA in the starting stage but less convenient later when making big volumes of the FitClips. This is where making the PLA would be more convenient than buying it and if producing the PLA, this method would be the preferred one. This patent was filed in Japan by Daiso Co Ltd on the 24th of November in 2009 and its status is still pending thus using this method of producing PLA does not present any legal constraint for the moment.

(https://patents.google.com/patent/JP2011111461A/en)

G.3 Project Plan Update

The following is a link to our wrike:

https://www.wrike.com/

Conclusion

In conclusion, the detailed economic analysis and intellectual property considerations laid out in this report underscore the viability and strategic planning of the FitClip renal care device project. The comprehensive breakdown of expenses, revenue projections, NPV analysis, and break-even points highlights our commitment to fiscal responsibility and market competitiveness. The identification and assessment of relevant intellectual property, particularly patents, demonstrate our awareness of the legal landscape and our preparedness to navigate it.

To summarize, the report highlights key financial metrics such as projected yearly expenses ranging from material costs at approximately $31,238 to $93,714 over three years, labor costs of $455,000 annually, and initial machinery investment of $250,000. Revenue projections are based on selling 15,619 units in the first year, increasing to 46,857 by the third year, with a product price set at $30 CAD. The NPV analysis, with a 10% discount rate, and the break-even analysis, indicate the project's financial health and viability. Additionally, strategic pricing, comprehensive cost management, and detailed IP considerations for two significant patents ensure our project aligns with legal requirements and market expectations.

Overall, this report reflects a thorough and realistic approach to launching a successful and legally compliant healthcare product in the competitive medical device market.