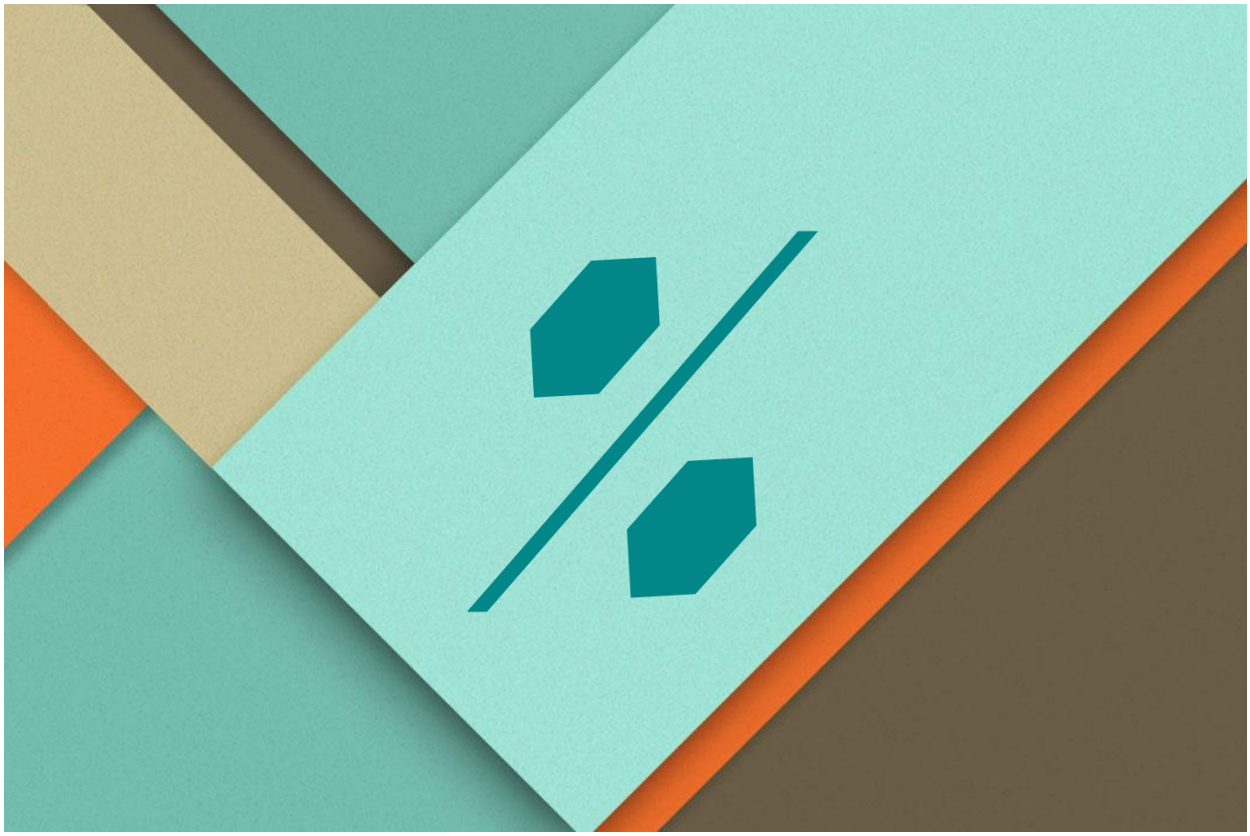

Modulo: Modular Smartphones

Business Report

10.12.2021

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ELEC 481

Table of Contents

Executive Summary

We are Modulo, a group of engineers that want to change the smartphone industry to become more sustainable. Our goal is to provide our customers with a modular smartphone that is longer lasting and better for the environment. From our research, we found that the smartphone industry in the US and Canada has created a short artificial life-span for smartphones as a way to entice customers to purchase replacement phones at a higher frequency. This results in a greater cost for the customers, as phones may have to be replaced even when only one component is faulty, and is more wasteful to the environment. This short life-span creates an unnecessary amount of electronic waste.

The smartphone US market has shown great potential in regards to revenue and growth. In 2021, the revenue for the industry was $84.1 billion (USD) and the market is expected to grow by an average of 3.5% each year. The market is controlled by 4 major players, but a quarter of the market is shared by multiple smaller companies. There is room for us to enter the market and grow, with a large revenue.

Our product is a modular smartphone with guaranteed 5 year support. We will guarantee software and hardware support for devices for 5 years following their model release date, and may provide options to extend. Additionally, we will sell hardware replacements for each module, including but not limited to the camera, battery, charge port, and screen.

We will advertise our product using a mixture of online advertisements, and of outreach to tech influencers and reviewers. We will send them our first batch of phones for review in advance of our product launch, and use their feedback to improve our product for the first official release.

Over time, we plan to hire more staff to join our team. This includes people in marketing, sales, operations, engineering, and accounting. To start, in our first year, we will raise funding with some personal assets and seek angel investors. This will primarily fund our research and development for the product, as well as some initial advertising. Then towards the end of Year 1, we will seek funds from venture capitalists and government grants and loans which will be used to fund components and manufacturing for the first launch of our product. In Year 3, we will start selling our smartphone in batches and see a return on our investment. We expect our initial costs to be paid off in Year 4, from which point we will continue to improve our product, to advertise to a wider audience, and to gain a larger customer base.

Background

Mission Statement

Our mission is to provide high value and reliable smartphones to consumers, while reducing the environmental impact of excessive electronic waste.

Company Description

At Modulo, we are a team of environmentally conscious engineers. As students in our early years of university, we were annoyed by having to replace our smartphones whenever any part of them broke. This was a financial and environmental burden. By purchasing new phones and disposing of old ones, we contributed to electronic waste (e-waste). From some research we found that many smartphone companies impose an artificial short life-span on their products to entice customers to purchase new phones more often. Our team believes that this is wasteful and that the industry should change its behaviour. So, we founded Modulo, a company with the goal of producing a modular smartphone to combat e-waste and increase the lifespan of smartphones in the industry.

Goals

We at Modulo want to achieve two main goals. With our modular smartphone we want to reduce the annual contribution to e-waste, starting locally and then expanding worldwide. Additionally, we want to combat the artificial short life-span of smartphones that currently exists in the industry. We want to be the company that changes this standard towards sustainability, for both the industry and our planet.

Product Description

Our primary product will be a high performance, modularly designed smartphone, which will allow consumers to buy and replace modules that have worn out and failed. For example, if a Modulo phone camera were to break, we would expect the customer to purchase a new camera module replacement rather than an entire phone. The product includes the smartphone itself, as well as 5 years of guaranteed software support (OS updates, security, etc) and hardware support (replacement modules and guides) from the release date of the phone model. Additionally, we may extend software and/or hardware support beyond the guaranteed 5 years depending on the release schedule of the new phone models.

Marketing

Market Analysis

We plan to target the smartphone industry in the US and Canadian markets. Due to the availability of market data, most of our analysis was performed on the US market; however, we believe that there will be similarities between the US and Canadian markets.

According to the IBISWorld database [10], our research showed that the US smartphone market had a revenue of $84.1 billion (USD) in 2021. This revenue is divided among 4 major players and many smaller players (Fig. 1). Smaller players take 25.8% of the market share which is a considerable amount. This means that if we are able to steal only 1% of the market then we can expect a revenue of $841 million (USD). We can also note that this is just the US market and does not incorporate the Canadian market.

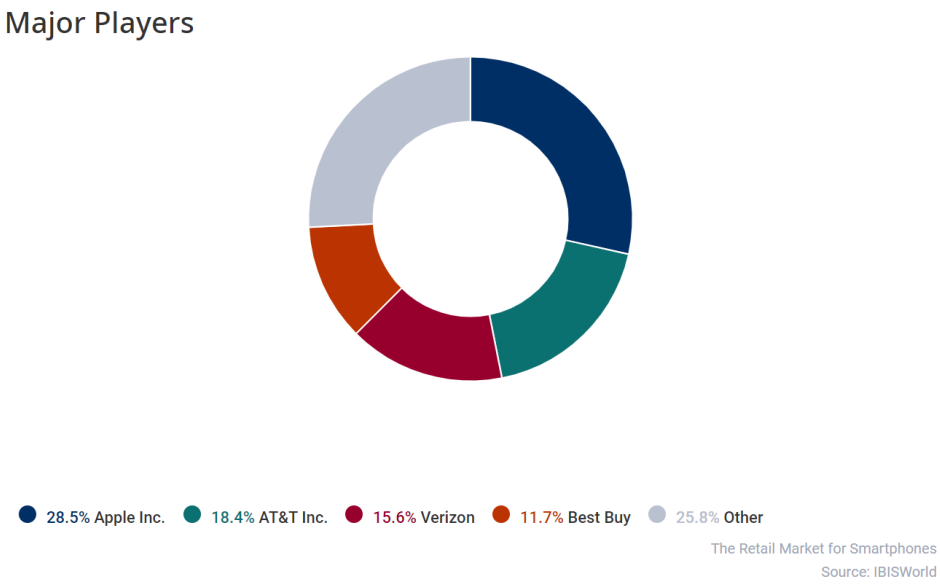

Fig. 1: Major players of US smartphone retail market (Source: https://my.ibisworld.com/us/en/industry-specialized/od6131/industry-at-a-glance)

We observed a high revenue for the market in 2021 but we also see that the market is expected to continue growing over the next 5 years at an average annual rate of 3.5%. This can be seen in Fig. 2.

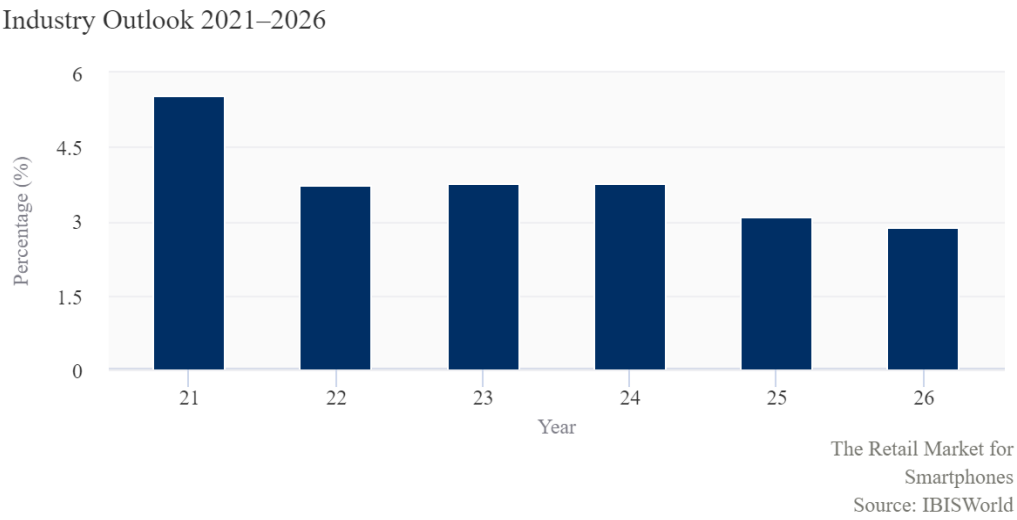

Fig. 2: US smartphone market project growth rate for the next 5 years (Source: https://my.ibisworld.com/us/en/industry-specialized/od6131/industry-outlook)

Competition

We face three main sources of competition, as shown below.

Conventional Companies: This is a catch-all term for companies such as Apple, Samsung, Huawei, etc. These companies all have similar offerings; they offer phones for any budget (~$100-$1000 CAD), with corresponding ranges in performance. These companies have a global market, and as such can benefit from economies of scale. Conventional companies fail to offer devices with truely long lives (averaging about two years), due to lack of extended software support and designed obsolescence.

Fairphone [1]: Fairphone is a smartphone company operating in much of the European Union, and creates a product that we consider to be the gold standard of modern modular phone design. Their newest devices come with a 5 year hardware warranty starting up to 2 years after release date, and 5 years of software support after release, with the possibility of a 2 year extension. Their product comes in at about $850 CAD, and features modern, higher end components

The company became profitable in 2020, and has been selling devices since 2013. The company publicly states no intention to corner the market, but instead to share sources in order to change the smartphone industry. Currently, Fairphone has made no statements of intent to expand into the US or Canada.

Teracube [12]: Teracube focuses on environmentally friendly phones, which are available to both the US and Canadian market. While not offering the same user repairability as Fairphone, it offers flat rate repairs on accidental damage under its 4 year warranty, and

offers 3 years of software support. On top of the warranty for factory defects, they offer a flat $59 repair fee regardless of the damage for accidental damage. The newest device costs $199, and offers lower end components.

Competitive Advantage: Our competitive advantage will be to bridge the gap between the companies listed above. Modulo phones will offer the repairability of Fairphone's devices, the North American availability of Teracube, the environmental friendliness of Fairphone and Teracube, and the performance of conventional devices.

Barriers to Entry

According to IBISWorld [9], the US smartphone industry has steady medium level barriers to entry. The high level of competition is one barrier to entry since there are many players with some major players with large shares of the market. This high level of competition may make it difficult for new firms to succeed.

Another key barrier to entry is the upfront capital required for the office space and equipment required to manufacture the phone. This becomes especially difficult when manufacturing large amounts of products.

However, we believe that our focus on sustainability and modularity offers us a niche with which we can break into this market.

Marketing Plan

We will target customers aged 20 - 39 years old within the US and Canadian markets. This is because younger people tend to be more tech-savvy than older people; therefore, we limit our scope to include a smaller subsection of smartphone customers.

To estimate the size of our customer base we obtained census data for Canada and the US for 2020. From our research we found that there are about 100 million people aged 20 - 39 in Canada and the US combined. This translates to up to 100 million Modulo phones being sold (of course, we do not expect these numbers to start).

We plan to advertise our smartphone through two main avenues: online advertising, and sponsorships to tech influencers and reviewers. Online advertising will be done through website advertisements and video advertisements such as YouTube. We will reach out to tech reviews who have large viewer bases and good reputations (e.g. Linus Tech Tips, Marques Brownlee, etc).

We plan to sell a brand new modular smartphone for about $900 (CAD) and replacement modules for various prices, depending on the type of component. Customers will purchase the phone online through our website and have the product shipped to them.

Operation and production

Legal and Licensing Requirements

We intend to ensure compliance to legal and licensing requirements by consulting legal services; start-up law firms (such as Voyer Law [15], for example) tend to have reasonable legal packages for legal services relating to launch of products, early-stage setup of companies, and hiring agreements.

At a high level, we will want to consider the following:

BC Legal Requirements [2] for setting up the company

1. Submitting a name request. As our intended market is the Canadian and US market, we want to make sure that our name "Modulo" is consistent with requirements in both markets (i.e. name doesn't use unavailable words, no similar names in the sector, etc.)
2. Incorporation (for limited liability). This includes setting up record books, issuing share certificates, an incorporation agreement etc.
3. Set up company articles

BC Legal requirement [2] for continued operation

1. Annual general meetings
2. File an annual report

Legal requirements for cellular devices in North America

1. We plan on investigating (with the help of legal consultation) the legal standards for cellular device communication in Canada and the US

Organizational Structure

Our founding members will hold the executive positions of the company: xxx as the CEO, yyy as the CTO, and zzz as the CFO. Each of us are engineers by training, and thus have the technical understanding to successfully lead this high-tech company. The subteams that we expect our company to be composed of are outlined below, in the staffing section; each subteam will report to a company officer.

Staffing

The following will describe the initial (start-up) staffing requirements of Modulo, as well as its full (scaled-up, long-term target) staffing.

Initial Staffing

The initial staffing will be in effect during the first 2-4 years of operation, as the financial situation demands. This staff will be responsible for the initial launch, design, and advertising of our product.

Position (name, if known)	Full-time, Part-time, consultancy?	Description
CEO and Head of Operations (xxx)	Full-time	Coordinates marketing, sales, supply-chain, and company strategy
CTO and Head of Hardware (yyy)	Full-time	Coordinates technology strategy, and ensures compliance to technological standards and regulations Responsible for hardware design (including modular structure, power systems, etc.)
CFO and Head of Software (zzz)	Full-time	Coordinates company investments, and the capital structure of the company Responsible for software design (including OS releases and firmware)
RF (communications) Hardware Engineer	Full-time	Responsible for RF design of phones and compliance to RF regulations
Startup Lawyers	Consultancy	Offers legal council for incorporation, intellectual property agreements, contractor agreements, etc. Drafts employment agreements Drafts product launch IP agreements

Marketing	Consultancy	Advises company on marketing strategy

Full Staffing

As Modulo progresses, we intend to scale up as a company. We expect to gain the following teams: finances and accounting, legal, support and operations, HR, hardware, software, and sales.

Team	Position	Description
Finances and accounting (reports to CFO)	Accountant	Maintains company books
	Investment manager	Determines the best investments for the company
	Financial adviser	Assesses business model quality on a rolling basis Outlines strategies for the company to pursue
	Financial analyst	Tracks company performance, forecasts market conditions
Legal (reports to CEO)	Company lawyer (Modulo may maintain additionally legal advice on a consulting basis as well)	Writes IP, employment, etc. legal contracts Provides advice on tax laws
Support and Operations (reports to CEO)	Operations manager	Ensures shipments and deliveries are correctly executed Arranges for repair / replacement of assets
Human Resources (reports CEO)	HR generalist	Updates HR policies, processes payroll, maintains records

	Recruitment	Scouts out and recruits new talent for the company
Hardware (reports to CTO)	Mechanical (Module) engineer(s)	Designs modular interlocking of the Modulo phone components Designs the phone case and appearance (along with marketing team)
	Power system engineer(s)	
	RF (communications) engineer(s)	
	Low-power peripherals engineer(s)	
Software (reports to CTO)	Firmware engineer(s)	Maintains firmware compatibility with peripherals
	OS developer(s)	Designs and maintains OS support across Modulo devices
	Software security expert(s)	Ensures compatibility with the newest security standards
Sales (reports to CFO)	Marketing lead	Determines marketing strategy of the company
	Product design	Works with the engineering team to determine the best features to maintain for our market, and the visual design of our phones Performs market research
	Customer support	Provide support to customers (e.g. advice for repairs)

Policies and Procedures

Our policies and procedures (e.g. equal opportunity policy, complaint policies, benefits, etc.) will be written according to our company values of equality, flexibility, and work-life balance. We want employees from every level of the organization to feel comfortable speaking to upper management and expect our policies to reflect this flat hierarchy. Additionally, we want to offer flexible work hours and a flexible work from home policy to employees where possible; we believe that a good work environment will allow us to retain skilled employees and forward our mission as a business.

Supply Chains and Delivery

Our model for supply chain and delivery will be optimized for robustness and cost.

In order to reduce the need for long term inventory space, devices will be sold in pre-order batches via the company website. Once each batch fills, or the time frame elapses, the order for manufacturing will go out and the devices will immediately be distributed upon arrival. This reduction in needed warehousing space comes with great cost savings, and at a minimal overhead from a logistics side.

The supply chain for consumables for devices (e.g. ICs, passive components, etc.) will be made more robust via a hardware agnostic design strategy. That is, for a given task we expect a handful of parts to meet the specifications, and the device will be designed to be built with any of them with no changes to the PCBs. While this may not be possible for all parts (processors and screens are often part of the advertised specifications, and could not be changed), reducing the number of parts with only one viable option reduces supply chain vulnerability. Parts such as screens and processors may need to be purchased in bulk to reduce risk.

More research into lead times, bill of materials, and shipping times would be needed before solidifying details for batch periods and supply chain management.

Financial Projections - 5 Year Financial Plan

Income and Expenses

This section lists the expected sources of income and expenses of our business. Estimated quantities, and the month-by-month income flow will be expanded upon in our 5 year financial plan.

Values given in the tables are not in present worth.

Projected sources of income (5 years)

In the first five years, much of our capital is expected to come from government funds and grants and investments. We expect to see revenue by the end of the second year, upon which our reliance on such external funding is expected to decrease. As such, the funds raised, not including sales, will aim to pay for the first two years of costs. We expect the largest contributor to our expenses to be the sourcing and manufacturing of components.

Source	Projected / target amount	Examples* / Description
Government funds	$678k (Government and Angel Investments add to $1.357M)	Innovative Solutions Canada [8] ($150k for proof of concept, up to $2M for prototype development) Creative Export Canada [7] Export Grant Funding (up to $2.5 M)
Angel investments	$678k (Government and Angel Investments add to $1.357M)	VANTEC Angel Network [5] Western Universities Technology Innovation Fund (WUTIF Capital) [5] eFund (VANTEC's Entrepreneur Fund) [5] Vancouver Angel Forum [5] Keiretsu Forum (Vancouver Chapter) [5]
Venture capitalist investments	$678k	Venture Capital investors to contact can be found in databases such as this: https://www.crunchbase.com/hub/canada-venture-capital-investors
Government/Bank Loans	$543k	Canada Small Business [6]Financing Program (up to $1M in loan support) in

		cooperation with RBC [13] BDC Small Business Loans [3]
Personal funds and assets	$136k	N/A
Sales	$0 (year 1) $1.8 M (year 2) $5.4 M (year 3-5)	Projected

* Grant examples (to apply to, or to further investigate our eligibility to) and prospective investors. Funds may end up coming from other sources.

Source	Annual projected amount	Explanation
Salaries	$320k (year 1-2) $320-400k (year 3-5)	Competitive entry-level engineering salary of $80k/person/year 4 Employees in year 1-2 4-5 Employees in year 3-5
Components and manufacturing	$1.22M (year 1-2) $3.60M (year 3-5)	These costs are a conservative estimate based on predicted popularity (predictions based on sale of similar products, such as Fairphone in the EU). We expect ordering of individual modules to be less significant to start, and so values are not explicitly included in this table. $600 / phone Expected batch size is 2000 Projected launch of first batch is at the end of year 2 Subsequent expected

		delivery is every 4 months (sooner if orders exceed expectations).
Advertising	$7.8k (year 1) $26k (year 2) $25k (year 3-5)	Year 1 costs include online media advertising at $20 / day, and website costs at $40/month Year 2 costs are the same as Year 1, with additional funding to send product samples to reviewers Year 3-5 have additional funding to expand our business reach.
Legal fees (including filing for incorporation etc.)	$7k (year 1) $1k (year 2-5)	Estimates are derived from Voyer Law quotes [15]. Year 1-2 costs are set up funds and thus higher. Year 3-5 costs are discretionary funds (as needed)
Equipment	$5k (year 1) $1k (year 2-5)	Rework station required for prototyping (year 1). Manufacturing is out of house, so costs are minimal (include solder, prototyping equipment replacement, some discretionary funds)
Workshop / space	$0 (year 1-2) $301k (year 3-5)	We plan on working out of a private space to save costs in years 1-2 We are budgeting for a 1000 square feet office in years 3-5 at ~$25 / square feet / month for office space (competitive rates in Surrey,

		BC) Commercial property insurance is on the order of $1k / year [4].

Cash Flows

The following cash flow uses a MARR of 10%, with EOY cash flows and market values (no inflation). If a range is given in the above tables, the maximum cost and minimum revenue is used.

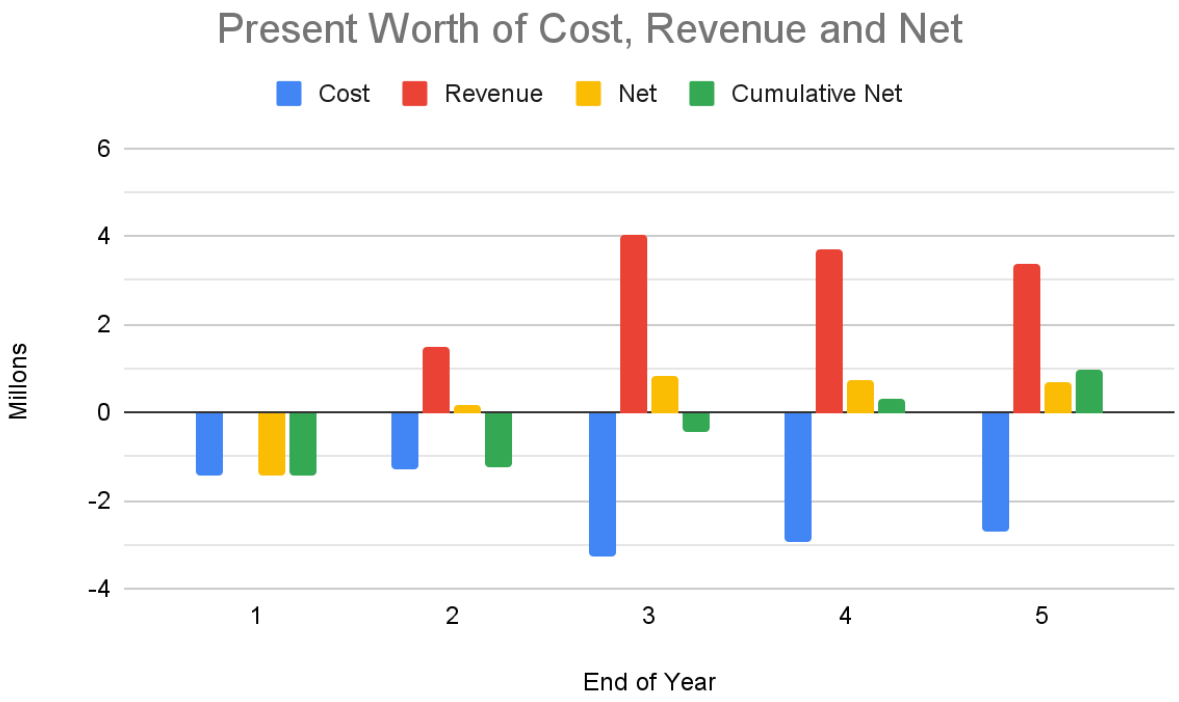

Fig 3: Present worth of the costs, revenue, and the net of the two at end-of-year for the first five years of operation. This does not include initial capital from investments, loans, etc.

As shown above the primary financial strain is within the first three years of operation, and this is what initial investment will cover. This remains true even with an MARR of up to 18%.

As a simplification, corporate taxes are not included. We expect that between the marginal tax rates and deductions due to paying interest would lead to zero taxable income. More

information about interest rates and other tax deductions for small businesses would give a more detailed analysis.

Implementation Time Table

To make our goals a reality, we need to source funding. We plan to seek funding from various sources to have a wider range of opportunities. These sources include: angel investors, venture capitalists, government loans & grants, and our personal assets. At the beginning of our 5 year plan, we will start with our personal assets and seek investment from angel investors in British Columbia. From that we can start working on our research and development (R&D). Then later in the first year we will perform more financing rounds with venture capitalists to seek investment from them. This will ensure we have the funding we require until we are able to sell our first batch of smartphones.

The second year will focus on advertising as we aim to be wrapping up our R&D. With this complete we can launch our website and start reaching out to tech reviewers and influencers to help advertise our product. By the end of year 2 we expect our final product to be complete, and to have received enough orders for our first product launch (our projected launch size is of 2000 phones).

During years 3 - 5 we will focus on obtaining feedback from the early adopters of our customer base to incorporate back into our product. This will allow us to make improvements to our first phone model and the modular components that we will offer as replacements. Rather than immediately developing an entirely new phone model, our engineering team will release backward compatible hardware module updates during this period (with a new module, e.g. camera or screen module, released approximately every 8 months). We intend to sell our product in batches every 4 months (or once the batch size is filled, whichever comes first). To achieve this sales goal, we will focus on advertising so that we can reach out to a larger group of customers to increase the size of our customer base. We will still, however, invest money back into our R&D.

The full timeline can be viewed in Fig. 4.

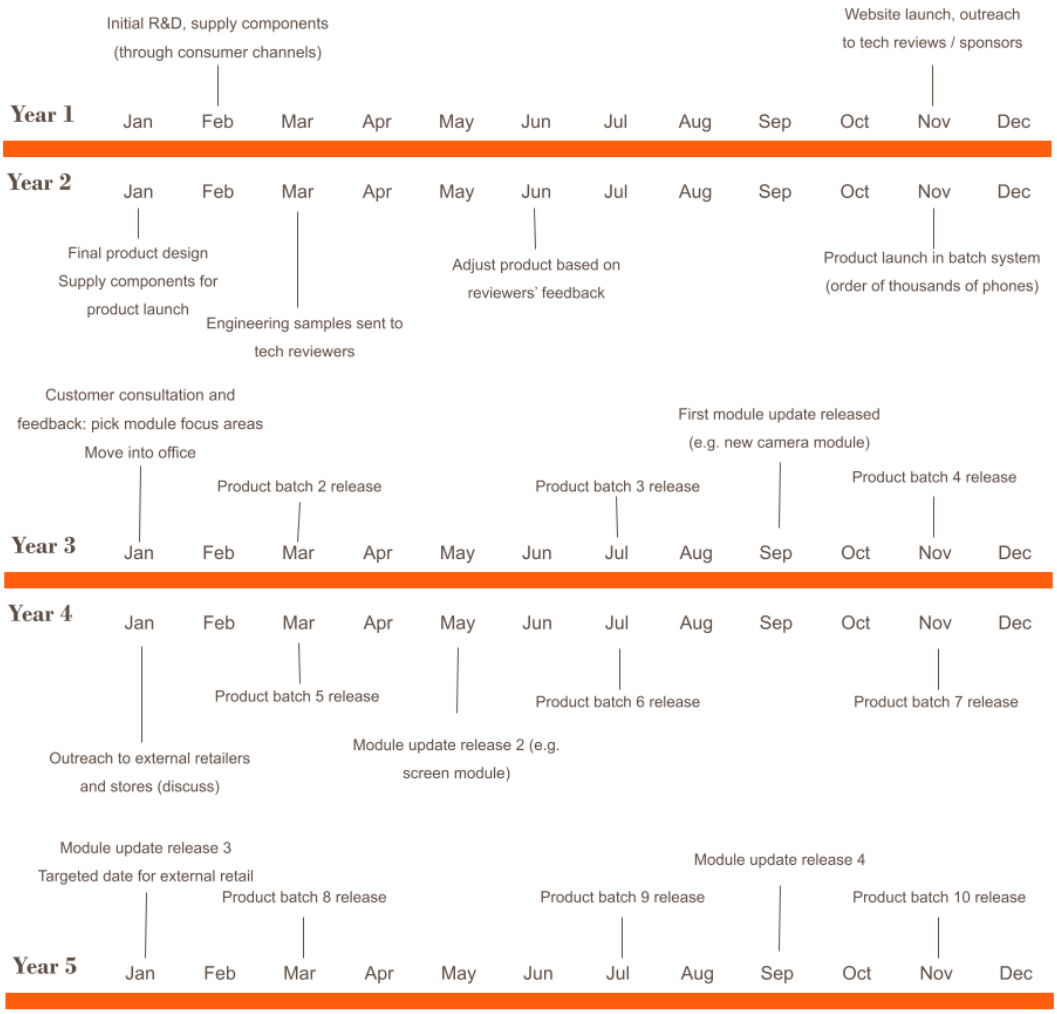

Fig 4: Implementation timeline laid out month by month

Appendix A: References

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