**LawnBots: Cost-Volume-Profit and Cost Behavior in the Crowdfunding Environment**

**Fundfunder**

**Where funding gets funded**

Development Stage

BUILD DESIGN PROTOTYPE PRODUCTION SHIPPING

    

LawnBots Is a small firm made up of some engineering friends from college. They are just starting out with a great new idea for an automated lawn mower, the Autonomous Lawn Fighter, which was pitched to all the big names in the lawncare market. While they loved the idea they hated our low cost high volume approach and wanted to make it more commercial and expensive. We at LawnBots hated that, and so we are bringing it directly to you, sitting on the couch professional. With your help you can help us make your dream of cutting the lawn from your PJs while on the couch a reality.

LawnBots set out on a mission to create a fully automatic mower at a price point that people could afford all while being simple to install and user friendly. In a world that is continually evolving, the LawnBots team asks, “Why has the lawn mower been left in the weeds?”

No one likes hours spent mowing on hot summer days, and we know that mowing remains a weekly chore. So LawnBots set out to change the world of automatic mowing by developing the most affordable, functional autonomous mower in the market, that would allow you to never mow your lawn again. But the team needs help from you to make that dream a reality.

**Welcome to the dream of full autonomous lawn care!**

Our team:

Gordon Schumway – CEO/Co-Lead Designer

William Tanner – CTO/Co-Lead Designer

Trevor Ochomek – Lead Systems Engineer

All of our leadership team are young, motivated, engineers with one thing on their mind, your lawn.

**How does it work:**

* Designed for ease, safety, and value. A low profile, perimeter wire is placed around your yard. Our patented trace technology starts to build a map for where your Bot needs to be. The wire acts as a wall and over time, once the software picks up the dimensions on your yard. Once we know the size and shape the barrier is brought down and you can sit back and relax as your lawn looks great.
* And the mower takes care of the rest, don’t worry about charging, when the battery is low the mower will return itself to the docking station, and rain or shine, we have you covered with our rain sensor that cuts the power to the blades and has the mower return until the conditions dry out.
* Your mower will run on schedule every other day or night and don’t worry about pets, kids, random wildlife, the low blades and safety sensors means it cant cut anything, well other than grass of course.
* And, we won’t wake the neighbors, or you for that matter. Up to 100x quieter than a normal gas powered lawn mower.
* Of course the most important thing for us, making it friendly on your wallet. Our mass production design means there is only one model of the Automated Lawn Fighter, but it is a great model and on the cheap made to fit into any lawn budget. At a flat $999 we are more than a gas powered mower, but the money over time (and also time in general) means we are cheaper in the long run, and for someone to come cut your lawn? We are easily cheaper than the yearly average for most lawn cutting services.

Find out more (FAQ)

Back this Project

**Your Role**

You work for Keaton CPA firm, a small and medium sized specialist that is known for their work in with crowdfunding companies. You have been assigned to run some preliminary work for the LawnBots team.

The LawnBots team knows one thing, lawn mowers. What they don’t know is how to run or operate the business side of things. So they did the responsible thing and hired your CPA firm to help them to help understand the financial side of things in running their first crowdfunding campaign. Their first issue is trying to figure out what they need to set their reserve at for how much they need to raise in the campaign to not only break-even but turn this into the revolutionary product they truly believe it to be. The team has asked you to look over their estimates from the manufacturing plant to help them set their funding goal.

**Part 1:**

The team is eager to bring this to market and thinks they could be really successful and project 10,000 units could be sold! They are worried about setting the right price, but want to make between a 30-40% profit at least. They are unsure about what direction to take. They have seen other less impressive models sell for, on average, 600 USD. They have asked for some help in determining how to proceed on the production front. They have run some prototype builds in which they detailed their process in the attached schedule. Additionally, they think they can rent out a factory for anywhere between 700,000-1,000,000 USD. They have asked your firm for some advice in helping the price their product.

|  |  |  |  |
| --- | --- | --- | --- |
| Build | Machining Hours  | Materials Cost | Utl, Supplies, Other Expenses |
| 0.1 | 50 | 197.49 | 206.78 |
| 0.15 | 55 | 276.49 | 227.46 |
| 0.2 | 20 | 207.37 | 82.71 |
| 0.3 | 22 | 236.99 | 90.98 |
| 0.4 | 15 | 197.49 | 62.03 |
| 0.45 | 10 | 217.24 | 41.36 |
| 0.46 | 12 | 217.24 | 49.63 |
| 0.5 | 16 | 207.37 | 66.17 |
| 0.51 | 12 | 192.55 | 49.63 |
| 0.52 | 18 | 192.55 | 74.44 |
| 0.53 | 12 | 177.74 | 49.63 |
| 0.54 | 13 | 197.49 | 53.76 |
| 0.55 | 12 | 207.37 | 49.63 |
| 0.56 | 16 | 217.24 | 66.17 |
| 0.6 | 12 | 207.37 | 49.63 |
| 0.8 | 12 | 246.86 | 49.63 |
| 0.9 | 11 | 197.49 | 45.49 |
| 1.0 | 15 | 187.62 | 62.03 |
| 1.1 | 12 | 192.55 | 49.63 |
| 1.15 | 12 | 187.62 | 49.63 |

**Part 2:**

The price point the team thought made the most sense was $599. The team has shopped this to multiple factories and have passed on that information to you. The team asked for quotes at 5,000; 10,000; and 15,000 units respectively. Two manufacturers had the best bids:

The first bid comes from Electronics Benchmark in Arizona.

Basic tooling and design will cost 750,000 USD.

Shipping costs from the factory to the warehouse are 100,000 USD for up to each 5,000 units.

Materials and labor costs are 375 USD/unit for 5,000 units 370 USD/unit for 10,000 units; and 365 USD/unit for 15,000 units.

Domestic shipping costs from the LawnBots warehouse to the customer will average $50/unit.

The second bid comes from Sourced in Shanghai.

Basic tooling and design will cost 325,000 USD.

Shipping costs and tariffs are 500,000 USD for up to each 5,000 units.

Materials and labor costs are 340 USD/unit for 5,000 units 340 USD/unit for 10,000 units; and 340 USD/unit for 15,000 units.

Final shipping costs from the LawnBots warehouse to the customer will average 50 USD/unit.

**Part 3:**

LawnBots decided to use Sourced as their manufacturing partner. All the contracts have been set up and preliminary manufacturing has begun while the campaign is starting. Their decision was based on the fact that the cost per unit was so much lower, at only 400 USD/unit they felt that they could make huge savings if the product really took off. And even though the shipping costs were with the savings on machining and tooling it was overall cheaper than the alternative.

Multiple tech blogs and YouTubers pick up on the campaign and start to build hype for the Automated Lawn Fighter, and the campaign starts off to a roaring success. The team can’t believe it, it becomes the fastest campaign to fund in Fundfunder history. LawnBots raised over 12,000,000 USD within the first hour online, and ultimately raised around 21,000,000 USD in total funding with a total of 21,037 people backing the project. Needless to say the team was ecstatic. However, the team received a new estimate from Sourced and they are a bit confused. It all seems off. The new bill is much higher than expected, they are making far less than expected at only 1,361,093 USD in profit. They ran the numbers based on your estimates and thought it should be 2,913,213 USD. They have the most successful project of all time, how could it not be more profitable?

The following is the estimated bill (in USD) from Sourced:

|  |  |
| --- | --- |
| Materials and Labor | 7,783,960 |
| Domestic Shipping | 631,110 |
| Machining and Tooling | 325,000 |
| International Shipping and Tariffs  | 2,500,000 |

The LawnBots’ team is a little miffed at you and your firm. They do not understand why their costs are so different than expected and why they aren’t turning the profit they feel they should be.

**LawnBots: Cost-Volume-Profit and Cost Behavior in the Crowdfunding Environment**

**Abstract**

A cost accounting case focused on cost behavior set in the crowdfunding environment developed for use in a Cost Accounting course. This case has three parts that can be given individually or in succession that allows students to practice cost behavior techniques, data analysis, and critical thinking. LawnBots is a start-up company raising funding for the first time on a crowdfunding platform called Fundfunder. The inexperienced members of the management team have the engineering know-how but lack the understanding of cost and cost structure to be successful. They have asked you to read over their documents and help them understand the cost environment of their firm better. They need assistance with CVP, break-even, and understanding cost behavior.

**Keywords:** Cost-Volume Profit; Cost Behavior; Fixed and Variable Costs; Crowdfunding, Cost Accounting

**Teaching Notes:**

This case is based on real crowdfunding campaigns and from discussions with creators that frequently use crowdfunding platforms to raise funds. It was inspired by some real-world problems that they brought up. This is designed to fit into a Cost Accounting course around the time of discussing Cost-Volume Profit Analysis (CVP) and Cost Behaviors and is designed to help students calculate, and explain the issues that arise from differing cost behaviors. The full range of topics covered in this case are: CVP, Cost Behavior, Cost Estimation, Data Analysis, and Price Setting. The overall objective of this case is to allow students to not only calculate these items but also give them some free reign to explore the problem space by explaining their calculations as well as critical thinking skills.

**Case Questions:**

**Part 1:**

**Required:** What is the average cost you estimated?

How much would you recommend they price this product for, and why (provide some reasoning on why/how you achieved this price)?

**Part 2:**

**Required:**

Who would you recommend LawnBots use as their manufacturer? Why?

How much should LawnBots set as their funding goal? Why?

**Part 3:**

**Required:**

Explain to them the discrepancy they are seeing and why your estimates did not include this contingency.

**Case Solutions:**

**Part 1:**

This case has three parts to it and they made be given to students individually or as part of a more comprehensive case. The first part allows the students to practice with cost estimation and cost-plus pricing models. Students should consider 3 major components: estimated factory costs, the provided prototype build costs, and the profit margin, but how exactly they deal with this should be afforded some discretion. Students could approach the given costs from a simple average to identify variable costs, or could use the high-low method or even regression analysis via Excel. These possible solutions look like:

Simple Average:

(Average Prototype Costs + Factory Costs) \* Profit Margin = Suggested Sales Price

( (208 + 74) + (1,000,000/10,000) ) \* 1.4 = 535

High-Low (including factory costs):

|  |  |  |
| --- | --- | --- |
|  | Hours (Cost Driver) | Total Cost |
| High | 55 | 603 |
| Low | 10 | 358 |
|  |  |  |
| 503 – 258 | 5.4/Hour |  |
| 55 - 10 |  |  |

Using High: 603 = 5.4(55) + Fixed

 503= 5.4(55) + 306

Total Estimated Cost (using average Hours): 5.4(18) + 306 = 403

Suggested Sales Price = 303 \* 1.4 = 564

Regression:

Per Regression Results Using Excel: Intercept: 292

 Variable Cost: 5.1

Total Estimated Cost (using average Hours): 5.1(18) + 292 = 384

Suggested Sales Price = 384 \* 1.4 = 538

However, there are also cost outliers seeded in the data, namely the first two builds which can make for a discussion point when recapping the case for if they should be included or excluded in cost estimation under any of the methods. Then the students must set the price using a cost-plus model. However, they are given a range on profit margin and this creates a good inflection point for discussion, in particular with this setting, do they try to maximize their profits and possibly alienate their market or do they set a more conservative price to help ensure they generate funding.

**Part 2:**

Part two focuses on Cost-Volume-Profit (CVP) analysis. Using multiple iterations allows for students to build mastery of the topic while also working on their ability to operationalize both fixed and variable costs within a firm. Students should also be encouraged to explain why or why not they suggest a particular level be used as the funding level. The calculations are included as Appendix 1. All levels explored are profitable so the students will have a decision to make. This part will task them to think about their solutions in the terms of the setting not just the strict calculations. By asking about the minimum funding level, students can take the route of lowest break-even point available as that will give the team the greatest likelihood of getting funded while also not losing them money vs setting a higher goal where the profits grow at a much higher rate. Secondly, the students must deal with suggesting a manufacturer. Of note, the students should be encouraged to identify the different cost structures of the bidding manufacturers. Bid 1, Electronics Benchmark has more fixed cost but they are more profitable when more units are made due to their lower step costs and more efficient variable costs, while Bid 2, Sourced is cheaper upfront and thus the better choice if there is low volume but becomes far less profitable due to the high value of step costs tied to their shipping. So a student could present this as Bid 1 has more potential for high profits, where Bid 2 offers a similar profit at the expected level and more profit if they fall short. This gives the students more of an ability to discuss the idea of high-reward in particular with a unknown product with unknown demand.

**Part 3:**

In part three of the case requires the students to revisit CVP analysis but also engages their critical thinking to look at the client’s work and evaluate where the errors in application are. Students can recalculate and compare and project their estimates out to the new number and compare that to the actuals presented. They should find that there is a new variable cost of the platform fee, but also should identify that the firm’s projections are not taking into consideration the cost behavior. As the volume increases Bid 2, Sourced, was far less profitable as they were more heavily rooted in step costs and lacked the efficiencies at volume presented in Bid 1.

**Strategies for the Case**

This case was developed using some real-world examples and from some discussions with actual founders and the problems that they have. Of note, one of the more interesting problems I found, was this notion of failing due to success. This case looks at some of the unique aspects of crowdfunding with inexperienced creators and the potential burdens of success that these individual creators or small start-ups face. Students may have some level of familiarity with crowdfunding sites such as Kickstarter or Indiegogo and this unique setting and small business focus should be something that students can relate more to. For instructors that are less familiar there are some high profile failures in crowdfunding you may want to read about such as: Amabrush whose components became too pricey, Coolest Cooler who didn’t plan their financials properly, and Zano who over promised and underdelivered.

When presenting this case, I prefer to have the students respond directly to the creator from the fictional accounting firm via a 1-2 page letter along with any supporting calculations. I remind them that the client is not a professional accountant and, as such, they need to put things into terms that the client could understand. I find this method allows for the students to not only practice some professional writing skills, but also reinforces their knowledge as they must fully explain their responses and the methods they used to come up with their figures.

**Evidence of Efficacy**

“I really liked this project. At first I was getting frustrated since there wasn’t a clear response to take. But then when I started to play around with the numbers, I thought it was really a lot of fun! It was hard to put my responses into the letter, but it helped me to understand the stuff we covered in class, by seeing it in a more practical setting.”

* Ian C.

“ I thought it was pretty cool. It was fun using real data for something like this. I saw some people try to do this without Excel and I don’t know how they do it. It took a while to get set up, but once I did it was really easy to look at a bunch of different situations and figure out which ones worked and which ones didn’t. I liked that you let us explain ourselves more instead of having an exact answer for us. Felt more connected to what you talk about in class that way.”

* Ben A.

**Appendix 1 – Cost-Volume-Profit for Bids**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bid 1 |   |   |   |   |   |  |  |  |
| Volume | 5,000 |   | 10,000 |   | 15,000 |  |  |  |
| Sales Price | 599 |   | 599 |   | 599 |  |  |  |
| VC | 375 |   | 370 |   | 365 |  |  |  |
| CM | 224 |   | 229 |   | 234 |  |  |  |
| FC | 850,000 |   | 950,000 |   | 1,150,000 |  |  |  |
| Break Even | 3,795 |   | 4,148 |   | 4,915 |  |  |  |
|   |   |   |   |   |   |  |  |  |
|   |   |   |   |   |   |  |  |  |
| Total Profit | 270,000 |   | 1,340,000 |   | 2,360,000 |  |  |  |
|  |  |  |  |  |  |  |  |  |
| Bid 2 |   |   |   |   |   |  | Actuals | Estimated |
| Volume | 5,000 |   | 10,000 |   | 15,000 |  | 21,037 | 21,037 |
| Sales Price | 599 |   | 599 |   | 599 |  | 599 | 599 |
| VC | 350 |   | 350 |   | 350 |  | 400.0128345 | 350 |
| CM | 249 |   | 249 |   | 249 |  | 198.9871655 | 249 |
| FC | 825,000 |   | 1,325,000 |   | 1,825,000 |  | 2,825,000 | 2,325,000 |
| Break Even | 3,313 |   | 5,321 |   | 7,329 |  | 14,197 |   |
|   |   |   |   |   |   |  |   |   |
| Total Profit |   |   |   |   |   |  |   |   |
| Sales Price | 420,000 |   | 1,165,000 |   | 1,910,000 |  | 1,361,093 | 2,913,213 |