

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

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INTRODUCTION

LawnBots¹ is a start-up manufacturing firm that creates robotic lawnmowers for personal consumers. After recognizing the emergence of artificial intelligence (AI) models being applied to mundane tasks, the LawnBots team saw an opportunity to apply its technology expertise in a new market. The robotic lawnmower applies AI self-learning technology to the traditional lawnmower allowing for a hands-off, autonomous lawnmowing experience.


To secure financing, LawnBots has decided to produce its product using crowdfunding on the platform Crowdfunder. Crowdfunding is the process of raising funds via a large group (the crowd) of investors. This can bypass the more traditional financing model requiring a venture capitalist or banking institution to provide funding and, instead, can directly target the market for whom the product is being produced.

While well-versed in the technology aspect, the team of Gordon, William, and Trevor (the LawnBots team) are total novices in the business and manufacturing side of things. They are very confident in their product and the ability to create an excellent piece of technology. But this is the first product any of them have ever brought to market. As they are new to the manufacturing industry, they have serious questions on how to properly plan for the production process. The team has reached out to your firm to assist them with this process.

¹ LawnBots a hypothetical firm and all data was created by the author inspired by real world firms.

Fundfunder

Where funding gets funded

Development Stage				
BUILD	DESIGN	PROTOTYPE	PRODUCTION	SHIPPING
✓	✓	✓		

LawnBots is a small firm made up of 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. With your help, you can help us make your dream of cutting the lawn while sitting on the couch in pajamas 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.



Exhibit 1. LawnBots Crowdfunding Pitch Page (continued)

Our team includes the following:

Gordon Schumway—chief executive officer (CEO)/co-lead designer
William Tanner—chief technology officer (CTO)/co-lead designer
Trevor Ochomek—lead systems engineer

Our leadership team members are young, motivated engineers with one thing on their minds—your lawn.

How it works

- 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 once the software picks up the dimensions of 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.
- The mower takes care of the rest. Do not worry about charging, since when the battery is low, the mower returns 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. Do not worry about pets, kids, random wildlife, the low blades, and safety sensors, which means it cannot cut anything other than grass, of course.
- We won't wake the neighbors—or you for that matter---because the Bot is up to 100 times quieter than a normal gas-powered lawn mower.
- Of course, the most important thing for us is 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 made to fit into any lawn budget. We are more than a gas-powered mower. The money and also time in general saved 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.

[Back this Project](#)

[Find out more
\(FAQ\)](#)

YOUR ROLE

You work for Keaton, a small- to medium-sized certified public accounting firm (CPA), known for working with crowdfunding companies. You have been assigned to run some preliminary numbers for the LawnBots team.

The LawnBots team knows one thing—lawn mowers. What they do not know is how to run or operate the business side, so they hired your CPA firm to help them understand the financial side of running their first crowdfunding campaign. Their first issue is determining what they need to set their reserve at for how much they need to raise in the campaign to not only breakeven but turn this into the revolutionary product they truly believe it to be. The team has asked you to look over estimates from the manufacturing plant to help them set the funding goal.

PART 1

The team is eager to bring this to market and thinks they could be very successful and project 10,000 units could be sold. They are worried about setting the right price but want to make at least 30 to 40% profit. They are unsure about what direction to take. They have seen other less impressive models sell for \$600 on average, and have asked for help in determining how to proceed on the production front. They have run prototype builds themselves in which they detailed the process in the attached schedule (see Table 1). Additionally, they think a full-time factory for mass production will fall anywhere between \$700,000 to \$1 million. They have asked your firm for advice on the product price.

Table 1. LawnBots Prototype Cost Schedule

Build	Machining Hours	Materials Cost	Utilities, Supplies, Other Expenses
1.0	50	197.49	206.78
1.15	55	276.49	227.46
1.2	20	207.37	82.71
1.3	22	236.99	90.98
1.4	15	197.49	62.03
1.45	10	217.24	41.36
1.46	12	217.24	49.63
1.5	16	207.37	66.17
1.51	12	192.55	49.63
1.52	18	192.55	74.44
1.53	12	177.74	49.63
1.54	13	197.49	53.76
1.55	12	207.37	49.63
1.56	16	217.24	66.17
1.6	12	207.37	49.63
1.8	12	246.86	49.63
1.9	11	197.49	45.49
2.0	15	187.62	62.03
2.1	12	192.55	49.63
2.15	12	187.62	49.63

Note: All monetary values are represented in U.S. dollars.

PART 2: BIDS

The price point the team thought made the most sense was \$599. To mass-produce the product, the team has shopped this to multiple factories to outsource the final production. They fielded bids but finally were able to narrow it down to two firms and have passed on that information to you. The team asked for quotes at 5,000, 10,000, and 15,000 units, respectively. The two finalist bids for manufacturers are Electronics Benchmark and Sourced.

Electronics Benchmark

Electronics Benchmark is located in the United States, which is where the LawnBots team is and the largest expected proportion of LawnBots customers live. This supplier is relatively new to the manufacturing sector and touts an innovative design process that extensively utilizes 3D printing tailored to the specific characteristics of the clients. This company spends extra time and attention working with clients to specifically design and create all custom tooling and schematics. Electronics Benchmark is eager to partner with new technology companies and believes it will have plenty of room to fit the project in and produce the needed units. The custom work, however, does require significant lead time and iterations on prototype models before final manufacturing. These constraints lead to a higher level of initial costs for tooling and design than most other bids. Final estimates are as follows:

- Basic tooling and design will cost \$750,000.
- Shipping costs from the factory to the warehouse are \$100,000 for up to each 5,000 units.
- Materials and labor costs are \$375/unit for 5,000 units; \$370/unit for 10,000 units; and \$365/unit for 15,000 units.
- Domestic shipping costs from the LawnBots warehouse to the customer will average \$50 per unit.

Sourced

Located in Shanghai, which is overseas for the LawnBots team as well as the largest expected proportion of their customers, this supplier is very well established within the manufacturing sector. Sourced has extensive experience working with many different clients and even came on recommendation from another creator who already used the supplier on a crowdfunded project. Focusing on speed and efficiency for the production schedule due to typically having a large number of clients, production must be planned out well in advance. To utilize a quick turnaround, the company tries to reuse as much design and tooling as possible while still providing a quality final product. This leads to a much lower initial design and tooling cost than most other bids. Final estimates are as follows:

- Basic tooling and design will cost \$325,000.
- Shipping costs and tariffs are \$500,000 for up to each 5,000 units.
- Materials and labor costs are \$330/unit for 5,000 units; \$340/unit for 10,000 units; and \$340/unit for 15,000 units.
- Final shipping costs from the LawnBots warehouse to the customer will average \$50 per unit.

Once again, the LawnBots team has asked you to review the offers and help them decide on the best manufacturing partner.

PART 3: PROBLEMS WITH SOURCED

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. This decision was based on the cost per unit being so much lower at only \$380/unit, instead of the approximately \$400/unit estimate from Electronics Benchmark. Sourced recognizes shipping costs are high but at a much lower price per unit, LawnBots could make huge savings if the product really took off.

The product did, in fact, take off. Multiple tech blogs and YouTubers noticed the campaign and started building hype for the Automated Lawn Fighter, so the campaign started off a roaring success. The team was elated as it became the fastest campaign to fund in Fundfunder history. LawnBots raised more than \$12 million within the first hour online and, ultimately, raised approximately \$21 million in total funding with a total of 21,037 people backing the project. The team was ecstatic. But when the team received the final bill from Sourced, the LawnBots team was a bit confused. It all seemed off. The new bill was much higher than expected, so LawnBots was making far less than expected at only around \$1.7 million in profits. They ran the numbers based on your estimates and thought it should be closer to \$2.7 million. Since they had the most successful project of all time, how could they have lost approximately \$1 million?

The following is the estimated final bill from Sourced:

Materials and Labor	\$6,812,000
Domestic Shipping	\$1,100,500
Machining and Tooling	\$325,000
International Shipping and Tariffs	\$2,500,000

The LawnBots' team is confused by this, as they used some of the numbers in the full estimates that you and your firm provided: why are the costs so different than expected, and why is the profit not what they thought it should be? The LawnBots' team said they used estimates from numbers included in the comparisons that your firm created based on \$380 of costs per unit for the Sourced bid. The team used these numbers based on the new totals sold and felt there should have been a much higher net profit. They have asked you to break down why the profits were so much less than expected when using that core \$380/unit estimate scaled to the actual production number.

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