11 Common Mistakes of Hardware Startups and How to Avoid Them

admitad.pro/en/blog/11-Common-Mistakes-of-Hardware-Startups-and-How-to-Avoid-Them

June 29, 2021

What a hardware startup is and what defines it. Examples of such startups in Russia and worldwide. Common mistakes of innovative hardware companies. What you can do to avoid making such mistakes.

A hardware startup is a company that creates, develops, and manufactures electronic devices.

Hardware startups are somewhat opposed to software ones: while the latter produce computer programs, the former build actual physical objects.

General features of hardware startups often lead their founders to make the same mistakes. In this article, we list key gaps in hardware startup management and ways to avoid incorrect decisions.

Hardware startup characteristics

There is a rule for hardware companies: only a scalable project can be transformed into a successful business. It means that the difference between **a project** and **a product** is the difference between **creating one piece of hardware** and **producing a whole batch**.

However, “producing a batch” is traditionally associated with higher costs, limited access to the materials, and other difficulties. In order to grow and evolve, a company must find a way to keep its production costs as low as possible.

Luckily, over the past few years, a trend towards simpler manufacturing processes has emerged. It has affected the hardware industry, too.

Hardware manufacturing specificities

Building a company that makes proper physical objects may be complicated by a couple of specific industry characteristics.

1. **Lengthy and labor-intensive development process.** Generally, hardware startups require more time and work to create their very first products. Preparations for the launch include steps that are simply unnecessary for software development.
2. **Involvement of third parties and contractors.** Hardware startups tend to involve external actors in their business processes. Such actors may include consultants, design agencies, manufacturers, distributors, and so on. Building relationships with partners is a difficult strategic process that requires constant attention.

3. **Complicated organizational structure.** Differences between hardware and software development are manifested in companies' internal structures as well. As a general rule, hardware startups have more complex multi-level business models since they also need a packing department, a production management department, and so forth.
4. **Butterfly effect.** Tiny mistakes at earlier stages of hardware development lead to disproportionately destructive consequences in the long term.

Examples of hardware startups in Russia and worldwide

Russian hardware startups

Dauria is an ambitious startup that specializes in space exploration and satellite manufacturing. It's one of the first Russian corporations to launch private satellites into Earth orbit. *Dauria* has worked with *Roscosmos*. In 2015, it received $70 million from *Cybernaut*, a Chinese investment fund. *Dauria* was founded in 2012 by Mikhail Kokorich.

RoboCV is a manufacturer of smart autopilots for warehouse transportation vehicles. It has created X-MOTION NG, the world's first fully automated mobile robotics system designed to operate indoors. Industrial robots made by *RoboCV* can move objects along all of the three axes. They are controlled through a cloud solution. Founded in 2012 by Sergey Maltsev.

DRD Biotech is a startup from the Republic of Buryatia that works on creating in vitro rapid response tests for diagnosing brain damage based on biotechnology and IT. The company products are used to detect ischemic strokes, epilepsy, and cranial injuries. In 2020, the company started to develop a rapid test for coronavirus. Founded by Anzhei Zhimbiev in 2014.

Global hardware manufacturers

Graphcore is a British company that makes chips and processors for artificial intelligence and machine learning. Graphcore's production is used in many areas, such as medicine, robotics, and automated vehicles. The startup intends to make its IPU technology a world standard in AI. *Graphcore* was founded in 2012 by Nigel Toon and Simon Knowles.

Fitbit is an American manufacturer of wireless devices for physical activity tracking. *Fitbit*'s gadgets can measure the number of steps you walk during the day, your sleep quality, and many more health indicators. In 2015, the company conducted an IPO on the New York Stock Exchange which brought it $358 million. Founded in 2007 by James Park and Eric Friedman.

GoPro is a startup that manufactures cameras for action video shooting. Its first product was a film camera that brought only $150 000 to the company. However, in 2007, a shift to digital cameras allowed the startup to receive $3.4 million in revenue. In 2014, *GoPro* launched an IPO hoping to raise $2.95 billion from the sale. But the stocks sold like hotcakes on the *NASDAQ*. Their aggregate market value increased four times over several months reaching $11.8 billion. The company was founded by Nick Woodman in 2002.

Common mistakes of hardware startup founders

1. Trying to create the next *Apple* or *Tesla*

The easiest way to instantly drain a startup's money is to imitate tech giants. New companies just don't have enough capital to do things the way industry moguls do.

When *Apple* began manufacturing aluminum cases for Macbook Air, it had to purchase 10 000 CNC machines to be able to ship one million units per year. Obviously, no startup can replicate that move. A newly established company that needs to manufacture similar cases is more likely to change the design so that it can function just as well while requiring simpler production.

Solution: build the manufacturing system on the lean startup methodology right from the start. Keep the processes simple. Don't try to make another *Tesla* in your favorite industry or niche market; work on your own unique offer instead.

2. Blind trust in customer opinions

You might probably want to ask, "What do you mean? Shouldn't businesses always listen to customers?" Our answer would be: not necessarily. Or at least not without critical thinking.

When founders are obsessed with their projects, sometimes they become tempted to promise clients everything they demand. While paying attention to customers is a must for every startup, it's equally important to take into account actual financial limitations. **An aspiring project cannot make everyone happy** as it lacks sufficient resources, experience, and key team members.

Solution: focus on one particular need of your client and find a way to address it better than anyone else on the market. The more functions your product has, the pricier its production gets, and yet more things can go wrong.

Every wrong move is costly in the hardware industry. Big companies can afford mistakes, but a startup must avoid them by all means. Therefore, it's best to keep products simple, designing them with fewer functions and thereby fewer errors.

3. Product design that ignores technological limitations

Building a functional prototype is just half the battle. The real challenge lies in scaling the project to organize its mass production.

The most important things to design at this point are the printed circuit board and the exterior of the product. The latter is especially tricky: no matter how many prototypes a startup builds, at least half of them will never make it to the production phase.

Things get complicated when founders underestimate how crucial it is for a product design to comply with technological requirements. Reckless development practices, especially when critical errors get detected in the middle of a large batch production, lead to enormous expenses and delays.

Solution: as a rule, first prototypes get 3D-printed or made of materials at hand, such as wood, paper, or cardboard. As startup evolves and moves forward, it can afford professional product design services. This solution allows combining looks, usability, and functionality, all while abiding by manufacturing restrictions and other technical characteristics.

4. Obsession with an idea

A good idea is not enough: it also needs a sales market. But some founders become so obsessed with their concepts that they cannot accept the current economic situation and respond to it. They can't evaluate the demand level objectively or simply listen to constructive criticism from users, investors, friends, and family members.

Solution: improve your projects by conducting CustDev interviews, gathering data from end-users, and adjusting the product accordingly. This way it has more chances to find its target audience and remain on the market for a while.

5. Underestimating development and production costs

Prices on electronic components and prototype building tools continue to decline. However, when a production line reaches an output level of thousands of units per month, expenses may increase at an exponential rate while remaining unnoticed.

That is often a result of underestimation of certain expenditure objects like certification, assembling, packing, and shipping. Founders' disregard for sudden delays, changes in the instruments used, or discovered defects might be involved, too.

For example, *Coolest Cooler* became the second most supported startup on *Kickstarter* in 2014: the company raised almost $13 million. That seemed like enough money to start a production process, but all of the investments could not save *Coolest Cooler* from a complete failure. It underestimated the development expenses, resulting in shipping delays of several years. Thousands of disillusioned customers were awaiting the arrival of goods they purchased.

Solution: analyze your expenses well beforehand. Ask manufacturers or founders of other startups how much the development process may cost. The more opinions you gather, the better. Finally, be sure to calculate your budget thoroughly and with due attention so that you do not spend your entire capital on production alone.

6. Inaccurate planning or scheduling

Many manufacturers from Western countries prefer to launch their products during the Christmas season, expecting to monetize the holiday surge in sales. However, no company is safe from unexpected disruptions in the production schedule.

They might be caused by

- delays in the supply chain,
- inaccessible components,
- poor production quality,
- sudden changes in the manufacturing process,
- correction of discovered errors.

Solution: try to predict all possible delays and include them in the production schedule, leaving out a considerable amount of extra time to cover any emergencies.

It may also be wise to bear in mind all important events and holidays in your partners' countries. For example, if your manufacturer is from China, make sure to exclude the Chinese New Year weekend from your working schedule.

7. Lack of proper testing

Say, founders create an excellent smartphone prototype. Its waterproof case was tested at sea level and worked perfectly well in every test.

But the waterproof material may start deforming at higher altitudes. This points to the lack of testing during the design phase: the product designers didn't account for pressure differences and therefore ignored the necessity to try the smartphone out in various environments or use cases.

Solution: you should spend a lot of time and effort to test your product before shipping using only appropriate methodologies and product testing standards.

8. Insufficient market research

Ignorance of customers' needs, desires, and problems is another trap for hardware startups. Many founders start working on their projects in a complete information vacuum. As a result, their products do not solve any real problems and lack an actual market or business model.

Solution: feedback is everything in the earlier stages of development. Start gathering client reviews by identifying your target audience and conducting an extensive market study. Find out more about CustDev.

A preliminary study helps you understand what the target audience looks for, so you'll be able to abandon ideas without potential. It allows you to focus on actual problems and avoid spawning useless product features.

Pro tip: crowdfunding schemes are useful for testing the actual demand for the concept of your startup. If people are ready to pay for your product when it's merely an idea, then it must really be valuable. Moreover, a successful crowdfunding campaign is a good argument for potential investors.

9. Wrong choice of a manufacturer

Numerous startups have had to stop production because of totally incompetent manufacturing partners. In most cases that happens when a factory of inadequate scale gets chosen.

For instance, an order for 20 000 parts would simply go unnoticed by a big manufacturer that ships more than a million parts every month. But a smaller factory would be able to pay attention to the developer's needs and complete the order more thoughtfully.

Solution: you should request relevant documentation and reference materials to ensure the partner will actually be able to deliver your order in the required quality.

Communication is key to managing every relationship. That is why you might want to avoid working with middlemen and spend more time on the ground with the producing team instead. It will help you get into corporate culture, understand the processes, and form expectations for quality standards.

10. Lack of competitive advantage

We live in a world where every innovative idea will be copied by some Chinese company and made into a much cheaper knock-off. The majority of hardware projects are particularly vulnerable to reverse engineering and reproduction.

A patent may be used to protect business concepts, but obtaining one is a rather costly procedure. And besides, in case of legal proceedings, a patent violator almost always has more money to cover legal costs than a startup. That explains why patents are generally not used by founders nowadays.

Solution: if a hardware project has no objective anduncopyable competitive advantages, you should focus on creating a loyal brand community. Exceptional customer service and splendid user experience will help your startup stand out from the crowd of even the most accurate fakes.

11. Inadequate traction

Remember those hypothetical founders with their waterproof smartphones? Let's say the team of the startup spends months refining every part of the prototype. Then the product launches, and it turns out customers are not exactly interested in waterproof phones.

That happens all the time: sometimes startups fail to become successful despite having an excellent conception. Such failures are attributed to the fact that a startup couldn't secure enough initial support as a result of a weak marketing strategy.

Solution: start your advertising campaign early on to hype up customers and create a big client base. When the startup is ready to present shiny new prototypes, enough people will be interested in the product, and the company will be able to convert that interest into its first shipments.

Brief summary

Hardware startups develop actual physical gadgets with innovative features. The industry specificity makes hardware startup founders make similar mistakes. Basically, all of them are caused by problems which can be divided into three main categories.

1. **A startup lacks**
    1. information about its target audience,
    2. a marketing strategy for product promoting,
    3. sufficient testing and quality control,
    4. a unique competitive advantage.
2. **A startup has unrealistic expectations for**
    1. its own possibilities and resources,
    2. customers' opinions and genuine needs,
    3. the value of an idea the startup is based on.
3. **A startup has made mistakes in**
    1. the product design itself,
    2. calculating costs and expenses,
    3. establishing a work schedule,
    4. choosing a manufacturer.

Each of these problems is capable of setting a project back for a couple of steps, canceling out all of the achieved progress, and resulting in thousands, if not millions in losses. That is why we recommend you carefully plan the strategy, test your hypotheses repeatedly, and hold a finger on the market's pulse, whatever venture business you're building.

Dayana Bol'shakova

Marketing Manager at Admitad Projects