

# Reaching sustainability in bottom-up management of radical innovations

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## Abstract

While modern history is full of indispensable innovations that are like all technology for non-experts at first look close to being indistinguishable from magic (Arthur C. Clarke), it is worth pointing out that the path from invention to innovation is long and difficult. Focusing on small teams working on radical innovations we present our view of the problem and we offer some possible guidelines and solutions. In contrast to large companies, with strong financial and networking background, which ensure their competitive advantages with incremental innovations, developed by people with a less scientific background, small innovative companies usually consist of highly motivated scientists that share a vision of their invention. Such teams encounter many problems regarding financing, entering the market and public acceptance of their radical innovation. Regarding financing and entering the market there are many possibilities that depend on the size of the team and the nature of the invention, but public acceptance strongly depends on marketing.

In our view the originality and technical superiority of the innovation has to be backed with good business model which allow integration of new solutions into existing value chains. Strong and motivated team is a key success factor, since for smooth running and upgrading of the business depends on their decisions and output. Solid vision and focused determination can reduce risks of being trapped into “gathering money in business as usual” concepts or staying at “solo innovator fighting for industry acceptance” status. Crucial concept is sustainability in both in creativity and resource content.

**Keywords:** *Invention, innovation, management, bottom-up development, team, incremental innovations, radical innovation, organic growth, value chain, business angels, venture capital, sustainability*

## 1 Introduction

The invention is a form, a composition of matter, or a process that has an element of novelty. Inventions that become common in usage are innovations. We are mostly motivated to deal with innovations that are novel, non-trivial and industry applicative so they also have a potential to obtain the legal protection of a patent [1].

The society needs innovations in order to enable new activities, to simplify the accomplishment of different tasks and to widen and to deepen our knowledge. Innovations can be divided into two major groups from the perspective of novelty and importance. Namely, *radical innovations* are responsible for major

breakthroughs and *incremental innovations* bring additional optimization to already established products or processes.

The management of invention with a goal to turn it into successful innovation (further in the text it will be denoted as the *management of innovation*) is a long process where many bright ideas and motivated teams fail, thus management of innovation is worth of a careful analysis. For the sake of simplicity we will limit ourselves to the product innovations, but the concept is similar to the process innovation as well. We are interested in outlining the most critical steps from the original radical invention to the market acceptance of innovative product and we will try to suggest some general tips for successful strategy.

There are many excellent books and papers written on the topic of good management in

innovative companies. Innovators dilemma [2], Innovators solution [3] and The blue ocean strategy [4] are just a few of them. These books mostly cover the content where the initial financial resources are available and where innovation is a tool for increasing or spreading market success of the company or their shareholders. The arguments of importance to find the simplest mass market niche where the innovations mostly simplifies the project and make possible to get the goals as simple and cheap as possible for sure holds in long term if supported by appropriate amount of money and skills. However these are the resources the innovators most often lack and sometimes they are forced to go into more demanding products where added value can be achieved with smaller production quantity of more expensive products.

On the other hand there are also books on start-ups like The art of Start-up [5], where we can find advices how to run a business in a high-tech start-up company. The book Spiritual capital [6] is one of the books dealing with motivation where the importance of psychology is emphasized. All this knowledge can be very useful, but what is missing is the content of the initial process where innovation, goals and business model are defined.

In this article we would like to brighten this issue where most of the inventions fail and they never get appropriate opportunity to be raised to the implementation stage with good hopes to success.

## 2 Origin of the invention

Radical inventions begin with an idea that can not be simply implemented in the available products in the market. Usually, they are discovered by innovators who are deeply involved in science and who are searching for possible implementations of new concepts [7]. From this aspect we can also argue that radical inventions are more frequently *technology driven* then *market pushed*. Even more, according to Benoît Sarazin [9], radical inventions are not inspired by market but rather by sensible detection of *latent* (therefore, not yet manifested) needs and wishes of the customer. On the other hand, market typically demands incremental inventions in order to create competitive advantages with limited risk. Such inventions are frequently ordered to be developed by non-scientist staff of larger companies and they are relatively easily transformed into successful innovations. A new, small company would hardly live of an incremental innovation, the competitive advantage of the incremental innovation would fade in comparison with competitive companies due to the lack of other skills and qualities:

research, production, sales and all other existing business as usual qualities. This is very important since the management process depends on the origin of the invention and the business environment.

Since innovators are typically educated in science and not in economy, the success of the invention strongly depends on the coincidences during the proof of the concept and search for market opportunity processes. Relying onto coincidences does not give an adequate hope. An analysis of possible strategies and key important decisions is required in order to formulate solid strategic suggestions for optimal way to bring the invention to a successful innovation on the market.

The innovator is in a critical position when he created the invention and most probably he also has the idea of the potential market. At this stage he has to be very careful in defining the business model for the management of innovation. Soon he will be faced to the process of forming and guiding the team as well as initiating business-to-business relations.

## 3 The first steps

It is very important not only to have the invention but also to have clear ideas of how to push this invention through the existing environment and offer its advantages to the market. Typically parts of the environment are rigid to accept novelties, since they disturb their continuous process of work. The culture of accepting new ideas, the willingness to learn and exploit new options and other sociological aspect are playing an extremely important role in this process. It is important for the innovator to be aware of the traps in this environment. In authors' opinion more than 90% of inventions fail to fully overcome these obstacles and are never in good starting position. They may evolve to a starting position, but not to a good one. In such cases the initial innovator vision fades and the economic success is obtained by others. The problem is that such process is not sustainable for the innovator and he or she is forced to constantly work in unprivileged position in the society without significant organizational and financial background to invent things that have to be invented and to do it in a creative, "not-too-economically-dependent" way.

In the beginning it is very important for the innovator to answer what seems to be very obvious. Innovator has to define what exactly his invention is but in many cases this is not evident at all. After knowing that, he can set goals and further activities.

It is also important to understand that definition of the business model is a process, not an one time act, so there are usually several iterations and tests of different kinds of models until the appropriate one is selected.

A good management based on the business model is as important as good invention itself for a successful transformation of invention to innovation. If the management does not have possibilities and resources to run the process of transformation smoothly even the brightest invention will have severe difficulties to be successful on the market. In order to establish conditions for a good management, the invention needs to address all demands for the new innovation to become present on the market.

While finalizing the invention the innovator usually attracts a team of people who share the belief in the success of the invention and who have complementary skills and knowledge in order to cover some of the necessary roles for the business model to work., but

This is a new type of work and relations for the innovator whose typical work is solo-development. Sharing the idea to the team and teamwork itself has some important benefits and drawbacks.

## 4 The team

The establishment of a firm and coherent team takes time, but once it is fully operational, the quality, efficiency and productivity are significantly increased compared to a solo innovator. If the project of further development of the invention is expected to be a long run process then it makes sense to build team *organically*, since people have to be self motivated over longer periods of time.

The team has to re-question all the crucial aspects of the invention, such as what the product is, what it brings to the people and the market and what the most appropriate business model is. Is it a materialized final product for final customer, is it a patent or is it something in-between?

Only after all this critical answers are answered, we can begin talking about how to manage later stages of completing the innovation process.

After knowing what the intentions are, the team has to find its optimum organizational way. Is it a hobby, a more serious after-work activity, formally organized as an association, or is the invention serious enough to establish a company and to work in a fully organised and professional way?

In unorganized ways, like the hobby activities, the reach of a team is most probably limited to mathematical theory, basic technical drawings and perhaps prototypes. In a more professionally organized way the limits of the team can be significantly expanded to wider patent protection, trademark, and repeatable process of further development. Though more subtly, the motivation of the team also depends on the form of organisation. It is very hard to fully motivate highly educated, young and ambitious people in an unorganised way of work, due to financial security and status portrayal. Unlike experienced, employed workers that have reached some goals in their career and can be searching for fulfilment in a non-financial sense.

It is also important to establish an appropriate work environment to suite the profile of the team and also the philosophy behind the organisation. A professional organisation demands a more formal environment, company quarters and some form of hierarchy, while unprofessional team members can work out of their own homes, with much more independence and creative freedom, but with fewer coherencies with other team members.

It seems that the informal environment suits innovations best but is at a disadvantage when it comes to making it economically. Therefore some mixed form of organisation should be most successful in the big picture.

Most importantly, the team has to work in a sustainable way both financially by earning its own reliable income and creatively by new solutions.

## 5 The company

If the team is organized in a legal form such as a company, some of the business environment benefits can be used. Solo innovators or hobby teams are quite often disappointed by inability to become the part of the business environment. The reason is mostly related to their special way of work and their origin of motivation. Financial success is not likely to be the main motivation. Naturally, financially motivated people are not innovators; they rather devote their time and energy to other financially more reliable activities.

But the process of invention to innovation requires additional technological development and also management activities where financial resources are of crucial importance if the team wishes to be competitive. To have access to financial resources and to be still the owner of the intellectual property of the invention the team has to be organized as a company. In such case it can choose among all possible funding mechanisms to support its work. This is important for

sustainability of a team as a whole and also for all individuals in a team.

The first task of a team is to position itself in to a *value chain*. This is extremely important from both the development and business perspective. If the value chain will be active, the development process will proceed smoothly, if not, it will stagnate or face a dead end. If the positioning will produce benefits for neighbour links, also the cash flow will allow establishment of a successful business. Good positioning depends on the possible links between the product and existing business and development environment.

In order to obtain a good value chain position, three questions have to be answered. They are listed by their importance: (1) What are the neighbour links? (2) What are their benefits of your existence? (3) How to exploit the knowledge in order to make a sustainable innovation development business?

Without those answers, even extremely good and useful inventions fail to be accepted in the environment.

## 6 Development of an innovation

When a company is on a way to implement the invention to the market, the main issues are: to motivate the team, to finance the development and to create revenue. By completing all these three aspects, the team has produced a sustainable process.

Enthusiastic self motivated people are the most important asset of a company since all the activities depend on them. From management perspective it is important that the staff not only fulfil their orders but also thinks of possible activities that will help achieving goals. This can be done successfully if everyone is involved in the process of defining goals. We have to keep in mind that this is a dynamic never-ending process so naturally the long term goals strongly depends on personalities, nature, capabilities and visions of all group members. From the initial innovators vision the vision is changing according to the involved time and energy of everyone participating. Based on those thoughts we can conclude that it is of crucial importance for the innovator and owner on what kind of people he grows the team on. On one hand he is interested to grow his idea, on the other hand he requires people with complementary personalities and strengths.

The development is by definition an activity where money is spent and the product does not yet exist, so it can not be sold. It is a challenge how to finance it, and the additional difficulties are related

to the experimentally proven fact that the required amounts of time and money are approximately 3 times the expected amounts. This uncertainty especially holds for radical innovations where a lot of unexpected problems occur. If we want to finance the development in a triple way and we have non resources in the beginning we have to use multiple mechanisms.

The first are government tenders to support the development. This mechanism is related to lots of bureaucracy, lobbying and waiting for tender results but in the end it can bring free white money.

The second mechanisms are *business angels* or *venture capital* that gives the money for the exchange of a share of the company. This, so called smart money brings also first possible links to the business environment and value chain.

The third source of money is the direct business relation with the industry and this is the most important since it gives a very detailed feedback on the potential of the invention and the business model.

These are the three possible sources of funding for financing the development of the radical innovation. The additional one is the owner's share of the company that can be used in initial stages for paying some of the team members activities. However, if in a reasonable amount of time, one year for example, there is no positive response from the three external ways of funding something has to be wrong with the invention or with the business model. Especially feedback from business angels and industry is important.

Earning revenue from the innovation is different than funding the development. Revenue is made by sales of complete products of different sorts. It can be licenses, patents, products, supports such as technical support or some other way. In order to be sustainable it has to be independent from the development. Only the added value can support the further development. If a company accomplishes this, then the circle is closed and the activities are sustainable.

## 7 Conclusion

Typically, the invention is created by a single innovator and the team to transform the invention to the innovation is formed after the creation. The challenge is how to keep the original vision and motivation since the required actions consist of various most often of multidisciplinary tasks. Innovator at the very beginning of the process does not predict some of them.. Thus, he or she can be disappointed if the original sound of his ideas is

drowned in the noise of other activities. “The requests for financial stability and sustainability can be satisfied by careful analysis of all possibilities and intuitive selection of the optimal funding source. Unfortunately we do not live in an environment where achievements are recognized and financially awarded just by their existence.

For a conclusion we would suggest some thoughts that may be considered during the process from the idea to the final product:

- The innovator, the team and/or the company have to define the invention as well as the business model.
- All the relations inside the team and the company have to be clear and visible. Everyone has to be self motivated to participate and share its energy with the team and the project. Otherwise he cannot expect to guide the events according to his desired vision.
- Financial sustainability has to be guaranteed as soon as possible in the development process.
- Check the feedback from business angels, venture capital and the industry. If they are not willing to fund the invention, change the business model or rethink what your innovation is!
- Build a self motivated team and allow personalities of each individual to guide the process. Create detailed and understandable measures for responsibilities and credits of everyone participating.
- Use multiple financial options all the time and pay significant attention to them. The development requires certain amount of time and certain amount of resources. There is no short-cut, if the required investment is one million EUR, you will eventually have to find such investment or proportionally lower your goals.
- Spent as much energy and time in activities that create revenue. This will

enable sustainability and added value to break the dependence on the day-to-day search for funding.

- Face potential customers with serious test: Are they willing to pay the money or not? Only their financial contribution guarantees their sincere interests in your work.
- Be aware that the quality of your business model is as important as the quality of your invention and technical solution. If you aim to develop the best product in the world then also the business part has to be at the appropriate level.

Do not expect too much credit for all the trouble. If the innovation is successful most of the people will just believe that you have been at the right spot at the right time. Those who have tried or experienced something similar will understand more.

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