

# Necessity of using an Optimum Business Model in High-Tech Firms, Nanotechnology Case Study

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**Abstract**—In the way of growing and developing firms especially high-tech firms, on many occasions manager of firm is mainly involved in solving problems of his business and decision making about executive activities of the firm, while besides executive measures, attention to planning of firm's success and growth way and application of long experience and sagacity in designing business model are vital and necessary success in a business is achieved as a result of different factors, one of the most important of them is designing and performing an optimal business model at the beginning of the firm's work. This model is determining the limit of profitability achieved by innovation and gained value added. Therefore, business model is the process of connecting innovation environment and technology with economic environment and business and is important for succeeding modern businesses considering their traits.

**Keywords**—Business Model (BM), Nanotechnology, High-Tech Firms.

## I. INTRODUCTION

In recent years, high-technologies have developed and grown a lot but in spite of rapid progress of these technologies, there are a lot of obstacles to their extension. One of the main influential factors in the success of high-tech firms is having an optimal business model. These models which are framework for creating value for firms generally answer three key questions about firms, which activity, how and when must be done? Correct answers to these questions result in correct function, creating value added customers' satisfaction and finally profitability for the firm.

## II. INTRODUCTION OF NANOTECHNOLOGY

Nanotechnologies are a range of technologies that use materials on an incredibly small scale: one nanometer is a millionth of a millimeter, roughly the equivalent of one eighty thousandth of a human hair. They offer real benefits for consumers.

## III. IMPORTANCE OF NANOTECHNOLOGY DEVELOPMENT

Prediction of big market for nanotechnology products and its rapid growth has made different countries to make big investments in developing technology. Wide market and big investments in this domain result in the appearance of new

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concept named Economics of nanotechnology. Economics of Nanotechnology is due to convergence of Nano sciences and Economics by which the way of technological changes is accelerated. Nano Economics is not application of one domain for studying other domains but it means that science, technology and economics cannot be completely separated.

So Nanotechnology is the newest arena of modern technologies which is described as one of the preferences for technology in some countries because of application of its products. Considering undeniable share of technological products and value added created by them in economic development of countries, it seems that this technology is a suitable solution for speeding up their economic development.

## IV. WHAT IS THE PROBLEM?

Awareness of managers of Nanotechnology firms about the necessity and importance of Business model in surviving and developing commercialization of this technology is vital. But it seems that this awareness is poor. Certainly those firms are successful that have a more suitable and more precise business model for themselves.

## V. WHAT IS A BUSINESS MODEL?

A 'business model' is commonly seen as composed of two elements: a business system and a profit model. While the latter often gains the higher profile, the former is arguably the real 'meat' of a firm's business model. Not only does it act as the 'system of works' that actually produces and delivers the firm's products or services, it is also the locus where a firm can learn about its operations and the behaviors of its suppliers and customers. This learning can accumulate to represent a considerable competitive advantage, one that risks being wasted if activities are unwisely unbundled. While the profit model earns revenues for the short term, the business system learns information for the longer term: a successful business model must aim for both these outcomes. (Itami and Nishino, 2010)

## VI. THREE CORE COMPONENTS IN A BUSINESS MODEL

A business model can be described with three core components:

- ✓ Resources and competences,
- ✓ Organizational structure
- ✓ Propositions for value delivery.

• Even a start-up will begin with something in the way of resources and competences. The resources may come from

external markets or be developed internally, while the competences refer to the abilities and knowledge managers develop, individually and collectively, to improve, recombine or change the services their resources can offer. [7]

• The second component– the organizational structure, encompasses the organization's activities and the relations it establishes with other organizations to combine and exploit its resources. To put it in a nutshell, this 'building block' includes its value chain of activities, i.e. the various discrete process it is involved in, and its value network, i.e. the (maybe quite complex) web of relations its creates with external stakeholders (suppliers, customers, competitors, regulators ...)

[4].  
 • Finally, a business model also includes a third component - the value propositions a company delivers to customers, in the form of its products and services. At a subsidiary level, these propositions also encompass how and to whom the offer will be marketed. Firms may address value propositions to various kinds of 'customers' - end consumers, suppliers, complementors, competitors or sponsors - particularly in the case of multisided markets [5].

As Amit and Zott define them, value propositions reflect the content of the transactions with customers, and the idiosyncratic deployment of resources that each organization manages so as to generate its offers. For instance, in the biotech industry, many start-ups add services to their portfolio of products development: in the long term their revenue sources are their products, but proposing services to their customers allows them to generate short-term cash resources [8]. These three core components (resources and competences, organization, value propositions) will each encompass several different elements (numerous kinds of resources, partnerships with different firms within the value network, various kinds of products offered to customers ...), and the structure and volume of the organization's costs and revenues follow from them. Our conception sets value propositions as the only sources of revenues, to be understood in the broadest sense as turnover, but also include to royalties, rents, interest, subsidies or assets handovers. Alongside revenues, running different activities in an organization and acquiring, integrating, combining or developing resources are the BM's costs drivers. The difference between revenues and costs ultimately generates a more or less substantial margin (reflecting the value that the organization captures) that can subsequently feed the stock of resources and competences and which

therefore determines over time the sustainability of the business model [1]

#### VII. THE RELATIONSHIPS BETWEEN COMPONENTS WITH THE GROWTH OF A HIGH-TECH FIRM

The growth of a high-tech firm results from the interaction between its resources, its organization and its capacity to propose new value propositions in markets. As already noted, the three basic business model components in the RCOV framework - resources and competences (RC) to value or combine; the organization (O) of the business within a value network or within the firm boundaries; and the value

propositions (V) through the supply of products and services - determine the structure and the volume of costs and revenues of a business and thus its margin, and so, ultimately, its sustainability. The RCOV framework constitutes a parsimonious and dynamic approach to the business model, implying that entrepreneurs and managers have to consider – jointly – questions of accumulated and combined resources, of organization and of value offered [6].

In our view, the business model of a given firm is a snapshot, at a given time, of the ongoing interactions between these core components. But, rather than a snapshot, we should perhaps think of this image as a single frame from a motion picture - for the open-ended interactions between its core components (and between the elements within each core component) and the initiatives that flow from managers' entrepreneurial abilities ensure that the business model is necessary for developing high-tech firms.

#### VIII. THE NECESSITY OF USING BUSINESS MODEL IN HIGH-TECH FIRMS

Technology by itself has no single objective value. The economic value of a technology remains latent until it is commercialized in some way via a business model. The same technology commercialized in two different ways will yield two different returns. In some instances, an innovation can successfully employ a business model already familiar to the firm, while, other times, a firm will have a business model that can make use of the technology via licensing. In still other cases, though, a potential new technology may have no obvious business model, and in such cases technology managers must expand their perspectives to find an appropriate business model in order to be able to capture value from that technology. In fact, it is probably true that a mediocre technology pursued within a great business model may be more valuable than a great technology exploited via a mediocre business model. Unless a suitable model can be found, these technologies will yield less value to the firm than they otherwise might – and if others, outside the firm, uncover a business model more suited for a given technology, they may realize far more value from it than the firm that originally discovered the technology [3].

[3] have suggested that a business model in a technology based firm fulfills functions that have been indicated in the table I.

TABLE I  
 BUSINESS MODEL FUNCTIONS IN A TECHNOLOGY BASED FIRM

No	Functions
1-	Articulates the value proposition (i.e., the value created for users by an offering based on technology);
2-	Identifies a market segment and specify the revenue generation mechanism (i.e., users to whom technology is useful and for what purpose);
3-	Defines the structure of the value chain required to create and distribute the offering and complementary assets needed to support position in the chain;
4-	Details the revenue mechanism(s) by which the firm will be paid for the offering;
5-	Estimates the cost structure and profit potential (given value proposition and value chain structure);
6-	Describes the position of the firm within the value network linking suppliers and customers (incl. identifying potential complementors and competitors); and
7-	Formulates the competitive strategy by which the innovating firm will gain and hold advantage over rivals.

In the other hand using a precise operational business model for starting up and developing nanotechnologies firms has more importance than traditional firms which are related to important traits of their business and works based on nanotechnologies. Some important traits have been indicated in the table II.

TABLE II  
IMPORTANT TRAITS IN NANOTECHNOLOGIES FIRMS

No	Traits
1	High growth speed and need to dynamic and flexible systems for growth
2	High risk
3	Distinction and Innovation
4	Specialized human force
5	Dependence on R & D
6	Vague Market
7	Short distance of Researches to Market
8	Having Patience
9	Need to specific rules and regulations
10	Value based on knowledge (Knowledge-center)
11	Interdisciplinary of technology
12	Need to risky investment

Therefore, considering mentioned traits and BM functions, nanotechnologies firms need to specific requirements for developing, it seems that inattention to these requirements causes that successful experience in this field is not gained. One of the most important requirements in nanotechnologies firms is having an optimum business model for activity which survives and develops the firms.

## IX. CONCLUSION

Considering mentioned subjects, it can be found out that business model of nanotechnologies firms not only has more specific traits and parts than business model of firms with traditional technology but also has more importance for developing and growing these firms. Business model in nanotechnologies firms is the process of connecting innovation and technology environment to economic environment and business.

## REFERENCES

- [1] Benoît Demil and Xavier Lecocq. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Long Range Planning* 43 (2010) 227e246. Elsevier Ltd. All rights reserved.
- [2] Hiroyuki Itami and Kazumi Nishino. (2010). Killing Two Birds with One Stone: Profit for Now and Learning for the Future, *Long Range Planning* 43. Elsevier Ltd. All rights reserved.
- [3] H. Chesbrough and R.S. Rosenbloom, (2002) The role of the business model in capturing value from innovation: evidence from xerox corporation's technology spin-off companies, *Industrial and Corporate Change* 11 (3), p. 529.
- [4] M.E. Porter, (1985). Competitive Advantage, *The Free Press*, New York.
- [5] J.C. Rochet and J. Tirole, (2006) Two-sided markets: a progress report, *The RAND Journal of Economics* 37 (3), pp. 645–667.
- [6] P. C. Godfrey and H. B. Gregersen (1999), op. cit. at Ref. 18 define managers' entrepreneurial ability as '... the capacity to identify, develop and complete new combinations of existing asset bundles or new asset configurations' (p. 41).

- [7] P.C. Godfrey and H.B. Gregersen, (1999). Where do resources come from? A model of resource generation, *Journal of High Technology Management Research* 10 (1), pp. 37–60.
- [8] R. Durand, O. Bruyaka and V. Mangematin, (2008). Do science and money go together? The case of the French biotech industry, *Strategic Management Journal* 29 (12), pp. 1281–1299.

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