



RISK MANAGEMENT IN INNOVATIVE HIGH TECH COMPANIES

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ABSTRACT

This paper explores the strategies used in managing innovation risk in technology based companies. The article presents literature review specifically focused on managing innovation risk in companies from IT sector. Next the article presents two main for managing such risks based on classical risk management literature and crisis management literature. Article propose classification of suitability of these models depending on innovation risk type the companies face.

Key words:

risk management, crisis management, IT, high-tech

INTRODUCTION

In 21st century risk management is crucial to competitive advantage of any company. yet it is especially paramount for high tech organizations. These companies face additional risks related to management of innovation process which are key for their development and survival. Since innovation is inherently risky, thus these companies should carefully adopt risk management strategies that allow to achieve their long term objectives. Therefore it is crucial to understand innovation process in high tech companies, before these can classified into different risks, so ultimately these risks can be analyzed and managed.

1 RISK OF INNOVATING

Literature recognizes vast number of ways to show different types of innovation. The primary distinction has been made by Schumpeter et all [6,7]. Schumpeter divided innovation into incremental and disruptive. Incremental

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innovation does not destroy existing structures of the market, but instead changes some “rules of the game”. On contrary disruptive innovation completely changes the marketplace and market equilibrium. An example of disruptive innovation is development and commercialization of facebook, while adding new features to the platform would be an example of incremental innovation. Of course disruptive innovation is more risky than incremental innovation, conclusion that comes directly from so-called S-model of innovation diffusion [5]. Initially when disruptive innovation takes place, there is high number of entrepreneurs that specialize in development of specific innovation. This often results in a number of different standards being offered to the market while products have limited functionality. After a technological innovation and a subsequent era of ferment in an industry, a basic architecture of product or process emerges and it becomes the accepted market standard [10]. This is known as dominant design. As the standard in the industry is established disruptive innovation phase is over and industry concentrates at improving incremental features of product or service. Thus radical innovation becomes incremental innovation and primary success factors such as speed and novelty change into efficiency and costs cutting. Figure 1 shows relation between stage of innovation and number of companies on the market, confirming higher risks related to early stages of innovation.

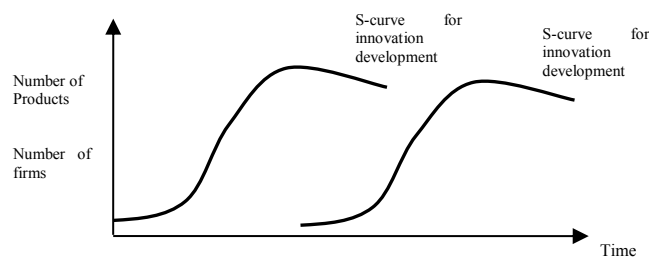


Figure 1 S-Curve of innovation (adapted from: [10])

An important distinction is usually made between product, process, position and paradigm innovation (so called 4p's of innovation) [3] and each type of course has different risks attached to it:

- Product innovation - change in things (products or services) which organization offers; for instance new mobile phone processor with greater camera.
- Process innovation - change in ways in which products or services are created or delivered; for instance Amazon new delivery system.
- Position innovation - change in the context in which product or service are delivered; for instance reverse hypothec for older people.
- Paradigm innovation - changes in the entire models which frame what the organization does, for instance online insurance services.

Teece [4] model try to explain who benefits from innovation, whether it is inventor or imitator, thus implying different risks related to innovating for different players on the market mainly first mover and followers. Figure 2 shows that two main factors are important in profiting from innovation, appropriability regimes and complementary assets.

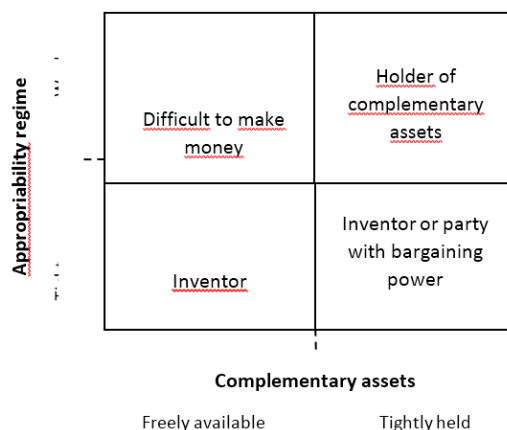


Figure 2 Teece model of innovation (adapted from: [4])

An appropriability regime is the extend to which technology can be protected from imitation, thus allowing inventor to directly profit from it. Inability to imitate innovation can be safeguarded by law (patents, copyrights, trade secrets or trademarks) or can come from the fact that knowledge is tacit thus imitator does not have sufficient skills to imitate. Complementary assets are all the other capabilities, except those related to technology, that firm needs to posses to be able to commercialize new technology. These include: manufacturing, marketing, distribution channels, reputation, brand name, channels and complementary technologies. Innovator is likely to profit from innovation when appropriability regimes are tight and complementary assets are unimportant. High importance of complementary assets implies that either inventor has to share profits from invention with owner of complementary assets or owner of complementary assets will become the only to benefit from innovation. Summarizing, inventor risks are highest when appropriability regimes are weak while complementary assets are important.

Finally one can try to combine all these different definitions of innovation and try to link it with different, co-related risks factors, considering innovative high-tech sector. Such attempt has been presented in table below [3].

Table 1 Innovation factors

Innovation factor	Innovation type	Advantage gained	Risks	Examples
Novelty in product & service offering	Disruptive	Offering something no one else can	Market and product related	Introduction of first smart phone
Novelty in process	Incremental	Offering product & service in a way others cannot match i.e. lower cost	Risk limited	On-line book selling, internet banking,
Complexity	disruptive	Offering something others find difficult to copy	Risk of combining different elements	New operating system, iphone
Add / extend range of competitive factors	Incremental	Moving basis of competition, from price to quality, variety, reliability	over investment risk mismatch of product offering vs demand	New features in smart phones, tablets etc.
Robust platform design	Incremental / Disruptive	Offering something that is a platform so other variations and generations of products can be built	High initial costs of platform building, risks of adapting platforms to changing market conditions	Samsung platform for smart mobiles
Rewriting the competitive rules	disruptive	Offering something completely new that directly competes with old	Market risks	Cloud computing versus standard on-site server system
Reconfiguring parts of the process	Incremental	Rethinking ways in which different parts of the system work together	Low risks mainly related to client acceptance	Cisco connectivity
Transfer across different application contexts	Incremental	Recombining established elements to suit different market	Risks of market acceptance	Gmail initially used for private now customizable and used by companies

Concluding depending on innovation type, innovator faces wide range of different risks that should be managed properly to allow achieving and sustaining competitive advantage.

2 RISK MANAGEMENT

There is substantial and rich literature on risk management (see for instance Simak, at all, Tichy at all, Cleary at all and others). Figure 3 presents the basic approaches to risk management.

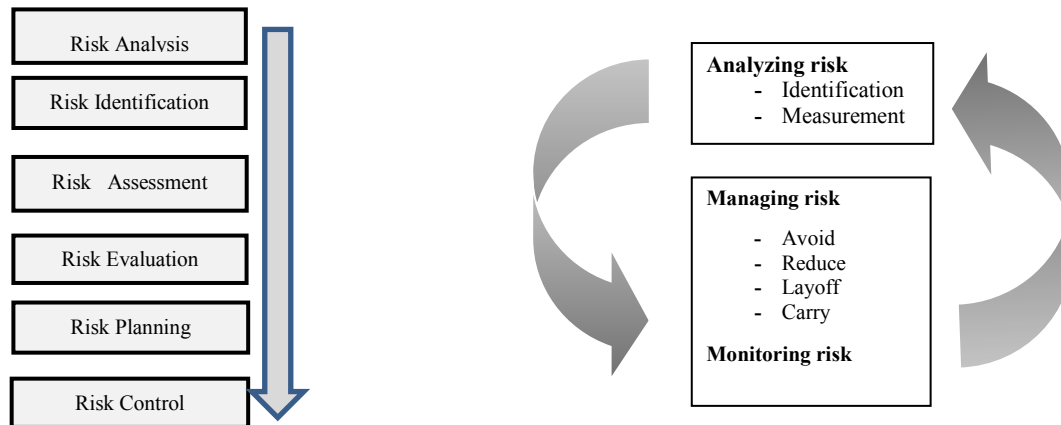


Figure 3 Typical risk management models (adapted from: [1] and [2])

The process of risk management starts with analysis and identification of various risks and assessment of their severity. Risk identification and assessment means the firm is able to understand the extend of the risks to which the firm is exposed in each case, the circumstances in which they might emerge and the consequences if they do. Risk identification often follows using experience from similar risk situations in past. Once risks are identified and measured the entity should choose how to approach these risks. The options are: risk avoidance, risk reduction, lay-off or risk carrying.

Avoidance means trying to eliminate risks that are not acceptable. For example firm might not be interested in pursuing very risky innovation and can completely resign from such innovation. Risk avoidance reflects every firm's need to maintain focus and follow agreed patch of development. Yet every firm faces some core risks, that are fundamental to its business and there is no simple way to avoid them. For high-tech firms, for instance, innovation risk is an example of risk that can't be avoided, given very high reliance of this sector on innovation as a driver of competitive advantage.

Reduction concentrates on minimizing risks the firm is exposed to. This strategy is often referred as consisting of three activities:

- loss prevention- aims to reduce the like-hood of a given type of loss occurring. Examples of loss prevention are the smoke detectors and burglary alarms or the use of security guards.
- loss control- is defined as all techniques designed to reduce the severity of loss, should it occur. Firewalls for instance prevent fire to spread, without preventing fires from starting.
- diversification- is a third mean to reduce risk. If risk is diversified the firm takes lower stake in each project, yet increases the number of projects it conducts. This allows decreasing the risk of a single failure.

Layoff focuses on finding the third party to bear risk for the firm. Thus risk is passed on the third party that is better equipped or more willing to bear it. The most common way to transfer risk is insurance. In such case, for an agreed premium the insurer agrees to indemnify its clients, up to a pre-defined limit, in case of a loss. The example from financial world is hedging. With hedging, through buying futures, firm can mitigate the risks of currency movements, commodities price fluctuations or changes in interest rates.

Retention aims at accepting level of risk and embodying it within the activities of the firm. Some risks should not be transferred to other parties, because dealing with such risks internally is the most cost efficient way. Involuntary risk retention is a result of failing to identify given risks.

The final part of the risk management agenda is risk monitoring. Monitoring involves repetitive assessment of numerous risks faced by the firm. It is a process embodied deeply in risk management cycle and its aim is to assure continuous control over possibilities of risk.

These models are different from models of crisis management, where crisis can be considered as an extreme case of risk management. There are some key differences between crisis and risk management. Risk management models assume that risks can be quantified and it is known more or less when they can occur. This is different from crisis situation where crisis consequences can often be quantified yet it is not known when they will occur. Also results of crisis are more severe than results of risks situations.

An example of model for managing crisis situation is model presented on figure 4.

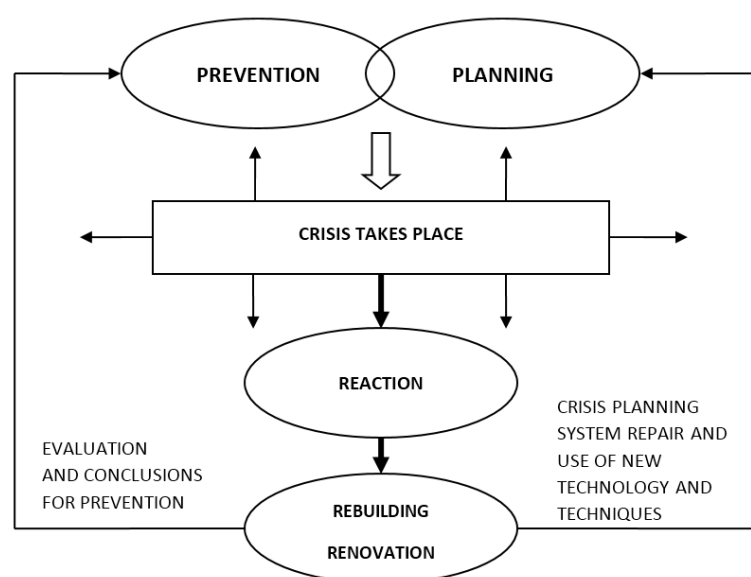


Figure 4 Crisis management model (adapted from: [8])

Model presented by Simak has some important differences compared to standard risk management models. First, planning comes before reaction, since in crisis management the moment of risk cannot be perfectly predicted. This prevention is further reinforced in crisis situations, for instance principles recommended by the EU and NATO in order to increase quality of crisis management system is regular training of activities of individual components as well as of the security system as a whole on model situations [9]. Firm can predict some risks, which are the result of its own activities; the best example would be risk of entering new market, which is the result of firm first entering or planning to enter this new market. On contrary in crisis management it is the prevention and planning that are taking place before crisis occurs to assure appropriate action can be taken. The other important difference between these models are the feedback loops that are present on crisis management model. The feedback after the crisis situation occurred allows improving system sufficiently to prepare better for crisis in future.

CONCLUSIONS

Innovation management is the key factor determining survival of high tech firms. Since innovation means risk, risk management is crucial for these enterprises. Considering the importance of innovation and risks related to it, one can argue that innovation management in high-tech sector is closer to crisis management models than to generic model of risk management. Specifically when we have the example of company pursuing radical innovation (in Schumpeter meaning) or innovation on market where appropriability regimes are weak while complementary assets are important (Teece criteria) or innovation involving paradigm shift (Besan definition) one can consider crisis management models as more appropriate than standard risk management models for management of such innovation risks.

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