Risk Management in New Product Development

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I hereby declare that the work submitted is mine and that where I have made use of another’s work, I have attributed the source(s) according to the Regulations set in the Student’s Handbook.

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ABSTRACT
This dissertation was written as part of the MSc in Strategic Product Design at the International Hellenic University.

The topic of this thesis is the use of Risk Management in New Product Development. The purpose of the present dissertation is to examine what the existing literature has to offer about the necessity of risk management, how much it has been evolved through years of practice in companies and what level of help it has provided to them, and how it is implemented by companies nowadays. Many methods have been found and explained in this research and they were compared on whether they agree in a situation where an existing company uses any of them for managing risks while developing new products.

The results have shown that almost all of them are considered essential in the new product development process and it is up to the company to decide which one is preferable to it. But there is always the possibility that the field on which a company is developing its products does not serve the use of some of the mentioned methods. According to the analysis of the Samsung Company in this study, a company in the field of technology, the literature is in the same path with the reality, but with the addition of the extra steps that are taken by the specific organization for further forecasting regarding negative potential events.

Alexandros Avgeris

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Author

Avgeris Alexandros
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INTRODUCTION

The general topic of this dissertation is the Risk Management in New Product Development, an interesting topic which concerns and will concern organizations in the future, given the fact that innovative products have to be released to the market faster than the previous years. It is considered extremely important because there are a lot of companies who develop new products, even in such a short period of times, but only a few succeed in doing it correctly and enjoying the acceptability of the people who are the targeted group and are seen as customers. The above companies are very keen on optimizing not only the development process but the one of the risk management behind it as well. This explains the fact that more and more jobs are created within organizations with the main purpose of managing this kind of situations or events. The importance of this subject can be proved by the number of existing studies too. There are many authors, academics or professional managers, who continuously publish reports and books on the better management of risks when developing new products with many methods presented and analyzed. Each one individually even tries to interpret older methods in accordance with the current technology’s assistance. The main problem that this thesis examines and tries to analyze is the understanding of existing risk management methods, how effective are the current methods, and to confirm the fact that indeed a company uses them for the development of new products despite the lack of a standard method or way of implementing them which promises positive results and the elimination of the negative ones. Of course never will there be such a certain method, because some events would not be thought of or it is inevitable to happen, but organizations apparently will not stop researching this subject.

As far as the content of this thesis is concerned, a brief description follows. The Literature Review chapter answers to the question why is it so important in today's competition, describes the new product development process, the risk management process and the steps of its breakdown regarding the risk itself, there is a division of risk categories that exist in new product development, how risk management is used throughout the new product development process, and what are the methods with which a company can implement the risk management process. In addition, the mentioned methods are explained to give a general idea of what they offer to the user. Finally, there is a real case scenario presented of how a well-known company
functions when developing a new product and how it identifies and treats the potential risks. The Methodology chapter discusses the chosen methodology in detail with what was taken into account, what steps were followed, and what were the met obstacles for the dissertation. The Findings chapter sets out the results and findings of the examined literature in combination with the included real case. In the Discussions chapter, an analysis of the results takes place and whether they agreed with the theoretical part of the literature review. Finally, the Conclusions chapter is where the author drew any conclusions.
LITERATURE REVIEW

INTRODUCTION
It is well known that competition in the business area has grown rapidly during the last years. Many companies try to be innovative, one step ahead of others, by launching new products out to the market. This alone does not constitute a problem for any firm, the story behind it is what creates the most worries and pressure. It would be too naive to consider a product (good or service) successful just because it hit the market, and not to take into account the several processes that took place as well as all the resource allocation, which should be done optimally, along with the close collaboration among different departments of a company. Having said that, one could easily understand that many things can go wrong as all of the aforementioned are not standardized processes and actions. Thus, there are a lot of risks which should be managed properly and considered as threats for a project, making it important for companies to break down the stages of initializing it until releasing the final product to the market.

NEW PRODUCT DEVELOPMENT
The main reason that a company is trying to develop and, in extent, launch a new product out to the market is to stay viable among its competitors. As discussed before, for developing a new product, a certain path is followed widely. Usually, there are 8 steps to take (Duval, 2013):

1. **Idea Generation**: Execute a SWOT analysis, conduct market research, receive suggestions internally (employers) and externally (target group).
2. **Idea Screening**: Eliminate ideas that are not accepted or feasible. It is better to fail fast because changes in a next stage would be destructive.
3. **Concept Development and Testing**: Delivery of information to loyal customers in order to see their reaction whether the product would be acceptable.
4. **Business Analysis**: In this stage, numbers fall on the table. Some of the questions that need to be asked are if the product would be profitable, how the sales of the new product will be, and how is it going to cost in terms of advertising and promotion.
5. **Product Development**: Plans for production, marketing plans to distribute the product, plans for promotion.

6. **Test Marketing**: Introduction of the new product on a small scale of customers. If it is accepted the project is a “Go”. If not, changes are being made to reverse the situation, otherwise, the project “dies”.

7. **Commercialization**: Reaching this phase means that the test marketing was successful. Therefore a bigger investment takes place on this product to deliver it on a larger scale of customers.

8. **Review of Market Performance**: Once the new product hit the market, this doesn’t mean that all actions have been completed. The company must monitor its performance in the market otherwise the product will fail if the sales are not the prospective ones, meaning the investment was a fail as well.

Throughout these steps, whether the new product is something tangible or intangible, the close collaboration among the different departments of the company is essential. According to Duval (2013), the marketing department is responsible for most of the actions, as the most important factor for launching a new product is to be widely accepted by the end customers. Of course, this doesn’t mean that all the other departments are excluded from the process. They need to participate in the whole research, and data should be shared within the project team properly until it is their turn to take action.

In a similar way, Kantomaa (2012) said that the process of the Product Development consists of 6 phases. These are:

- Phase 0: Planning
- Phase 1: Concept Development
- Phase 2: System – Level Design
- Phase 3: Detail Design
- Phase 4: Testing and Refinement
- Phase 5: Production / Ramp-up
Except for the above mentioned, there are other departments that need to follow up the project, such as:

Finance Department: Present planning goals, optimize economic analysis

Legal Department: Research in order to prevent any pattern issues

Sales Department: Create a sales plan

General Management: Optimal allocation of resources

The common point between those two approaches is the unity of all segments of the company. They collaborate as much as possible to prevent the project from being delayed or even terminated for no apparent reason, like an internal misunderstanding. Any reason for an internal misunderstanding, inability to communicate and collaborate properly, even the unavailability of sharing data to all the departments resulting the project’s delay or, even worse, termination is a risk and it should be managed accordingly. This is where Risk Management comes into play.
RISK MANAGEMENT
Before analyzing furthermore the importance of this aspect, it would be wise to explain the term “Risk Management” and its significance. Risk Management (RM) is the process in which the identification, assessment, controlling, and even prioritization of possible risks are all carried out in order to mitigate and control the probability of any unfortunate event or even increase as possible the possibility of opportunities. These unfortunate events which have a negative impact on a project are called “risks” whereas events with positive impact are called “opportunities”. The main purpose of Risk Management is to secure that all the business goals will be met despite any uncertainty (Wikipedia, 2017). According to the IRM (Institute of Risk Management), in any business activity, especially in NPD (New Product Development) the occurrence of a risk is inevitable. Therefore achieving the project’s goals requires this specific process to minimize or even eliminate, when possible, any threats. There are certain standards that have been created whose main objective is the establishment of a common path within a company or organization in order to implement the RM process effectively (Institute of Risk Management, 2017). Those are:

- ISO 31000 2009 – Risk Management Principles and Guidelines
- OCEG “Red Book” 2.0: 2009 – a Governance, Risk and Compliance Capability Model

RISK CATEGORIES in NEW PRODUCT DEVELOPMENT
After the analysis of the New Product Development process and identifying what is a risk, it becomes easier to divide risks into categories. Since this thesis aims to the NPD process, the most common risk categories are market, technical, financial, commercial organizational, schedule, external, and resource (Ricondo et al., 2006).
**Market Risk:** This kind of risks may derive from low customer acceptance which may lead to the rejection of the product, meeting the customers’ requirements, competitors risks which means the outperformance by a competitor (Cooper, 2003) etc. All these are external risks as far as the company is concerned but the marketing department is responsible for this area and some sort of screening is necessary to identify them.

**Technical Risk:** This category is an internal one and could be divided into sub-categories such as designing the product and manufacturing technology (Keizer and Vos, 2003). The most important concern of this category is the optimal exploitation and allocation of the available resources of the company. Meeting the performance requirements as well as safety after the development process is a key factor (Cooper, 2003).

**Financial risk:** Risks that are related to the budget, exchange rates, inflation, etc.

**Commercial Risk:** Whether the product and the project in extent are considered financially feasible to be developed by the firm falls under this risk category (Keizer and Vos, 2003). The key risk here is the possibility of exceeding important resource constraints such as the budget of the project which needs to be reduced and controlled through budgeting and forecasting methods (Cooper, 2003).

**Organizational Risk:** The organizational risk is an internal occurrence which includes the communication among different parties for achieving the acceptance and the realization of the idea of the new product. Also, the examination of the availability of the resources is essential (Keizer and Vos, 2003).

**Schedule risk:** Certain procedures for a specific project should be established regarding a number of operations which is referring to the milestones, the way tasks are dependent with each other, production planning, and lead times (Kayis et al. 2007)

**External risk:** This risk includes issues from parties outside of the organization, such as changes in customer requirements. Some companies have adopted the “Design with the Customers” approach in order to minimize such risks. In external risk, we can include factors such as political, weather, regulatory, economic, and competitive risk. Nowadays, a term that was introduced by the U.S. Army is most commonly used for the external risk, “VUCA” which stands for Volatility, Uncertainty, Complexity, and Ambiguity (Goldense, 2017).
Resource risk: For a project to be finished, such as the development of a new product and its appearance to the market, the optimal availability and usage of resources is important. Supplies, facilities, labor, and equipment are some of the resources that are needed the most and should not be in shortage. Otherwise, the development of the product may delay.

RISK MANAGEMENT in NPD
Risk management is applied in new product development for minimizing the time-to-market by removing any potential obstacle and barrier in an early step, so as changes can be easier and more affordable, eliminate possible failures, design flaws and defects, diminish any extra work as far as the design is concerned, and improve reliability by quick understanding of high probability failures (August, 2012).

After examining the existing literature, risk management in new product development includes seven phases: Context analysis (1), Risk identification (2), Risk analysis (3), Risk evaluation (4), Risk treatment (5), Monitoring and review (6), Communication and consulting (7) (Severine Sperandio, 2009). According to the general approach to risk management, the first three steps are the area where the diagnosis takes place whereas the rest of the steps apply as the correction whenever needed. Salamone (1995) agrees that risk management should be part of the new product development process from the beginning because any changes or interactions, where needed, in early steps, cost less than necessary changes in the implementation phase. Sataporn (2007) follows the same path saying that downstream losses by risk events, which are discovered early, are much more preferable than the losses that cannot be prevented with any action. Thus, even the smallest detail can become a crucial effect in the development of a new product from the beginning to the latest stages where the customer expectations are not met. All these consist some the project objectives of the new product development process that need to be achieved (Ammar, A., B. Kayis, and A. Sataporn, 2007).

As mentioned above, everyone within the project team is a part of the development process for a better collaboration and instant communication. However, there are some authors who have different approaches to the risk management process as far as the number of steps is concerned, as shown in the below:
<table>
<thead>
<tr>
<th>Author</th>
<th>Risk management process (No of stages)</th>
<th>Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairley (1994)</td>
<td>The 7-step risk management process</td>
<td>Identification, assessment, treatment, monitoring, contingency planning, managing the crisis, recovery from the crisis</td>
</tr>
</tbody>
</table>

If we were to break down the steps of the risk management process, concerning the risk itself, the following analysis takes place.
Risk identification
This is where the examination of any possible problems could appear in the product design and the development of the project, and how they are going to be confronted, not only in the early stages but at any given point of time. This examination includes the identification of the sources of the risk along with its impact on the project. Some of the techniques that are used for the risk identification (Gošnik, 2011):

- Checklists: They are often used to remind members of an organization that some risks have been identified in the past so they can easily be avoided or for new potential risks. The positive thing about them is that they can provide a quick answer for a risk based on previous experience and how feasible is the evolvement of a new idea. A common checklist should include the scope of work, the project resources, the project timeline, and cost, outside resources and how could they influence the flow of the project, and deliverables (Scheid, 2013). They are applied without serious difficulties, but they can result to “white spots” during the risk analysis when past information is not available (J. Oehmen; B. Dick; U. Lindemann; W. Seering, 2006).
- Failure mode and effect analysis (FMEA) (Cotnareanu, 1999): The FMEA is a complex of certain activities provided for recognizing and evaluating the event that a product could fail. Moreover, it procures some actions that could help reduce or eliminate potential failures and document the entire process. Although most techniques are used in the design or the process development phase, though a great thing about FMEA is that it has beneficial effects when used on an existing product too.
- Hazard and operability study (HAZOP)
- Fault tree analysis (Pilot, 2002): This is a procedure where combinations of hardware, software, and human errors take place and its main goal is to identify possible problems and prevent them from occurring. Also, it is often used for its ability to evaluate events with statistical and analytical methods. After these calculations, it is possible to determine the failure probability, the failure rate, and the repair rate.
- Event tree analysis.
Risk analysis

After having identified the risks, it is time for the assessment of their characteristics. This will help to decide whether they should be analyzed furthermore or not. From the time that a risk requires further analysis, the project team should find the proper means in order to understand the risk’s information. These means could be either qualitative or quantitative. Since a risk is that important, risk mitigation plans are developed which are the result of determined measurement metrics for these risks (Amornsawadwatana, 2002). Usually, there are two most common parameters to measure risks, the risk probability and the risk impact (Chapman, C. B., and S. C. Ward, 1997). Risk probability or likelihood represents the possibility of a risk event occurrence. Risk impact, or severity, indicates the outcome of a risk event. The result of those two, risk probability and risk impact, is called risk magnitude and it is measured after the risk assessment takes place, meaning that risk probability and impact need to be examined, as mentioned above (Ammar, A., B. Kayis, and A. Sataporn, 2007).

A widely known method for analyzing risks is the use of influence diagrams. They are a graphical representation showing how various decisions depend on with each other as well as uncertain variables (Howard, Ronald A. & Matheson, James E., 1984). The influence diagram is actually very important because it deals with unidentified risks, especially in the estimation of costs, and their use provides an easy to read yet understandable graph which connects the relationship between risks and costs. This way, participants in the new product development process from varying backgrounds not only have access to the communicating information regarding the project but they have a deep understanding too.

Risk evaluation

In the risk evaluation step, risk events are carefully prioritized and the plans of mitigation are being decided, usually based on previous experience, the knowledge inside the organization and the members of the project team, best or standard practices, and industrial benchmarks (Ahmed, 2003). In risk evaluation, certain “areas” of the project, such as schedule or budget, are taken into consideration in light
of a risk event so as to select among mitigation options the most appropriate mitigation plan which will be analyzed furthermore in the risk mitigation section.

Risk evaluation in new product development, or in any project in general, is usually qualitative, semi-quantitative, and quantitative. The qualitative evaluation is often descriptive with no quantification of the risk and is used as a support to the quantitative one. It also provides important information needed for the risk management process. The critical point for the success of the evaluation is the proper documentation and summarization of the gathered data which is going to be analyzed. The qualitative evaluation is preferable than the quantitative one for several reasons, such as (Vladut-Severian, 2014):

- Perception of speed and easy to implement
- More accessible and more conceivable by policy makers and others
- Usually, there is no sufficient quantitative data so it is preferred over it
- No need for mathematical competence to assess risk

Despite the fact that this kind of evaluation satisfies a wide range of needs, there are times that it is not a faster or an easier one. Though a qualitative method is very often the recommended one, in combination with the quantitative evaluation can be even more improved and the decision makers can capture perspectives that were previously unidentified.

The most commonly used qualitative method for risk evaluation is the probability impact matrix. It actually uses the combination of probability and impact scores of the risks separately and prioritizes them in order to for them to be controlled in an easy way. It is crucial for the determination of the proper detailed risk response plans for any risks appearing in the new product development process. Using this method, the whole project team knows exactly the relative importance of each risk. The 3x3 matrix is the one which is used generally with a Low-Medium-High rating for probability and impact, but a 5x5 matrix could be used as well with a Very Low-Low-Medium-High-Very High rating. A 5x5 sample matrix is given below:
The way to use this matrix is simple. If there is a possible risk with moderate probability and the impact to the project is major, then someone should look at the respective row and column. The risk rating is medium and a proper solution process should be planned. The colors show the seriousness of the risks (Manick, 2012).

On the other hand, quantitative and semi-quantitative analyses are performed after the use of statistical methods, meaning the use of numerical data. This type of evaluations are more accurate and objective and their results of risk analyzes should not be regarded as numbers, but estimates of a variable that depends on the quality scale data (Török, 1998).

Risk mitigation
The main purpose of risk management is to study various aspects of the new product being developed so there is a risk mitigation plan for all possible events that may occur and can be controlled. There are two different approaches to risk mitigation actions. The reactive approach which refers to risk mitigation actions that are taking place after the risk events occur. On the other hand, there is the proactive approach, or feed-forward approach, which refers to the already initiated risk mitigation actions before the risk events occur or analyzing the chance of their occurrence. A great example of this kind of approach is an insurance (Adriano De Maio, Roberto Verganti and Mariano Corso, 1994). As risk management is such an important process for the new product development and because the abovementioned approaches have their pros and cons, a combination of those two is applied so as to reduce the impact of risk, transfer risk, reduce the likelihood of risk, or even better to avoid risks (Risk Management Standard, 1999). Some of the mitigation techniques that are being applied widely are the following:
• Decision tree analysis
• Portfolio management
• Multiple criteria decision-making method

The latter, multiple criteria decision-making method, takes into account the positive and the negative factors of a decision regarding the project (Webb, 1994) (D. Remenyi and A. Haefield, 1996). Risks with a high chance of occurring, high possible impacts to the project, or risks that may lead to new opportunities must be investigated furthermore and need to be treated accordingly.

Within corporations, risk assessment and mitigation is a very complex subject. From all the organizations globally, only a few of them do a good job at it because no matter how much effort they put in order to assess the level of risks, there are no correct answers as well as specific. In an article of Industry Week, there is the conclusion that only 39% of the organizations can quantify their risk (Shecterle, 2011).

**Real Case Scenario**

In order to see how all of the aforementioned are implemented in an organization, a well-known company is to be examined of its plans to develop a new product and how this process could be affected by several factors.

The selected company is “SAMSUNG” which is one of the biggest international electronics company with its headquarters in South Korea. The whole business started with Byung-Chul Lee as the president of the company, and later on, the leadership was passed to Dr. Oh-Hyun Kwon. “SAMSUNG” has total earnings at around 327 billion US dollars with 427,000 employees under its umbrella.

The company’s aim is to include all its employees to the business strategy that it has created making them feel part of all the projects and not left out. As a result, the inspiration and the productivity of the employees are being raised to the highest possible level, allowing “SAMSUNG” to reach the most important goal that has been set, which is the maximized number of revenues by creating and delivering superior and innovative technology designs or products with the scope of ameliorating the life
of people and to contribute to future technology improvements. Doing so, the workforce of the company has the necessary stimuli to provide their expertise at its best without worrying for their working environment, making “SAMSUNG” a great place to work (Armstrong, Adam, Kotler, 2011). This means that as far as the human resources factor is concerned, any arising risks are absolutely reduced if not eliminated completely. All of the above can be seen in a single motto of the company which describes the situation, Great People – Partnership – Creativity (Samsung.com, 2015).

Because of the frequent changing of needs in the technology field, which create an increasing competition environment, the company’s executives have to establish a unique process for developing new products, and sometimes with the need of finding alternatives in details so as to maneuver among strategic decisions (Kuester, Homburg, Hess, 2012). For “SAMSUNG” new product development is vital and is all about new and unique features in technology products but with the purpose of benefiting the company with the highest positive acceptance from the customers and the market.

Before anything, in order to create a new product development strategy, it is crucial for the company to understand the international market and collect data from it. Also, because of the fact that its products are destined to people, their needs and prefers have to be fully taken into consideration. Even better, besides that, their future preferences must be examined too so as to forestall any future competitor’s win on the matter (Roebuck, 2010). Using this method, Samsung gains a huge benefit as far as the understanding of the international market is concerned along with the market preferences. In addition, some other important facts about the countries which consist this international market are taught. Afterwards, in order to find out the product acceptability, it is important for the company to have a satisfying share of market information. The fact that Samsung’s products are all about technology, they all have a great thing in common, which means that the development of a new product and its acceptability may show the way for other products too.

Another important aspect of the new product development process for Samsung is to give more emphasis on the research and development section. Because of the nature of Samsung, the constant invention and innovation of technology products in terms of
customers’ needs is crucial, placing the Research and Development as the number one priority (Sarin, S., Mohr, J., 2011). This doesn’t have a positive impact on the company but to the society as well because the standards of it are influenced.

The technology sector is a very competitive one and this obliges Samsung, as a whole, to put its best effort to maximize efficiency in launching an innovative and enhanced product which can make the customer have a unique feeling possessing it. Such a goal is a common one among technology companies so Samsung has to avoid this kind of obstacles too and develop a new product whose innovations will prove its higher quality.

A great problem for Samsung, and for technology companies in extent, is the product acceptability. It is not taken for granted that despite all the changes in previous designs, functions etc. that the newly developed product will meet the desired acceptability. But there is no way of knowing such a risk before the launch phase. That is why market surveys and examinations take place as a project initiation so as to mitigate as much as possible such a threat.

Analysis of potential risks
The matrix which is most often used by Samsung is the 3x3 one, as follows:

*Figure 2. Risk Matrix used by Samsung*
The table below provides an analysis of potential risks for a newly developed product.

*Table 1. Risk assessment*

<table>
<thead>
<tr>
<th>A/A</th>
<th>Potential risk</th>
<th>Potential risk elimination</th>
<th>Risk in matrix grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Technical capability fails to meet the customer needs</td>
<td>Predefined risk before research on market</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>2.</td>
<td>Expenses on manufacturing the product</td>
<td>Balanced between time, required fund and quality of product</td>
<td>High Risk</td>
</tr>
<tr>
<td>3.</td>
<td>Durability of the process of development of product.</td>
<td>Estimation on the life cycle of the product is made</td>
<td>Low Risk</td>
</tr>
<tr>
<td>4.</td>
<td>Complicated manufacturing process</td>
<td>Limitations on accepted risks</td>
<td>High Risk</td>
</tr>
<tr>
<td>5.</td>
<td>Need of critical resources</td>
<td>Monitoring and planning serious risks and developing practices and plans</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>6.</td>
<td>Product price extending market expectation</td>
<td>Responding to the reaction of the competitors with detailed estimation</td>
<td>Low Risk</td>
</tr>
<tr>
<td>7.</td>
<td>Use of new technology</td>
<td>Proper testing of the technology and tools introduced</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>8.</td>
<td>Competence of the new product</td>
<td>Project manager with good experiences are involved</td>
<td>Medium Risk</td>
</tr>
<tr>
<td>9.</td>
<td>Adequate Supplies</td>
<td>Proper Inventory Management</td>
<td>Low Risk</td>
</tr>
</tbody>
</table>
Impact in new product development process
Using the risk analysis the potential impact can be analyzed and, after the analysis, there can be a discussion with the help of an estimated probability on behalf of Samsung, as shown in the table below:

Table 2. Impact of risk

<table>
<thead>
<tr>
<th>Risk no</th>
<th>Probability</th>
<th>Risk no</th>
<th>Impact of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>12</td>
<td>1.</td>
<td>5,5</td>
</tr>
<tr>
<td>2.</td>
<td>15,5</td>
<td>2.</td>
<td>14,5</td>
</tr>
<tr>
<td>3.</td>
<td>4,5</td>
<td>3.</td>
<td>9</td>
</tr>
<tr>
<td>4.</td>
<td>2</td>
<td>4.</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>10,4</td>
<td>5.</td>
<td>14,6</td>
</tr>
<tr>
<td>6.</td>
<td>9,8</td>
<td>6.</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>4</td>
<td>7.</td>
<td>4,8</td>
</tr>
<tr>
<td>8.</td>
<td>3,5</td>
<td>8.</td>
<td>10</td>
</tr>
</tbody>
</table>

When the risk assessment is completed, it is obvious that there is a high risk involved in the market regarding the production of the new product. On the other hand, the risk regarding the durability of the development process along with the extension of the product price with the market expectation is low.

“Extra/Further” Steps
According to Samsung, besides the above-mentioned risk analysis, in the new product development phase, the company includes also some steps which can be summarized and be part of the launch phase. But still, they are very important and they have to be planned with caution by Samsung. Some of them are:

*Pre-launch build-up:* Usually a build-up is made by Samsung through visual promotion. This makes its customers wait for something new and exciting and they anticipate the arrival of the new product in the market (Chang, 2010). The possibility of something that is planned doesn’t work as expected creates a market risk.

*Location of prototype product launch:* Samsung puts a lot of effort to find the best and most popular place to launch its products as an initial contact with the customers. It is vital for the company that at this step, its people will participate and make sure that their customers will be fully aware of the utility of each product. Only then a
customer, even a loyal one, will decide to buy something that is new to him. Which means that the staff of the company should be strongly familiar with the products that are appointed to them and it is the company’s obligation to train them accordingly. Instantly, there is the appearance of two risks simultaneously. The location needs to be a prestigious one just like the brand name (market risk), and the proper training of the staff (internal risk).

**USP:** Samsung is most of the times one step ahead of its competitors and to stay this way, the organization has to provide good special features which differentiate its product from their competitors in the business. Samsung has surpassed this obstacle by knowing the potential of the competitors making its product features and accessibility the unique features. This means that Samsung focuses not only on the design of the products but also on their performance as well (Fuioagă, 2013).
METHODOLOGY

Overview
The main problem that needs to be addressed in the present paper is the risk management process in new product development and how a company is using one specific method. The main reason for using risk management is to reduce or even eliminate any potential risks when a new product is going to be developed. Therefore it is very important for the company that the chosen method will take into consideration any obstacle which is possible to appear throughout the NPD process. While studying the literature and various risk management methods, the goal was to gather any available information on the matter and find out how an existing company is implementing one of these methods in a real case scenario. After the presentation of the company’s actions towards this kind of “dangers”, and its behavior in case of inevitable problems, a discussion and analysis of the decisions made by the company will follow.

Research Design
The specific used method for this study is a qualitative one. Basically, a number of available case studies and reports from the internet have been examined and the most appropriate ones were collected and summarized. In addition, an investigation for a real situation in an organization has been made in order to verify whether the existing literature consorts with what is preferred and followed by companies which invest a lot to new product development. The reason that a qualitative method is considered better than a quantitative one is because we want to investigate, or better yet, we want to describe things for a certain area which is specifically the risk management in new product development. Quantitative methods are most commonly preferred for using statistics or models to propose a new theory or a course of action which is not the case here. Furthermore, an effort has been made to contact via emails with project/risk managers from companies so as to combine several methods of surveying and collect even more information but there was no intention of them to share this kind of data. Also, the case of sending them questionnaires was ruled out because of the risk of answering falsely on purpose or giving disorienting information. This is why the final chosen method is the analysis of a wide range of papers, case studies, and articles either in forums or in websites.
Population and Sample Technique

Population
For the needs of the specific dissertation, the examined sources were reports and case studies of academic people who were once occupied as managers by companies developing new products and have years of experience in managing such risks. Of course, the investigation also took place among several articles and reports in forums by non-academic project and risk managers who share their current professional experience and how they have dealt with problems in various occasions within their companies. The most common point of the above-mentioned researchers is that they are focused particularly on the risk management area in the NPD process and not solely in the financial, legal, or marketing sector. This means that risk management is analyzed in every department which participates in the development of a new product. It should be mentioned that opinions and comments on the research of the selected risk managers were excluded from this study because they were judged as unofficial and they might be totally wrong.

There was no limit as far as the number of the selected sources which were to be examined and included in this dissertation. The only basic criteria to extract information from a particular source was the occupation of the writer and whether the content was relevant to the problem that needs to be addressed. For example, a source written by a project manager and focused on the risks in the NPD process was preferable than the one which was written by an employee and presented the actions that were taken by the project manager. As mentioned before, this kind of information was judged as unofficial and scanty with no in-depth analysis. Up to one point, the existing literature actually repeated itself, as all the professional managers agreed with each other in general. This does not necessarily mean that all of them mentioned the same things and instances because the way they treat several risks differs, but generally, the methods used by each manager follow a similar path. That’s why an investigation of a well-known company has been undertaken of how risks are being identified, analyzed, assessed, and treated.
Sample Technique(s)

Two different techniques of sampling were used for the purpose of the thesis, the random sampling, and the opportunity sampling. The first technique was mostly used taking into consideration the academic background of the researcher, to whom their reports or case studies are addressed, and of course the content in them. Then, after gathering an adequate number of sources, each and every one of them had the same chance of being selected to extract the desired information which would be included in this research. Despite the fact that this technique was time-consuming because it was necessary to screen some sources among others, the advantage was that the sample was extremely representative.

Another method that has been used after one point was the opportunity sampling. This method was based on the convenience of finding sources through the internet. This does not mean that the smallest ones were preferable because of their size but many studies required payment installments so as to fully read and analyze them in depth so they were immediately rejected, and all of them that were free were selected. After the collection of these studies, a sort of screening among them took place in order for the more descriptive ones to predominate. By doing so, it made it easy to choose the appropriate sources because there was a compensatory number of free studies and reports. Thus, although there was enough information to extract data from, the only disadvantage to this method was the time consumption of the mandatory examination of all the collected papers.

Limitations

It is clear that in this study there were some limitations. One of them, and perhaps the most important, was the inability to gather information and data via an interview, emails, or calls from managers who are responsible for the NPD process in a company. Possibly this happened because the risk managers didn’t want to share any standard process that the company has established or new ideas for future plans. As mentioned in the literature review chapter, the NPD process is a competitive one which is becoming stronger and stronger so everyone involved in this should be very careful to avoid foul moves. This was confronted by analyzing the most suitable case study referring to a real scenario from a company whose “life” is depending on
developing new products. Presenting and analyzing an existing case study was later assumed as the best choice because it is actually based on a bigger company than the ones that were planned to be interviewed unsuccessfully. Finally, this could be avoided by trying to reach the risk/project managers of the companies with all means (calls, visits, and emails) all at once, and not by picking a number of managers that would be contacted via emails, another number via calls, etc.

Ethical Assurances
As the research of this thesis was conducted by looking for sources through the internet, it is responsibly stated that all the information that was found and any data that was extracted is fully referred with no intention of plagiarism.
FINDINGS

The main purpose of this dissertation is the Risk Management process in the New Product Development. The following chapter will present the most important, both positive or negative, results and findings after the analysis of all the gathered data that are included in the Literature Review chapter.

The first thing in common in any source of the examined literature was the fact that everyone who studied the specific process in an organization concluded the significance of it, especially in the case of innovation. Although there were many methods in order to optimally manage risks throughout the development of a new product, as explained before, the companies have to select the best one which includes and analyzes as much as many risks that could delay or even terminate a project.

While progressing with the research, it was found that there were not just risks outside the companies but within them too, the so-called internal risks. It was mentioned previously that some risks can be handled better than others, and this kind of risks are the internal ones because their existence depends on how well is each company organized towards those threats. Which leads to another important clue, the one that in today’s competition and in this kind of projects, it is needed from organizations to establish a procedure with which its departments should work concurrently, achieving all the set goals. Many sources agreed that generally, the people who are responsible for identifying, analyzing, and assessing potential risks are the managers. But the people who have to work on those risks so as to avoid them or in the case of their appearance are the lower positioned employees, making them necessary for the project as well. Additionally, it was pointed out that a widely common treatment to internal risks such as the low efficiency of the staff or the bad communication among departments is giving to all the workers the right stimuli for reaching their potential and placing them as an important link to the new product development (project) chain.

According to the literature review, when it comes to implementing any risk management method, there are four steps that need to be followed for encountering any obstacle which menaces the project, the risk identification, risk analysis, risk evaluation, and risk mitigation. They have been explained and, from that, has been found that there are several procedures, or sub-methods, for completing each step properly as well.
Furthermore, results from an investigation have been received which refer to a case study of a real case scenario. These results showed that a well-known company, in its sector, has a standard procedure of treating any risk when developing a new product. As it seems, the company uses a 3x3 risk matrix to compare the significance of each risk exactly like mentioned in the literature review. Afterwards, according to the table of assessment (Table 1.) the selected company numbers each risk, names it, proposes the best solution to each risk after conciliation among the participated departments and decides whether this risk is considered low-medium-high, depending on the scale which was created by the company. The next thing that was studied and agreed with the literature is the necessity of calculating the probability and the impact of the risks in the new product development process as a whole (Table 2.). Combining the observation of the two tables referring to the risks, it is worth it to note the severity of any potential marketing risk, or risks which are related to the targeted market, of the developed product, is bigger than the severity of the research and development risks or the manufacturing risks within the process. Finally, the theory of a “self-created” step from the specific company is proven along with proof that all the mentioned risks in the literature review chapter are taken into account by the organization, as shown in the table (Table 3.):
Table 3. Risk assessment with Type of Risk

<table>
<thead>
<tr>
<th>A/A</th>
<th>Potential risk</th>
<th>Potential risk elimination</th>
<th>Risk in matrix grid</th>
<th>Type of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Technical capability fails to meet the customer needs</td>
<td>Predefined risk before research on market</td>
<td>Medium Risk</td>
<td>Technical Risk</td>
</tr>
<tr>
<td>2.</td>
<td>Expenses on manufacturing the product</td>
<td>Balanced between time, required fund and quality of product</td>
<td>High Risk</td>
<td>Financial Risk</td>
</tr>
<tr>
<td>3.</td>
<td>Durability of the process of development of product</td>
<td>Estimation on the life cycle of the product is made</td>
<td>Low Risk</td>
<td>Quality-Technical Risk</td>
</tr>
<tr>
<td>4.</td>
<td>Complicated manufacturing process</td>
<td>Limitations on accepted risks</td>
<td>High Risk</td>
<td>Technical-Internal Risk</td>
</tr>
<tr>
<td>5.</td>
<td>Need of critical resources</td>
<td>Monitoring and planning serious risks and developing practices and plans</td>
<td>Medium Risk</td>
<td>Internal-Schedule Risk</td>
</tr>
<tr>
<td>6.</td>
<td>Product price extending market expectation</td>
<td>Responding to the reaction of the competitors with detailed estimation</td>
<td>Low Risk</td>
<td>Commercial-Market Risk</td>
</tr>
<tr>
<td>7.</td>
<td>Use of new technology</td>
<td>Proper testing of the technology and tools introduced</td>
<td>Medium Risk</td>
<td>R&amp;D-Technical Risk</td>
</tr>
<tr>
<td>8.</td>
<td>Competence of the new product</td>
<td>Project manager with good experiences are involved</td>
<td>Medium Risk</td>
<td>Internal Risk</td>
</tr>
<tr>
<td>9.</td>
<td>Adequate Supplies</td>
<td>Proper Inventory Management</td>
<td>Low Risk</td>
<td>Resources Risk</td>
</tr>
</tbody>
</table>

Samsung doesn’t stop to the impact of risk matrix (Table 2.), as any medium-sized company would do, but it tries to include some further steps in order to fix in advance some risks that are related to the market of the product where acceptability by customers is the most dangerous part for a company of this size. They were discussed and if we were to use those extra treated risks in Table 3, it is obvious that all of them would be characterized as Market-Commercial Risks.
DISCUSSION
The findings of the present research paper establish the fact that Risk Management is a very important part of the New Product Development process which provides insights and solutions in various minatory problems relating to the project.

Firstly, there is a great number of sources suggesting the significance of Risk Management, particularly in the sector of innovation. This is because the existence of companies whose main goal is to develop as much as many new products depends on it. The latter statement can be very easily proven in real life, apart from being observed in the presented literature, as competition has become very strong not only due to the continuous struggling among the already known organizations, who have been able to establish themselves to the market but to the creation of more and more new ones. Additionally, according to the findings, it is worth mentioning that only advantages are gained from the Risk Management process. With the proper exploitation of these advantages, any company can improve its place in the fast growing competition. The bigger organizations have some standard procedures of developing new products and their way of identifying and managing risks can help them climb up the ladder of competition, whereas the smaller ones have more possibilities of not getting hit hard by others in such a venturesome situation with the result of a potential disappearance.

Another important result is the occurrence of risks in all the departments of the company, even if some of them are not directly linked with the development of the product like the research and development department, the manufacturing department, or the marketing department. For example, such a department is the legal department where it may examine the possibility if the developed product falls under a patent copyright. In this case, the company takes one step behind, with negative consequences of course, because any action which will be decided is going to cost financially. This means that either the patent needs to be bought from the original owner, which will result to go over the budget, or in the worst case scenario abandon the idea of releasing the new product out to the market, which means that the whole investment was pointless. This possibility is an unlikely one in big organizations due to the fact that the legal department takes action even before the market survey where the new product is just an idea waiting for approval from all aspects. But still, it qualifies as a respectable risk, and in small companies which have entered the
technology sector, a mistake like that could cause irretrievable damages. From this, we can safely infer that for the same risk, the impact of it could be different depending on the size of the company in which it appears, along with its place in this competitive environment. As far as the risks of the departments who are directly linked to the project are concerned, it is mentioned that the responsibility for their treatment belongs to the project manager, at first, and then to the employees of each department. This statement actually describes the concurrent function of the different departments and the best possible collaboration of all the employees regardless their job level. It also points out the significance of the communication within the company by sharing important information and data so the project can be completed in a quicker way. Despite the fact that there is no reference to the accurate way of implementing this kind of strategy and which sized company is doing so, there is an assumption of a possible scenario. One project manager is appointed to each department (R&D, manufacturing, marketing etc.). After the decision of which idea dominates and after the necessity of proper planning for the project to be initiated and completed, any problems met or any data derived from the work of each department individually reach the hands of the responsible manager. Then, the managers of the departments prepare a gathering in which they present the reports to the general manager and together they decide the next actions be taken according to the results of those reports and what are the needs for the proceedings of the project. As a final step, the project managers deliver the decisions to the staff of the departments that they are responsible for, expecting corrections and completion of any possible problems until the next meeting of the managers. This is a procedure which requires as much as possible the best skills from the part of the employees because the needs of a project may change very often, leading to the result that any risk related to the human resources and the efficiency of the staff must reach the maximum level in a fast paced environment. Changes in the project may arise because of different received data from a specific department, a case where the perfect communication and sharing of information is crucial so time will not be lost as well as financial resources. That is why it is explained that full cooperation among the participated departments is more than essential when a company develops a new product and tries to eliminate such internal risks in early stages.
After the presentation of a real case scenario concerning the company of Samsung, several important findings have appeared. Many of them, if not all, agree with the general approach of the literature review. In detail, the company uses methods among many that suit its way of functioning to the development of new products. According to the literature, the risk management begins from the first stages of the product development, like the one of whether the product is needed by the customers. Because the idea generation and selection are internal actions and fall under the internal risk category, any problems or obstacles which may arise from it can be easily solved by the organization itself. What Samsung fears more than that is the incorrect translation of customers’ needs from the market survey which has been conducted by the R&D and technical department. The latter two departments are following the path of the market survey results, depending on how they are explained by the marketing department.

Regarding the rest of the company’s procedure on how it is managing the potential risks, the usage of tables showing the probabilities, impacts, reasons, solutions, and classification of risks in categories is considered appropriate (Table 3.). Thus, the whole project team is aware of what could go wrong, or what difficulties will be met. Initially, separating the risks depending on the probability and the impact of them gives the company the chance of hierarchizing them and deciding upon treatment plans accordingly. For instance, if we look up to the Table 2, we will see that when the calculation of both the probability and the impact of a risk is high, then automatically the specific risk is considered as high risk and becomes the number one priority for the company (risk no 2). Whereas the opposite situation places the risk to the lower scale, where the risk is characterized as a low risk, and despite the fact that a treatment plan should take place, it is not considered as a dangerous obstacle (risk no 3). In the case of two risks have equal calculations, it is up to the manager to evaluate the situation and decide which one is more important than the other, but always taking for granted that both of them are equally threatening to the project. Although from the examination of Samsung’s case study was found that there is a preferred solution for each risk to be eliminated, according to the company, the detailed plans and actions taken within the departments, and what the staff of them are working on, are not mentioned at all, possibly for safety reasons towards the existing competition which is growing.
Finally, analyzing the findings, it is revealed that there are some extra steps taken by the company in order to deliver a so-called prototype of the product with most of the functions and applications it is going to carry. The company selects a place where its sales are the highest, knowing that this option will receive a great acceptance from people who are considered as loyal customers by the company. They will anticipate such a reception due to the fact that there is the ability to try something tangible, instead of just reading about it and asking questions to the trained staff so as to understand the product better. But the most important benefit for Samsung through this is the opportunity which is given to the potential customers to propose some ideas of their own and feel like they are part of the development of a new product by their favorite company, and simultaneously the gained feedback from all these ideas. While this campaign does not look like a plan which has anything to do with a new product, for Samsung is highly critical because the feedback from using the prototype can prevent the company from making changes in a later stage of the development process where any differentiations can cost almost twice the initial budget and time consumption.
CONCLUSION
This paper has investigated the necessity of Risk Management throughout the New Product Development process. The evidence from this study suggests that Risk Management has become an integral part of companies which try to expand their position in the market by introducing innovative products that improve the daily needs of their customers, technologically speaking. Because competition in that specific field is always growing, any incorrect decision or move from one company may become the benefit of the other. So the use of Risk Management is taken for granted in order for a negative event or result to be identified at first, and then mitigated or even avoided whenever it is possible. Also, as the research has reviewed, there is always the possibility of an unexpected event to occur, and with the proper risk analysis for a similar situation to be eliminated. It has been confirmed that besides the level of importance of using Risk Management in New Product Development projects, something which is a common point of all the researchers who studied the same subject, great attention needs to be paid on the method which is going to be used, among many. Also, it has been proven that a company with a strong position in the field uses one of the mentioned methods along with interpretations of it as suited. Those interpretations are explained from the company as “further steps” and they are considered an essential part of the project before it reaches the last of the needed steps which are the final version of the developed product without the requirement of changes in an advanced stage.

Although there were mentioned a lot of methods of managing risks in the NPD process, none of them was considered as the best-suited one for a company which besighs itself on the development of innovative products. Surely it highly depends on the procedures that are established by each company, but a limitation like that most likely prevents organizations from taking the best actions as far as the occurrence of any unexpected events is concerned. On the other hand, it could be the reason for future and wider research to take place, on a sector that will continue expanding, in order to understand even more what makes a perfect method and if there is one.
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