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# **A risk assessment approach to support the launching of new products, services or processes**

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## **Abstract**

This research paper aims to develop a practical method to highlight certain key risk factors involved in the product development process. A new definition of the term “launch risk” is introduced in this work. The term is defined as the *uncertainty about* and *severity of* the consequences of failed launch. The launch could be the further development of existing products or the introduction of new products/services or processes. A risk management framework for launching is provided as well as a weighted average scoring model for launching (WASL) as an intrinsic part of the suggested framework. WASL is used to identify, evaluate and communicate the critical risk factors involved with the launching processes. WASL allows us to weight the most important risk factors more heavily than others when determining the average score for a launching issue, reflecting a numeric value (score) in terms of the level of risk involved. Specific scoring guidelines are provided for the practical use of WASL. Using a hypothetical launching idea, this study demonstrates how applying the suggested risk management framework can increase the ability of a firm to make better strategic decisions in relation to the launch of the new product or the modification of an existing product as a part of its overall portfolio.

**Key words:** Product development; risk; risk management; uncertainty; risk factors; scoring model; decision making.

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## **1. Introduction**

Fast and dramatic changes in customer demands, market, technology and competitor’s action are creating a highly uncertain environment (Singh et al. 2012). Businesses in a competitive situation face new challenges in the market, which may affect their economic situation significantly. In order to achieve business objectives in such complex situations, it is essential to enhance the capacity of the firm to cope with these challenges when the economic patterns

change. Organizations that are not capable of adapting to these changes will risk losing their competitive advantages. Appropriate adaptation may occur in the form of further development of existing products or the launch of new products/services and new processes, all of which are referred to as “launching.”

The literature makes several attempts to study ways to ensure that products are sufficiently profitable when launched. In this respect, researchers often base their research on a phenomenon referred to as *product development*. Krishnan and Ulrich (2001) define product development as the transformation of a market opportunity and a set of assumptions about product technology into a product available for sale. Researchers discuss product development from the perspectives of engineering and manufacturing (Brouthers, 2003), target costing systems (Cooper and Slagmulder, 1999), marketing and attitudes of customers and stakeholders (Fiaz et al., 2013). Henard and Szymanski (2001), in their research “Why Some New Products Are More Successful Than Others?” conduct a meta-analysis of the new product performance literature. In order to develop the database for the meta-analysis, they studied 60 reports and articles related to product development. Their research reveals 24 predictors of new product performance: dedicated human resources, technological proficiency, launch proficiency and cross-functional communication. The authors classify these predictors into four main categories: product characteristics, firm strategy characteristics, firm process characteristics, and marketplace characteristics. The result of the meta-analysis shows that, of the 24 predictors investigated, product advantage, market potential, meeting customer needs, predevelopment task proficiencies, and dedicated resources, on average, have the most significant impact on new product performance.

However, the market pays increasingly more attention to the other structural aspects of product development, such as the way it is produced. There is increasing demand for a minimum level of safety to meet public health requirements; see for instance Firesmith (2004), Martinez and Poole (2004) and Maruchek et al. (2011). Some of the critical risk factors involved during the launching process could be the condition of the labour force, environmental issues and ethical concerns related to child labour and gender discrimination.

In order to increase opportunities for a successful launch, a comprehensive analysis of the above mentioned factors is required, taking into account the potential for loss and large uncertainties. Furthermore, many studies have attempted to establish an integrated framework for these factors as a part of product development process.

Bassler (2011), in his work, “Integrating risk management as an intrinsic part of product development”, compares eight different existing risk management frameworks which are relevant to product development. Bassler concludes that all of these eight approaches differ regarding their definition of risk, risk management and specific scope. For instance, risk is defined as events as an effect of uncertainty, as a quantified impact of uncertainties and as a measure of future uncertainties and as the exposure to danger.

Although risk is expressed in various ways and assessed through different methods, there is still a need for a more operational (practical) tool for assessing risk involved with launching the new product or services. This study attempts to clarify the expression of the term “launch risk”, which is devoted to the development of a “practical tool” for assessment of an enterprise's potential risk factors at launching. Key issues addressed in this paper are as follows:

- i) How to understand, define and assess “launch risk”.
- ii) How to manage uncertainties involved with the launch and launching process.

This work provides a conceptual basis for the term launch risk, in which uncertainty is the main component of the term. A new risk management framework for launching is presented, including a scoring model (WASL) as a part of the introduced risk management framework. WASL provides input regarding the managerial review and judgment, determining whether or not the launch should be implemented. Moreover, this study presents a guideline for screening uncertainty factors. The guideline is based on three main areas of concern: first, *consistency and relevance*, which reflects whether the launching is in line with the firm’s business strategy; e.g., the firm’s underlying goal, scope and advantages. The second area, *essentiality*, refers to why the launching issue should have priority. Key issues considered here are whether the launching will provide an overall utility value, taking into account the market and the target group's attributes. The third area is the *implementation opportunity*, which takes into account the firm’s capacity in terms of human resource and expertise and the technical,

economic, and cultural capacity of the organization. To assess the extent of the risk, due to the identified uncertainty factors, a criterion is introduced that ranks risk classes, from low to extremely high risk. WASL enables us to weight the most important risk factors more heavily than others when determining the average score for launching. Weight is also assigned to each area of concern, which aims to indicate relative importance within the average total score. Based on this numeric value, a scoring card is attended to launching issue in three main risk classes: 1) class A, low risk launching issue, proposes that the launching is relevant to the firm’s business strategy, it is essential and could be implemented without further analyses, 2) class B advises further analysis before further decision making and 3 ) class C suggests rejection of launching due to its high risk level.

Using a hypothetical product, a new stuffed toy, as an example of launching idea, we demonstrate how applying the suggested risk management framework can increase a firm’s ability to make better strategic decisions in relation to the launch of the new product or modification of existing product in its overall portfolio.

## **2. Theoretical basis**

This section presents a theoretical basis of the main concepts which are used in this study. As is mentioned in Section 1, this work primarily conceptualizes the term “launch risk” and develops a risk management framework, including a scoring model for launching issue, based on the firm’s business strategy. As the main issues used in this work are risk, scoring and business strategy, the research is built on the theoretical background related to these issues.

### ***The concept of risk and the term "launch risk"***

Numerous definitions of risk exist; e.g. risk is referred to as the possibility of an effect (ISO 31000), uncertainty of outcome (UK Cabinet office, 2002) and as an event having a negative impact on outcome (Wang et al., 2010).

Considering risk as an “event”, we cannot conclude that risk is high or low or compare options with respect to risk (Aven and Steen, 2008). For example, the impact of using chemical materials on producing stuffed toys for children under 3 years old could present risk, according to Wang’s definition, as it can harm children. There are, however, uncertainties involved with the impact of using chemical materials in such products. If we constrain our definition of risk to “an event having a negative impact”, then the uncertainties and how people judge it is neglected. There is, of course, some risk involved with such toys,

but is it high, medium or low risk?

In defining risk as “uncertainty of outcome, of actions and events”, uncertainty is seen in relation to the expected value, and the variance is used as a measure of risk. This definition of risk fails to capture an essential aspect, the consequence dimension. For example, consider a situation in which a firm must choose between the production of two types of products: toy A, with lower production cost due to the cheaper raw material, and toy B with high quality in raw material and that meets safety standards. Both A and B offer the same expectation of return on investment (ROI) of 20%. In the worst-case and best-case scenarios, the variances with respect to expected ROI is calculated as 0.05 and 0.1, respectively. As product A has the lowest risk (uncertainty), expressed by the variance, this product would normally be chosen. However, there exist many types of uncertainties involved with the product and the way it is produced (e.g. using chemical material in the production of stuffed toys). According to this definition of risk, in the toy example, uncertainty is isolated from the intensity and judgment of the consequences.

ISO 31000 defines risk as “the possibility of an effect and, in particular, an effect on objectives” An effect is a deviation from the expected (positive and/or negative). Aven (2011) challenged this definition by asking some fundamental questions: “Risk has to do with uncertainty, but is it the effect of uncertainty? And risk is related to objectives, but what if objectives are not defined? Then we have no risk?” According to Aven, this definition per se is not sufficiently precise, and one may certainly also question its rationale as indicated.

Aven and Renn (2009) defined risk as the “uncertainty about and severity of the consequences of an activity”, in which context severity refers to intensity, size, extension, and so on, with respect to something that humans value (lives, the environment, money, etc). Losses and gains, are, for instance, expressed by amount of money or number of fatalities and are ways of defining the severity of the consequences. Following this perspective, uncertainty is the key concept of risk. Probability is a tool used to express uncertainties based on the knowledge available, but it is just a tool, with limitations. Renn (1998) summarises the critique drawn from the social sciences over many years and concludes that technical risk analyses represent a narrow framework that should not be the single criterion for risk identification, evaluation and management.

Aven and Krohn (2014) also use the above risk definition, take ideas from the quality discourse and the use of the concept of mindfulness as interpreted in the studies of High Reliability Organisation (HRO) and introduce a new perspective on how to understand and manage risk. This new perspective captures five characteristics of a HRO organisation: preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience and deference to expertise.

In this paper, we define launch risk as the “uncertainty about and severity of the consequences of failed launching,” based on Aven and Renn (2009). In the case of the production of a new type of stuffed toys, assume that the desired result for the firm in our example is making at least 20% return on investment (ROI) on the launching of this new product. The launching can have different outcomes. One outcome is that it could be profitable in the long term and not profitable in the short term (for example, the next 2 years). Another outcome could be that the launch is totally profitable, but it may harm the firm’s reputation, due to the condition of labour force or the quality of raw material used in production. In decision making regarding whether or not the firm should produce the new toy

(in the future), the main concerns are related to the major factors, which may lead to unsuccessful launching; i.e. an ROI less than 20%. As we do not know for sure what events will occur in the future and what the effects will be, the uncertainties involved with launching are the launch risks.

**Risk management**

Risk management is a structured framework to identify, evaluate, manage and communicate risk. It deals with balancing the conflicts inherent in exploring opportunities on one hand, and avoiding losses, accidents, and disasters, on the other (Aven and Vinnem, 2007). A considerable effort has been made in the last decades to develop methods and recipes for key concepts, principles and guidance for applying risk management in practice; for example, the Integrated Risk Management Solution (Basel II), the COSO Enterprise risk management framework (COSO, 2004) and the risk management process ISO 31000. However, there are some differences in the terminology and the practical approaches in applying the frameworks as a result of different scientific traditions, scientific environments, and contexts, needs and objectives. Although the terminology and methods differ, the overall principles overlap regarding risk assessment which includes risk identification, risk analysis and risk evaluation followed by risk treatment. The main elements of the risk management process are illustrated in Figure 1.

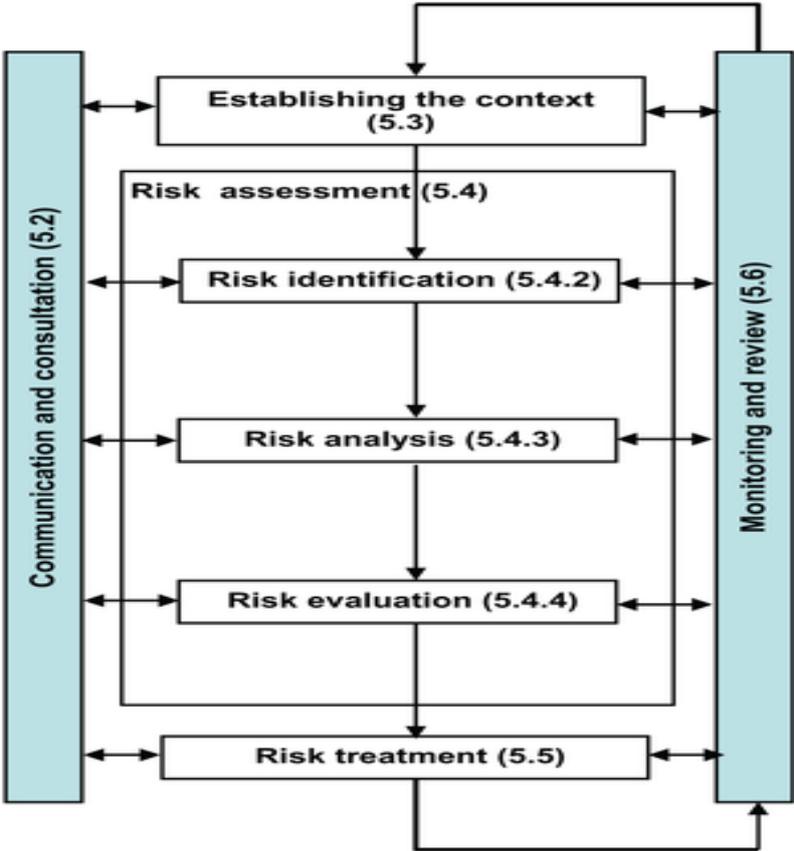


Figure 1 Main steps of the risk management process based on ISO 31000.

Risk assessment is the most demanding subprocess within the risk management process which provides a structured process for organisations to identify how objectives may be affected. During risk assessment an organisation processes a large amount of information

which has to be recorded, assessed and used for proposing the adequate solutions (Rehak and Dvorak, 2010)

Many studies emphasize the role of the risk management process in product development (Cooper, 2003; Maio et al., 1994; Leveson and Dulac, 2005). Cooper (2003) emphasises the role of knowledge management systems (KMS) in product development process as a risk reduction tool; e.g. by gathering and processing relevant information and encapsulated knowledge from a variety of internal and external sources. According to Cooper, the key challenge faced by new product development projects is acquiring knowledge and managing sources of uncertainty. Furthermore, in the context of product development, Keizer et al. (2005) conduct a risk reference framework (RRF) as a part of risk management process, for diagnosing risks in technological projects. The resulting RRF consists of 12 main risk categories and 142 connected critical innovation issues. This work concludes that the new product development and project management literature generally highlights risks regarding consumer acceptance, competition, commercial viability, competition, intellectual property, and organizational and project management. The authors assert that the success of innovation projects improves through formal risk assessment.

### ***Scoring and scoring card***

Scoring is used as a tool to i) analyse risk factors by using accumulated information and ii) devote a rank, classifying different risk levels. Scholars in different fields have developed various types of scoring.

Credit scoring and behavioural scoring help organisations decide whether or not to grant credit to consumers who apply for it (Thomas, 2000). According to Thomas et al. (2002), credit scoring is one of the earliest financial risk management tools developed. It is used by U.S. retailers and mail orders in the 1950s contemporary with the early applications of portfolio analysis to manage and diversify the risk inherent in investment portfolios. Today, credit scoring plays a crucial role in risk management in the financial systems.

In the context of *Strategic Management* field, the Balanced Scorecard (BSC) introduced by Kaplan and Norton (1993). BSC is a general framework for describing and implementing the strategy map, which specifies the critical elements and their linkages to an organization's strategy (Kaplan and Norton, 1993). BSC describes how intangible assets get mobilized and combined with intangible and tangible assets to create differentiating customer-value propositions and superior financial outcomes (Kaplan and Norton, 2001). The framework is composed of a collection of measures, arranged in groups, and denoted as cards. The cards offer a balanced evaluation of the organisational performance along financial, marketing, operational and strategic dimensions (Eilat et al., 2008).

In *project management*, the scoring card is used for research and development (R&D) project evaluation. A project management scorecard model for calculating the ROI for a project solution is suggested by Phillips et al. (2002). The authors suggest a criterion-referenced test (CRT) to measure, report, and analyse the project team member performance as it relates to the objectives for the project. In a CRT, the interest lies in whether or not a project team member meets the desired minimum standard. As another example in the project management field, Henriksen et al. (1999) applied scorecard to rank different project alternatives based on the criteria of relevance, risk, reasonableness, and return on investment (ROI). Moreover, Wang et al. (2010) propose the performance-oriented risk management framework for R&D projects. This research applies the balanced scorecard (BSC) to identify diverse and critical

performance measures of an R&D organization from four perspectives: finance, customers, internal business process, and learning and growth. In this research, quality function deployment is used to transform organizational performance measures, established by BSC, into project performance measure to ensure the achievement of desired organizational goals. The framework is organized in eight steps, including prioritizing the risk and monitor and control the risks which are identified. A relationship matrix is suggested to identify how much each project performance measure affects the organizational performance. In this matrix, a numerical scale is used to denote “weak, medium and strong” relationships. Based on the literature review and expert interviews, the research summarizes the possible sources of top-5 risks, and the corresponding risk actions, including on-time schedule, data quality, lead time, predictability and high mortality rate.

### ***Business strategy***

The term business strategy is defined as the manner in which a firm decides to compete, which encompasses the pursuit, achievement, and maintenance of competitive advantage in an industry (Morgan et al., 2003). According to Collis and Rukstad (2008) at Harvard Business School, any firm should be able to summarize its organization’s strategy with a *strategy statement*. The researchers introduce a hierarchy of the company statements based on three main elements: objectives and goals, scope and advantages. Vision depicts the firm's overall goals. The ultimate result of the business vision is a definition of the desired future state of the company and how that state can be reached (Penker and Eriksson, 2000). According to Collis and Rukstad (2008), a firm’s scope encompasses three dimensions: customer or offering, geographic location, and vertical integration. The scope of an enterprise encourages experimentation and initiative. The competitive advantage consists of two parts. The first is a statement of the customer value proposition, answering the question of why customers should buy the product or service. The second part captures the unique activities or the complex combination of activities allowing that firm alone to deliver the customer value proposition. The competitive advantages depend thoroughly on the firms capabilities. Capabilities are a subset of a firm’s resources and are defined as the tangible and intangible assets that enable a firm to take full advantage of the other resources it controls. The firm’s capabilities might include the firm’s financial strength, human resources/expertise, organizational and physical technology used in a firm, including a firm’s equipment, its geographic location and its access to raw materials (Barney and Hesterly, 2009).

Taking into account the previously defined dimensions of business strategy, this study presents a *guideline* for screening uncertainty factors based on three main areas of concerns. The first area of concern is *consistency and relevance*, which reflects that the launching is in line with the firm’s business strategy; e.g., the firm’s underlying goal, scope and advantages.

The second area, *essentiality*, determines why the launching issue should have priority. One of the key issues discussed here could be whether or not the launching will provide utility value. The third area of concern is the *implementation opportunity*, which takes into account the firm’s capacity in terms of human resources and expertise, technical and economic, cultural or other organizational capacity. This *guideline* could be used in the scoring process, which is one of the main parts of the proposed risk management framework discussed in the next section.

### 3. Risk management framework for launching

This section presents an iterative risk management framework for launching. The framework consists of 6 main steps (see Figure 2).

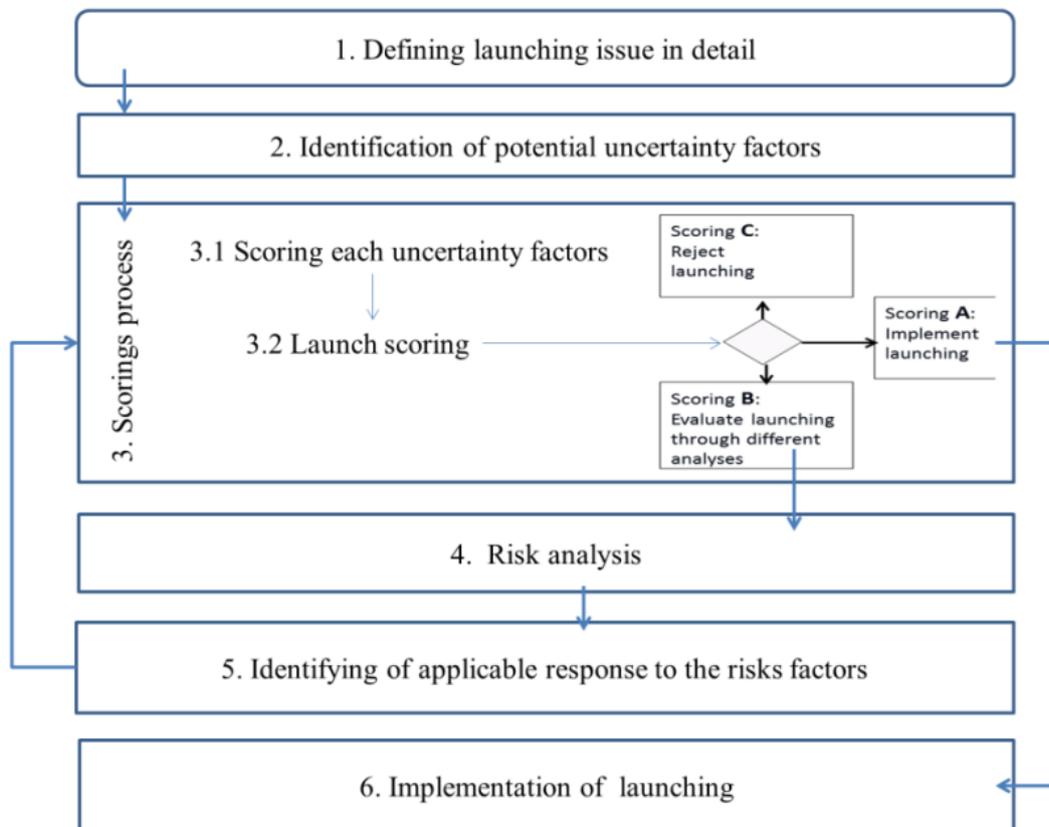


Figure 2: Risk management framework for launching.

To understand how the different steps in this framework work, let us consider a hypothetical launching idea as an example: A European Manufacture Company called “the firm” plans to launch a new stuffed toy for children under 3 years called Super LED Flashing toy (SLF). To achieve cost reduction and to expand operations into a new geographical region, decision makers in the firm consider outsourcing manufacturing to India.

#### *Defining launching issue in detail*

The starting point is describing the launching issue. In step 1, the main ideas of the launching issue should be clarified in detail, gathering the overall nature of the launching issue and how different aspects of launching will meet the firm’s business strategy. Hubbard (2010) uses the term “clarification workshop” as a possible way to get to the root of subject. A clarification workshop is a short series of connections that should bring us from thinking of something as an intangible to thinking of it as a tangible. According to Hubbard, identifying the object of measurement really is the beginning of almost any scientific inquiry. We use the term “scoring group” for this task.

The group members gather from different parts of the firm, e.g., product development, manufacturing, marketing, compliance, communication and sales departments. The goal is

to provide a clear understanding of the launching concept and the way it could match with the firm's "business strategy". Considering the Super LED Flashing toy example, some of the key issues could be:

- What are the features of the SLF in a general sense; e.g., how it works, the shape, color, weight, etc.? What are the instructions for use, and warnings where necessary?
- What does SLF mean for the firm? For example, is it a natural improvement of an existing product? A response to market demands?
- What compliance issues are involved with SLF? For instance, what requirements should be fulfilled in order to comply with the law; or the "conformity assessment activities," including calibration, testing, certification and inspection?
- How should the manufacturing and marketing processes proceed?
- Issues related to outsourcing to India, for example, the quality standard regulations, working hours, and environmental issues.
- How much capital is required to produce SLF?
- Which kind of production technology (e.g., IT) do we need? Which kind of production material and human expertise do we need?

Now that the launching issue is defined from different aspects, the scoring group members have a common and clear idea of what they expect from the launch and how the process goes on, then we shall engage in the risk assessment process, starting with identification of uncertainty factors, as we see in Figure 2.

#### *Identification of uncertainty factors in the launching*

In this step, all uncertainty factors should be identified. Let us consider our launch example: The Super LED Flashing toy (SLF) and see how the launch risk concept relates to SLF. The firm has an overall main goal of maximising profit and has a sub goal of maximizing ROI on the SLF. To the firm, making a minimum of 20% ROI is necessary to obtain a desired outcome. The key concern here is on the major factors which lead to failure launching, meaning not making 20% ROI. We are still in the planning phase, and production and sale occur in the next phase. As we do not know for sure what events will happen in the future and what the effects will be, some uncertainties are involved in the launch (see Section 2).

In order to obtain a desired outcome, it is essential to establish a procedure for screening uncertainty factors. Various techniques, tools and checklists can be used in the risk identification process; e.g., brainstorming, scenario analyses and Delphi-type exercises. The Delphi technique is developed for use in judgment and forecasting situations where pure model-based statistical methods were impractical or impossible. This is a procedure to obtain the most reliable consensus of opinion of a group of experts (Gunther, 2004).

In this work, a guideline for screening uncertainty factors is presented in Table 1. Considering our example, the decision makers in the firm consider outsourcing manufacturing to India. The key matters in the first area of concern, *consistency and relevance*, could inspire the following questions: Is outsourcing to India in line with the firm's business strategy; e.g., the firm's underlying goal, scope and advantages? Has the business partner in India the same interests as the firm's primary goal and objectives? Is SLF designed and manufactured to comply with the essential safety requirements during its

foreseeable and normal period of use? Is SLF accompanied by instructions for safe use and safety information where appropriate? What is the workplace situation in India? Might it cause some reputational damage for the firm?

In the second area, the *essentiality*, some of the key issues could be whether the launching will provide utility value. Given the market and the target group's behaviour, why would consumers buy this particular product? How could consumers react to the launching in relation to the price or design? To what extent will the launching increase the firm's competitiveness? How and to what extent does the launching affect the company's reputation in the market? In our example, launching the SLF, the critical issues could be as follows: How will this new toy, SLF, increase the firm's competitiveness in relation to its competitors? How will the target group (children under 3 years) benefit from this new toy? Why should parents buy SLF over other toys? How the buyers react to the price of the SLF?

The third area, *implementation opportunity*, takes into account the firm's capacity, including human resource and expertise, technical, capital, cultural and other organizational capacity. From an economical point of view, it is essential to have a clear idea about the implementation cost of launching. For instance, what will launching demand of resources in development and commercialization? Examples include all of the various expenses accrued during launch implementation. Considering our example, the SLF, the crucial concerns could be related to the communication problems and cultural differences when the production is outsourced to India. Misunderstanding could happen, and the true cost of production may vary substantially from the planned financial resources. Inadequate communication can also result in delivery delay. As mentioned earlier, one of the firm's intention for outsourcing is to expand operations into a new geographical region, but licensing and copyright issues should be taken into account when identifying uncertainty factors. Additionally, the firm may not realize the anticipated gains, making at least 20% ROI, because of the loss of oversight and control of an outsourced production line.

As we see from the above discussion, there are many uncertainty sources which could have negative effect on the firm's objectives. We need to determine the likelihood of failure due to the identified uncertainty factors and the extent of the potential damage. In order to do so, we proceed to the next step, the scoring process.

Uncertainty factors	Description
<b>Consistency and relevance: reflects on whether launching is in line with the firm's business strategy</b>	
<b>Strategic Alignment</b>	To what extent is the launch aligned with our organization's overall strategies? Internal political climate being in favour of the launching (**)
<b>Compliance</b>	Every commitment to launching is covered by compliance e.g., the current licensing requirements and relevant laws and regulations
<b>Scope of activity</b>	Launching issue is in line with the firm's conceptual and geographical scope
<b>Health, Environmental and Safety (HSE) issues, consumers</b>	Would consumers be exposed to a HSE related risk if they using the new product?
<b>Health, Environmental and Safety (HSE) issues, employees</b>	Would employees be exposed to a HSE related risk in production process?
<b>Reputation</b>	Would launch create any negative effect on the firm's reputation?
<b>Return in Investment (R.O.I)</b>	The R.O.I projection meeting the company's standards (**)
<b>Essentiality: points on why launching issue should have priority?</b>	
<b>Launching advantages*</b>	Superiority and/or differentiation over competitive offerings
<b>Lunch price</b>	The way consumers may react to the launching in relation to the price (knowledge of pricing sensitivity (**))
<b>Launch proficiency</b>	Launching will be profitable when manufactured (implemented) and delivered to the customer at the target price
<b>Marketing strategy</b>	Well established marketing strategy on how to attract the audience, Analysis the business market, How to maintain the existing customer, Competitor analysis
<b>Launching meets customers' needs</b>	Launching will expand and develop customer relationship
<b>Increasing market share</b>	Impact of the introduction of the new product on market share positions (**)
<b>Timing</b>	Competitive product being launch before launch of new product (**)
<b>Implementation opportunity: human resource and expertise, technical and economic, cultural and other organizational capacity</b>	
<b>Human resources and competence</b>	Human resources and competence requires to produce/ implement launch issue Are the roles, tasks and responsibilities of all team members defined and appropriate?
<b>Technical and raw material solutions</b>	Is it technically achievable to manufacture/ implement the launch? Is the raw material achievable to manufacture/ produce the launch?
<b>Financial capacity</b>	Can the launch be implemented with the planned financial resources?
<b>The implementation time</b>	Economic cost caused by delay in the launch, whether launch can be implemented within the planned time. Delays in product launch affecting the commercial viability of the product (**)
<b>Cross-functional communication</b>	Level of communication among departments in a new product initiative (*)
<b>Suppliers</b>	External parities ability and willingness to deliver in time , within budget and confirm technical specifications (**)
<b>Distributions</b>	Using the right distribution channels (**)

Table 1. Guideline for risk identification, founded by critical issues adopted from the research done by Keizer et al., 2005 (\*\*) and Henard and David M. Szymanski, 2001(\*).

### Scoring process

Once the potential uncertainty factors are identified, the members of the scoring group should convert their knowledge and experiences based on opinions and judgments into probabilities, determining the likelihood for the launching to fail. It is, however, crucial to have a rational basis and agreement on evaluation criteria. The criteria states what is deemed as a high, medium or low (tolerable) risk level. Whether a risk is tolerable depends upon the values, the relative weight of each value and the nature, extent and probability of the risk consequences as assessed and evaluated by those entitled to make these decisions (Renn, 2008). Risk tolerance is the amount of uncertainty an organization is prepared to accept in total or more narrowly within a certain business unit. In setting risk tolerance, management considers the relative importance of the related objective and aligns risk tolerance with risk appetite. Risk appetite is the amount of risk, on a broad level, that an organization is willing to accept in pursuit of value (COSO, 2012). For example, a company may have a low risk appetite related to its reputation, but a relative higher appetite related to production cost.

Since every company has its own tolerance level for risk, suitable scoring criteria should be predefined before using the WASL model. There are different ways to formulating scoring criteria, it could be for example based on the cost considerations, to set a maximum monetary value that could be loss if the launching fails. An example of a two dimensional, impact and likelihood scoring criteria is presented in Table 2. The impact dimension expresses the intensity, size or the extension of the economic loss caused by failed launch due to the identified uncertainty factor. The likelihood indicates the state of being likely or

probable and is divided into the four levels: expected, when the event/consequence is expected to occur in most circumstances; likely, the event/consequence will probably occur in most circumstances. The third level is seldom, when the event/consequence is unlikely but possible to occur, and finally, the fourth level, unexpected, reflects that the event/consequence may occur only in exceptional circumstances.

Impact Likelihood	Critical	Significant	Moderate	Negligible
Expected	Extremely high risk (S 0)	Extremely high risk (S 1)	High risk (S 3)	Medium risk (S 6)
Likely	Extremely high risk (S 1)	High risk (S 2)	Medium risk (S 5)	Medium risk (S 8)
Seldom	High risk (S 2)	Medium risk (S 4)	Medium risk (S 7)	Low risk (S 9)
Unexpected	Medium risk (S 4)	Medium risk (S 5)	Medium risk (S 8)	Low risk (S 10)

Table 2. The Consequence and Likelihood scoring criteria.

The final scoring corresponds to the likely attributes of one of the twelve possible scores, as outlined in Table 2. The level of risk could be assigned by getting a numerical value from zero to ten. The lower score implies the higher risk. For example, when the identified uncertainty factor seems to be unexpected, but if it happens, it could have a significant economic loss, the given score is a numerical value of five, which indicates a medium risk factor. In our SLF toy example, cross-functional communication could be a poetical uncertainty factor. Considering outsourcing and the cultural and language difference, misunderstanding is *expected* to happen. However, the impact does not seem to be critical. It earns a score S=3, which indicates a high-level risk factor.

After all potential uncertainty factors are identified and scored, then it is time to estimate the total scoring and denote a score card, using a weighted average scoring model for the launch.

*Weighted average scoring model for launching (WASL)*

In the present scoring model, we use the weighted average method to estimate the total scoring for launching. The mathematics underlying the weighted average method is well known and broadly practiced in literature; see e.g. Anderson and Jacobson (1968) and Wang et al. (2010).

In the weighted average scoring model for launching, weight is given to each risk factor from the last step. The weight is based on the judgment about its relative importance in their respective area of concern. The score of the different risk factors in each area is then multiplied by its weight and added together. The result indicates a score for each area of concern.

A weight is also assigned to each area of concern, which aims to indicate the relative importance on the average for the total scoring of launching. For instance, if a firm is more

concerned about its reputation than profitability, the weight given to the first area of concern, consistency and relevance, should be higher than the others. As a result, the emphasis will change the total scoring for launching. Since the weighting is a subjective evaluation, balance should be made between different concerns and then judgment of their average weight. Considering our SLF example, due to the nature of this new product, and taking into account the outsourcing of the production to India, the first area of concern could be weighted more heavily than others, for example 45%, the second area, the essentiality, 25%, and the third area of concern, implementation, weighted as 30% of total weight.

Now with weights decided, we can finally compute the weighted averages to obtain the overall score of launching issue. The above description is mathematically described in the following formula:

$$WASL = \lambda \sum_{i=1}^n \alpha_i C_i + \theta \sum_{i=1}^j \beta_i E_i + \rho \sum_{i=1}^k \varphi_i I_i$$

Where:

- $n, j, k$  is the number of risk factors in each area of concern.
- $\lambda \sum_{i=1}^n \alpha_i C_i$  : 1. Consistency and relevance, where  $C_i$  is scoring value of risk factors,  $\alpha$  is assigned respected weighting to risk factors and  $\lambda$  is the assigned weight to the first area of concern.
- $\theta \sum_{i=1}^j \beta_i E_i$  : 2. Essentiality and suitability, where  $E_i$  is the scoring value of different risk factors,  $\beta$  is the assigned respected weighting to risk factors and  $\theta$  is the assigned weight to the second area of concern.
- $\rho \sum_{i=1}^k \varphi_i I_i$  : 3. Implementation opportunity, where  $I_i$  is the scoring value of different risk factors,  $\varphi$  is the assigned respective weight to risk factors and  $\rho$  is the assigned weight to the third area of concern.

The result is a numeric value that is interpreted to be the weighted average scoring of the launching, which reflects the risk level involved with launching. Based on this numeric value, a scoring card is assigned to the launching issue in three main risk classes:

1) Score card A: Launching that makes the total scoring greater than eight could considered as A-launch. It indicates that the launching issue is essential, relevant and we have the opportunity for implementation. Scorecard A recommends that launch could be implemented without further analyses.

2) Score cards B: Launching that gets the total scoring between 3 and 8 are considered to the B-launch. These types of launching should be reconsidered. The critical question should be asked is: "Is the level of risk tolerable or acceptable, and *does it require further treatment?*" To answer this question, launching should pass thorough assessment and any traditional analyses such cost/benefit, risk analysis, etc." Class B launch issues move on to the next step, risk analysis.

3) Score card C: Launching that gets the total scoring less than three shows a high-level

risk launching issue, suggesting rejection of launching due to its high risk level.

*Risk analyses and identify applicable response to the risks factors*

As it mentioned earlier, when the launching gets scorecard B, it should pass thorough assessment via traditional risk analyses. There are many different ways to conduct such analyses, for instance: fault tree analysis (FTA), cost/benefit analysis (CBA), structured what-if technique (SWIFT) and cause and consequence analysis. All of these methods are explained in detail in Aven (2008). Through risk analysis process, the members of the scoring group have the opportunity to look over their scores again. They should find out which area of concern is the main reason for the low scoring and why. For example, is it the firm's implementation capacity or is it because the launching is not consistent with the firm's strategy? This information is crucial for dealing with risk factors and for selecting and implementing an appropriate risk treatment option. The alternatives available for the treatment of risk factors are generalized as follows (Southern Cross University):

- Retain/accept the risk – if, after controls are in place, the remaining risk is deemed acceptable to the organisation, the risk can be retained.
- Reduce the likelihood of the risk occurring with preventative maintenance, audit and compliance programs, supervision, contract conditions, policies and procedures, testing, investment and portfolio management, staff training, technical controls, quality assurance programs, etc.
- Reduce the consequences of the risk occurring through contingency planning, contract conditions, disaster recovery and business continuity plans, off-site backup, public relations, emergency procedures and staff training, etc.
- Transfer the risk – this involves another party bearing or sharing some part of the risk by the use of contracts, insurance, outsourcing, joint ventures or partnerships, etc.
- Avoid the risk – decide not to proceed with the activity likely to generate the risk, where practicable.

Specifically, in our SLF example, consider the cross-functional communication which received a numerical scoring value of 3 and was denoted as a high-level risk factor in the previous section. Through a cause and consequence analysis, the members of the scoring group are considering a risk-reducing measure as an applicable response to this risk factor. A cost and benefit analysis reveals that the estimated cost of implementation of this online solution is lower than the economic benefit gained. Considering this risk reduction measure, the re-scoring of the cross-functional communication changes the risk level from high to low.

The scoring group may, however, not find an applicable risk reduction measure due to the nature of the some uncertainty factors. They may decide to avoid the risk and decline to proceed with the activity that is likely to generate high risk. Then the launching issue should receive a score of C, resulting in the rejection of the launch. The process of risk analysis, risk treatment and re-scoring of all uncertainty factors should be continued until the total

scoring of launch changes the scorecard to either A or C for the respective implementation or rejection of the launching issue.

Two main research questions are addressed in this paper:

- i)* How can one understand, define and assess launching risk?
- ii)* How can one manage uncertainties involved in the different stages of the launching process?

Answering these questions, *i)* a review of common risk definitions is performed in Section 2. Based on this review, a definition of the term “launch risk” is suggested; i.e. “uncertainty about and severity of the consequences of failed launching”. To answer research question *ii)*, a new risk management framework for launching is presented. The framework started with the identification of uncertainty factors, which is an important feature of the approach taken, followed by the scoring of the identified uncertainty factors. The scoring result is a numeric value which reflects the risk level involved with launching. In order to find total scoring for the launching issue, a weighted average scoring model (WASL) is introduced, in which weight is given to each potential risk factor. The weight is based on the judgment about its relative importance in their respective area of concern. Based on the result of WASL, a scoring card is completed regarding the launching issue in three main risk classes: 1) class A, low risk launching issue, which proposes that launching could be implemented without further analyses, 2) class B, which advises more analysis before further decision making and 3) class C, which suggests rejection of launching due to its high risk level.

The WASL model could be used as a tool that captures a sufficient number of uncertainty factors which, to a great extent can affect launching. Furthermore, WASL could be utilized as a communication tool between different stockholders across the company. This occurs, for example, as different uncertainty factors are identified and scored through interaction from scoring groups, and the requirements and constraints could be better communicated and comprehended. Moreover, the WASL can offer documentation to support decision making regarding launching.

However, it should be acknowledged that the WASL model is only a tool in a decision-making process. It is based on both subjective assessment and facts about the economy and the market. A tool has its limitations and constraints. Its value is practically comparable with the extents of the scorings—the group’s ability to hunt down and analyze uncertainty factors that can influence launching. This ability is, of course, a matter of competence, skills, knowledge and experiences. Different persons (groups, societies) may give different weight to the remaining uncertainties. Yet, according to Cooper (2003), acquiring the knowledge necessary to address concerns, problems, uncertainties, assumptions, and the relationships between them is difficult in the dynamic world of new product development projects.

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