

EXISTING PROBLEMS OF IDEA EVALUATIONS AND POSSIBLE AREAS OF IMPROVEMENT

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1. Introduction

According to current studies, developing innovative products is one of the most promising approaches in order to meet challenges such as globalisation or saturated markets. In this context, the question arises as to how innovative products can be developed. Relevant literature often states that this is only possible by conducting an effective and efficient product development process [Stern 2010]. As a result, the right products must be developed on the one hand, while on the other hand, the products must be developed in the right way.

Within this paper, emphasis is placed on developing the right products. In order to achieve this goal and to use the companies' resources effectively, the most promising product ideas must be identified as early as possible in the product development process. Therefore, a well-founded evaluation and selection of product ideas is necessary [Sandau 2006]. In this context, ideas that are new solutions (tangible products or services) for customers' problems or needs are seen as product ideas.

Many studies show that the decisions about which product ideas seem to be most promising for further development is very important for the companies' future [Sandau 2006]. One possibility to support decision makers is to use systematic methods for the evaluation of product ideas [Sandau 2006]. Over the last decades, many methods and tools have been developed by academics in order to provide some kind of support for the evaluation of product ideas [Gutiérrez 2011], [Sandau 2006], [Piippo 1999]. However, most of these methods do not address the real problems of the evaluation and selection of product ideas in business practice. Therefore, companies still face problems in identifying the most promising product ideas [Gutiérrez 2011], [Piippo 1999]. Usable and reliable evaluation methods and tools are still missing. An important reason for this is that academia has failed to transfer and to implement knowledge of idea evaluations and evaluation methods into business practice sufficiently [Sandau 2006].

As a result, the companies' resources are often used for the "wrong projects" [Stern 2010], [Wildemann 2009]. This is due to the fact that only a small number of evaluation methods have been developed on the basis of a sound and systematic analysis of problems and weaknesses of idea evaluations and selections faced in business practice. Only a small amount of empirical literature and literature in general exists that covers this topic in detail [Piippo 1999].

2. Problem statement and research questions

In this context, the question arises as to what the problems of idea evaluation and selection in business practice are. In this connection, problems are seen as obstacles that have to be overcome to achieve the goal of identifying the most promising product ideas reliably. In order to support managers, the problems of idea evaluations must be systematically identified and analysed.

Additionally, approaches must be developed to overcome these problems. In this context, it is not reasonable to develop another evaluation method that leads to the same problems as existing ones.

Instead, the identified problems must be systematically addressed and implemented in the existing basics of idea evaluation.

Based on this approach different research questions (RQ) are answered within this paper. At first, it is examined which general factors are responsible for problems of idea evaluations in business practice (RQ 1, see Figure 1). Second, the problems of idea evaluations that exist in business practice are analysed (RQ 2). Furthermore, these problems are assigned to the factors concerning the first research question. Finally, approaches are developed in order to answer the question on how the stated problems can be overcome (RQ 3). Questions RQ 2 and RQ 3 can be seen as the main research questions. In Figure 1 it is shown in which section each research question is answered.

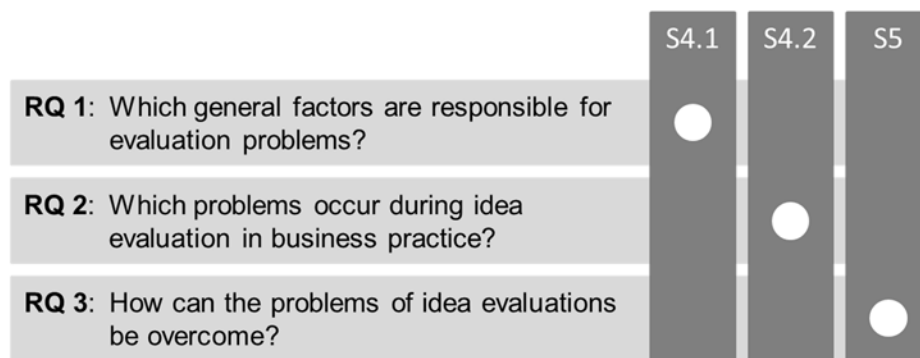


Figure 1. Research questions (RQ) answered in different sections (S) in this paper

3. Method

The research into problems of idea evaluations and possible areas of improvement and the paper itself are structured according to the following main stages of the Design Research Methodology established by Blessing and Chakrabarti [Blessing and Chakrabarti 2009]: Research Clarification, Descriptive Study 1, Prescriptive Study, Descriptive Study 2.

In the first stage of the Design Research Methodology (Research Clarification) problems and research questions are described in order to clarify the research approach. In the second stage (Descriptive Study 1), literature and results of empirical research are analysed so that understanding of examined phenomena can be increased. Afterwards, different approaches are developed to improve the current situation (Prescriptive Study). In the fourth stage (Descriptive Study 2) the developed support is evaluated and implications for improvement are developed.

The research questions described in Section 2 form the basis of the Research Clarification for this paper. In Section 4, research questions 1 and 2 are answered, so that understanding of the examined phenomena can be increased (Descriptive Study 1). In concrete terms, discussions with 15 experts of different companies and departments out of German mechanical and automobile engineering industry have been conducted in order to gain insight into the background of evaluation in business practice and to identify and investigate their problems. Among the experts have been managers and senior managers from innovation, technology and product management departments as well as developers out of R&D departments. They all deal with the evaluation of product ideas in their everyday work in large enterprises with more than 5.000 employees. The experts have been asked about their evaluation processes and problems and weaknesses they identified in their own procedures by means of unstructured interviews. The results have been analysed using the minutes of meeting.

Additionally, literature concerning empirical research has been reviewed in order to analyse problems of idea evaluations in business practice. Therefore, English and German literature dealing with problems of idea evaluations has been regarded. Beside relevant journals and conference proceedings, book publications have been analysed. To obtain an overview, the problems out of expert discussions and literature review are classified into different groups according to their causes.

Afterwards, different approaches are developed in order to overcome the identified problems of idea evaluation in business practice and to improve the current situation (RQ 3, Prescriptive Study).

Therefore, approaches that are described in the relevant literature are mentioned. Additionally, a number of new approaches are developed.

The evaluation of the developed approaches is not part of this paper. According to this, the Descriptive Study 2 has to be done in future work.

4. Problems of idea evaluation in business practice

In order to be able to analyse the problems that occur during the evaluation and selection of product ideas in business practice in a meaningful way, they are assigned to different factors that cause these problems.

4.1 Factors causing problems of idea evaluations

Normally, an evaluation of product ideas is conducted by one or more employees using a specific procedure, respecting a more or less formalised set of input parameters in order to generate an evaluation result. Each of these aspects of an evaluation is a factor that has the potential to cause problems. To be able to gain an overview of problems that occur during the evaluation of product ideas, each problem can be assigned to one of these factors. For the definition of these factors the commonly used cause-and-effect diagram (cf. [Pfeifer 2007]) can be used as a basis, see Figure 2.

In the area of quality management, the following factors are often used in connection with the cause-and-effect diagram in order to gain an overview of possible impacts on a problem: people, method, milieu, management, material, machine, measurement [Pfeifer 2007]. These factors can also be used to look for possible causes of evaluation problems.

For an assignment of the problems to these factors it is reasonable to adapt the factors to the present case. The factor “people” concerns the managers or employees that take part in an evaluation. Thus, this factor can be used without an adaption. The second factor, which is called “method”, concerns the procedure of evaluating and is also useful for the present case. The factor “milieu” normally concerns the environment of a specific problem. In this case, the environment of an evaluation can be seen as the company in which the evaluation is conducted. The factor “management” belongs to the factor company and therefore, is not used as a single factor in the present case. In connection with the factor “material”, the input material of a process is often addressed. The “input parameters” of an idea evaluation can be summarised by means of this factor in this regard. In Section 4.2.4 it is described what the input parameters of an idea evaluation are.

For the factors “machine” and “measurement”, no problems can be found that could be connected, so these two factors are omitted. The factors that are used as dimensions that cause the problems during an evaluation of product ideas are summarised in Figure 2.

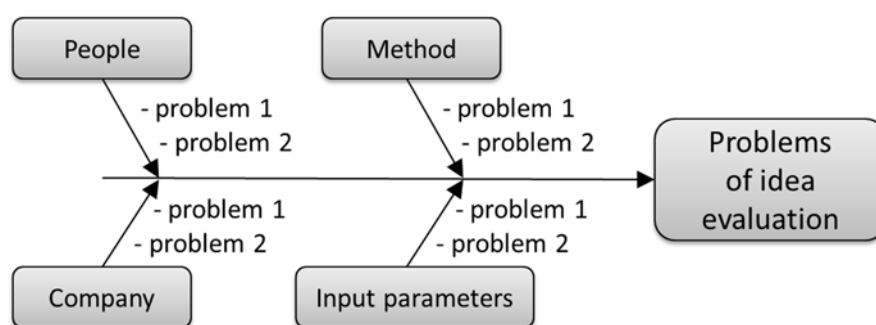


Figure 2. Cause-and-effect diagram for problems of idea evaluation

4.2 Problems of idea evaluations in business practice

In this section, the problems of evaluations are assigned to their causes. Some of the problems could be assigned to two or more factors as in some cases, a clear allocation is difficult. However, the allocation only serves as a means of ensuring a good overview. Consequently, there is no influence on the results.

Most problems are described in the reviewed empirical literature. Many have also been stated during the expert discussions conducted. Other problems are not described in the reviewed literature but have been stated by the experts who were interviewed.

The problems are summarised in tables in the following sections. Each problem is numbered so that the corresponding approach for improvement (cf. Section 5) can be assigned. Furthermore, the origin of each problem (literature or expert) is given.

4.2.1 People

The people that take part in an evaluation of product ideas have a significant influence on the evaluation, the procedure and the evaluation results (c.f. [Gutiérrez 2011]). Thus, several problems exist that can be allocated to the people involved themselves. However, all of the problems stated in the following sections are also influenced by this factor as each basic aspect that is used for an evaluation as for example a special procedure or different input parameters must be interpreted and applied by individuals.

The first four problems (P1.1 – 1.4) that are described in this section can be summarised by means of the term “difficulties of comprehension”. As soon as two or more people work together, each participant builds upon a different understanding of the things they deal with. During an evaluation this concerns the understanding of ideas (P1.1) [Gutiérrez 2011] and the understanding of the used input parameters (P1.2). A different understanding or only partial comprehension of ideas and input parameters leads to misunderstandings and wrong evaluations. As evaluating and decision making are processes that take a period of time, each evaluator recognises and interprets different aspects of an idea at different points in time during these processes and changes his interpretation of an idea constantly [Gutiérrez 2011]. This leads to different understandings of ideas in different evaluation situations and can influence evaluation results (P1.3). Similar problems occur where different departments of a company (for example R&D and marketing) are involved in an evaluation. Because of different backgrounds, difficulties in communication and in understanding all relevant aspects in the same way also occur (P1.4) [Piippo 1999].

In addition to these problems concerning difficulties and differences in understanding, the involvement of different people in evaluations causes other problems. It is not possible for evaluators to perform a completely objective evaluation. Each employee involved pursues his own objectives. Sometimes evaluations can even be exploited in order to achieve the particular objectives of individuals [Cabral-Cardoso 1996]. Employees often prefer projects in which they are involved themselves to other projects (P1.5). When it comes to the integration of different management levels in an evaluation in particular, this aspect gains in importance. Other evaluators and therefore the result of the evaluation can be influenced by superiors who wish to emphasise the personal opinion very strongly (P1.6) [Stern 2010].

Table 1. Problems of idea evaluations caused by people

No.	Problem	Origin
P1.1	Different/incomplete understanding of ideas	Literature + Expert
P1.2	Different/incomplete understanding of input parameters	Expert
P1.3	Evaluators change their interpretation of ideas during the evaluation process	Literature
P1.4	Difficulties in communication between people with different backgrounds	Literature + Expert
P1.5	Impact on evaluation due to subjective influences and egoistic objects of individuals	Literature
P1.6	People of superior enterprise levels influence their employees	Literature

4.2.2 Method

The second important factor that causes problems during an idea evaluation is the used method. In this context, method refers to the procedure that is used for the evaluation of ideas. This procedure does not have to be a formal evaluation method that can be found in literature. In business practice, both alternatives can be found: some companies use informal meetings to discuss new product ideas while others try to evaluate new ideas as rationally as possible using formal evaluation methods.

In business practice, evaluations are often only superficial [Stern 2010]. The product ideas and the related input parameter are sometimes not examined or discussed in detail. Evaluations are performed very quickly and isolated by using single criteria or not involving all relevant people and as a result, depend on chance and are not comprehensible to people not involved in the procedure (P2.1) [Stern 2010], [Piippo 1999].

Furthermore, in business practice the classification of ideas as a step before the evaluation itself is often very difficult owing to different understandings and the differing opinions of the evaluators involved [Gutiérrez 2011]. This leads to the comparison of different kinds of ideas and different maturity levels during the evaluation (P2.2).

In cases where formal methods are used, additional problems occur. In many cases, theoretical methods are difficult to understand and use and require great effort for learning and implementing in business practice (P2.3) [Cabral-Cardoso 1996], [Pidun 2010].

A further difficulty is that companies often fail to consider the experience and the knowledge of their evaluators or decision makers. In many cases, employees or departments that are able to answer different questions concerning the product idea in a meaningful way are not explicitly regarded (P2.4) [Pidun 2010].

Table 2. Problems of idea evaluations caused by the used method

No.	Problem	Origin
P2.1	Superficial, quick, isolated evaluations that are not comprehensible for others	Literature
P2.2	Difficulties in classifying ideas and comparison of different kinds of ideas	Literature + Expert
P2.3	Theoretical methods are difficult to understand and use and require great effort for learning and implementing	Literature + Expert
P2.4	Knowledge and experience of evaluators are not explicitly regarded	Literature + Expert

4.2.3 Company

Several problems during product evaluation are caused by different aspects of the company. As the company forms the framework for evaluations and provides different kinds of resources, all aspects concerning the actual product development process of a company, the used methods and procedures and problems that are connected to companies' financial, human and knowledge resources are summarised among this topic.

Often, only a small number of financial resources are devoted to idea evaluations in business practice. As a result, employees and managers do not have adequate time to evaluate product ideas (P3.1) [Sandau 2006], [Wildemann 2009]. Therefore, extensive and detailed evaluations are not possible.

A further problem in the context of the company is the fact that many evaluation methods are developed in an academic environment, perhaps evaluated by several projects in business practice, but not sufficiently adapted to the special environment of each company before they are used [Piippo 1999]. If such necessary adaptations are neglected, it is difficult to use the method and the results will be rather unreliable (P3.2).

An additional problem associated with evaluations that is closely linked to the problems discussed above is the fact that there are a large number of different evaluation situations in business practice. In some cases a number of ideas must be evaluated by a single evaluator in a short period of time in order to perform a preselection. In other cases, many evaluators discuss only two ideas for several hours in order to come to a final decision. Because of this variety of evaluation situations, existing evaluation methods often fail to match the specific situation (P3.3).

Another important aspect concerning the resources of the company is the knowledge that is necessary for an evaluation. In small and medium-sized companies in particular, the relevant knowledge of which evaluation method to use for which objective and in which way is often missing [Wildemann 2009]. In addition, knowledge of methods for the early phases of the product development process could often be improved (P3.4) [Sandau 2006].

Table 3. Problems of idea evaluations caused by the company

No.	Problem	Origin
P3.1	Inadequate financial resources/time for evaluation	Literature
P3.2	Evaluation methods are not adapted to the special conditions of the company where they are used	Literature + Expert
P3.3	Evaluation methods do not fit the specific situations	Expert
P3.4	Lack of knowledge of evaluation methods in early phases of the development process	Literature

4.2.4 Input parameters

In this section, problems connected to the input parameters of an idea evaluation are examined. In this context, the criteria that are used for an evaluation of product ideas and the information to answer these criteria are considered to be the input parameters. At first, several problems concerning the use of criteria in general are described. Afterwards, problems relating to the neglect or wrong application of specific criteria and problems in dealing with the relevant information are discussed.

Often, no clearly defined set of evaluation criteria can be found in business practice. Instead, vague, incomplete and changing criteria are used (P4.1) [Stern 2010], [Piippo 1999], [Cabral-Cardoso 1996]. Furthermore, the criteria are often overlapping (P4.2) [Pidun 2010]. As a result, the same aspects are respected more than once for an evaluation. Others are neglected.

Additionally, problems occur in handling specific evaluation criteria. For example, the connection between different product ideas or development projects is often neglected (P4.3) [Wildemann 2009], [Pidun 2010]. Therefore, possible synergies and other relationships between the projects of a company are insufficiently respected for the evaluation. Similarly, long-term goals and the business strategy of the company are often not sufficiently respected for an evaluation. Instead, often only short-term goals are regarded (P4.4) [Wildemann 2009], [Sandau 2006], [Stern 2010], [Piippo 1999].

Another difficulty is that the information required to perform a well-founded evaluation, for example information to answer certain evaluation criteria, is not procured or companies are not able to procure it (P4.5) [Stern 2010], [Wildemann 2009], [Piippo 1999].

Table 4. Problems of idea evaluations caused by input parameters

No.	Problem	Origin
P4.1	Vague, incomplete and changing criteria instead of clearly defined set of evaluation criteria	Literature + Expert
P4.2	Overlapping evaluation criteria	Literature + Expert
P4.3	Relationships/connections between different product ideas/projects are neglected	Literature
P4.4	Insufficient attention to long-term goals and business strategy	Literature
P4.5	Necessary information is not procured	Literature

5. Approaches to overcome the evaluation problems

In this section, approaches are described that are useful for overcoming the problems stated in Section 4. A number of these approaches are frequently described in the literature dealing with evaluations [Stern 2010], [Piippo 1999], [Pidun 2010], [Sandau 2006], [Wildemann 2006], [Gutiérrez 2011]. In order to be able to address the stated problems, this section is also divided into different subsections according to Section 4. Additionally, each subsection is summarised and the approaches are assigned to the problems by means of a table.

5.1 People

In order to overcome the problems that have been summarised by means of the term “difficulties in comprehension”, several approaches are useful. Idea evaluations should not only contain the evaluation itself. Instead, time for discussing the evaluation criteria and for developing an understanding of the ideas must be included. This ensures that every member of an evaluation team

has the same understanding, comprehends the evaluation criteria correctly, recognises the core of an idea and is able to understand other evaluators (see A1.1, Table 5) [Gutiérrez 2011].

Furthermore, the ideas should be described in a way that enables the evaluation team to understand the background and the details and to identify the opportunities and the risks of a product idea. Therefore, visual means such as drawings, process plans, prototypes or diagrams are especially useful (A1.2) [Gutiérrez 2011]. Based on that, the evaluation of an idea and its description must be adapted to one another so that the evaluators are able to perform a well-founded evaluation (A1.3).

Problems that occur in connection with employees pursuing their own goals or superiors influencing their employees cannot be completely avoided. However, by considering some approaches, the negative impact of these effects can be reduced. At first, a reasonable set of clearly defined evaluation criteria can prevent single evaluators from emphasising single criteria too much (A1.4) [Stern 2010]. In addition, this leads to a comprehensible evaluation (see Section 5.4). Thus, it is possible for evaluators and others to comprehend why an evaluation has been performed in one or the other way. As a result, evaluators will avoid evaluating ideas in a very subjective way.

Furthermore, the objectives of an idea evaluation and selection should be clearly defined and agreed by every evaluator at the beginning of an evaluation (A1.5). To a certain degree this prevents misunderstandings and members of the evaluation team having different goals.

In order to prevent an employee from preferring a project in which he is involved to other projects, the development team and the evaluation team should be separated. Additionally, it may be reasonable to weight the evaluation criteria in a first step by means of another team that is not involved in the evaluation itself (A1.6).

Furthermore, all evaluators should be part of the same management level if possible, in order to avoid impacts on their employees during an evaluation (A1.7).

In Table 5 the approaches of this section are summarised and it is shown which problems are addressed by which approach.

Table 5. Approaches addressing problems caused by people

Approach No.	Problem No.	Approach
A1.1	P1.1 - P1.4	Time for developing an understanding of evaluation criteria and product ideas
A1.2	P1.1, P1.3, P1.4	Meaningful description of ideas to enable evaluators to get the core of an idea (for example by means of visual means)
A1.3		Idea evaluation adapted to idea description
A1.4	P1.2, P1.5 - P1.6	Use of a clearly defined set of evaluation criteria
A1.5	P1.5 - P1.6	Definition of objectives of an idea evaluation
A1.6		Separation of idea development and evaluation
A1.7	P1.6	All evaluators out of same management level

5.2 Method

In Section 4.2.2, it has been described that evaluations are often superficial and not comprehensible. Furthermore, the step of classifying ideas before an evaluation is often difficult to handle (problems P2.1 + P2.2). To overcome these problems, a set of different approaches is necessary. At first, a well-defined, systematic and comprehensible procedure for the evaluation of product ideas is necessary [Stern 2010]. However, for companies dealing with the problems described above this is not sufficient. Additionally, the whole procedure of describing ideas after their creation, classifying them into different types and evaluating them must be regarded [Wildemann 2009]. Only if the description and classification of ideas fit together with the evaluation itself are evaluators able to get a deep insight into an idea and evaluate it correctly. Therefore, an approach to describe product ideas with respect to their novelty in different dimensions is reasonable. By systematically responding to the questions as to what aspect of an idea is new and to whom this aspect is new it is possible for the company to examine an idea in detail and to classify it into different types (for example incrementally, moderately and radically new ideas for the customer or the company) (see A2.1, Table 6). This examination must be

part of a procedure that does not only include the idea isolated from the environment. Instead, the business model and services connected to an idea must be analysed (A2.2).

Furthermore, the analysis of the different steps a customer must go through in order to buy the new product, to obtain it, to use it and to discard it, can be very helpful for the company in order to identify all possibilities and risks associated with a new product idea (A2.3).

After these steps of a description and analysis of an idea, the evaluation must be performed systematically, following a transparent procedure and using clearly defined criteria that are relevant and that do not overlap (A2.4) [Piippo 1999], [Stern 2010], [Pidun 2010], [Sandau 2006], [Wildemann 2009]. Therefore, the set of criteria developed by Messerle [Messerle 2011] forms the basis.

The problem that the implementation and the application of methods require too much effort can be solved, among other things, by a modular structure. This enables the evaluator in business practice to use the module that matches his current situation. Thus, the effort for conducting steps that do not contribute to the current objective of an evaluation is reduced (A2.5) [Stern 2010], [Wildemann 2009].

The problem that the knowledge and the experience of the members of the evaluation team are not regarded with respect to their background can be solved, for example, by assigning different evaluation criteria to different members of an evaluation team. For example, the question of whether a new product idea meets customer requirements should be answered by a member of the marketing department. Other evaluators may not be sufficiently qualified to answer this question and, therefore, should be respected to a lesser extent for this evaluation criterion (A2.6).

Table 6. Approaches addressing problems caused by the used method

Approach No.	Problem No.	Approach
A2.1	P2.1 + P2.2	Analysis of the novelty of an idea in different dimensions
A2.2		Analysis of business model and services connected to an idea
A2.3		Analysis of different steps of customer interaction with the new product
A2.4		Systematic and transparent evaluation procedure using a clearly defined set of criteria
A2.5	P2.3	Modular structure of evaluation method
A2.6	P2.4	Assignment of evaluation criteria to different experts

5.3 Company

The first problem caused by aspects of the company in which an evaluation takes place that has been described in Section 4.2.3 dealt with absent financial resources and time for idea evaluations (P3.1). This situation can be influenced by the company by allocating more resources to this part of a development process, on the one hand [Sandau 2006]. On the other hand, the approaches described in this section aim to improve the usability of evaluation methods for the companies and, therefore, reduce the financial resources that are necessary for an evaluation.

At first, an evaluation method that is introduced in a company must be adapted to the decision-making culture of the company. Otherwise, it will not be used on a frequent basis as it contradicts the normal procedures (A3.1).

Furthermore, by using the same evaluation method for more than one specific situation, the effort for implementation can be reduced because the evaluators are more familiar with a specific method (A3.2). However, in this case, the problem occurs that not every evaluation method matches different evaluation situations. Therefore, it must be designed in a way that allows modular use of different parts of an evaluation method that rest upon the same basis (A3.3) (c.f. A2.5).

To reduce the lack of knowledge of evaluation methods in business practice, evaluation methods must be transferred from academia into practice carefully (A3.4) [Sandau 2006]. For the development of evaluation methods, this means that stating theoretical results and offering guidelines is not sufficient. Instead, evaluation procedures must be adapted to the specific environment of a company with the exception of evaluation methods that are very easy to use and that do not require any additional information and adaptation to the environment. Additionally, knowledge concerning an evaluation method must be transferred to the people that are involved in evaluations in business practice.

Table 7. Approaches addressing problems caused by the company

Approach No.	Problem No.	Approach
A3.1	P3.1 + P3.2	Adaptation of evaluation method for decision making culture
A3.2	P3.1 + P3.2	Multiple usage of evaluation methods in different evaluation situations
A3.3	P3.1 - P3.3	Modular structure of evaluation method
A3.4	P3.4	Transfer of knowledge of evaluation methods from academia into practice

5.4 Input parameters

The problems caused by insufficient handling of input parameters are all related to the evaluation criteria used for an evaluation as stated in Section 4.2.4. All problems in connection with evaluation criteria can be addressed by using a carefully defined, not overlapping set of criteria that includes all relevant aspects of an evaluation (A4.1) [Stern 2010]. In this context, it is important that the used criteria are adapted to the situation of an idea evaluation. In this stage of the product development process, only a small amount of information is available. Some aspects of an idea can be evaluated quantitatively but for many aspects only qualitative information is available. Thus, attention must be paid to the aggregation of qualitative and quantitative information so that no difficulties occur concerning this aspect of an evaluation [Cabral-Cardoso 1996]. Messerle [Messerle 2011] has developed a set of criteria that is adapted to the evaluation of product ideas. This set of evaluation criteria forms the basis for this approach.

The problem of the connection between different product ideas or development projects often being neglected can be addressed by another approach additionally. Therefore, the approach to describe product ideas with respect to their novelty in different dimensions (cf. Section 5.2) offers some advantages (A4.2). By analysing the novelty of each idea before an evaluation, it is possible for the company to gain an overview of the novelty of all development projects that the company conducts and to compare them with one another. As a result, the company is able to expand its information about its own product portfolio by the aspect of novelty. Thus, future development projects can be systematically controlled so that the mixture of radically new ideas and incremental improvements can be defined.

The problem that the necessary information is not procured during an evaluation can be solved by involving all relevant actors of the company as far as possible [Stern 2010]. It is obvious that criteria concerning the customer or some market aspects cannot be answered by the development department. Therefore, the departments that are able to contribute to an evaluation must be respected logically (A4.3).

Table 8. Approaches addressing problems caused by input parameters

Approach No.	Problem No.	Approach
A4.1	P4.1-P4.4	Carefully defined, not overlapping set of criteria that includes all relevant aspects of an evaluation
A4.2	P4.3	Analysis of the novelty of an idea in different dimensions
A4.3	P4.5	Involvement of all relevant actors/departments of the company

6. Discussion

Within this paper, several approaches have been mentioned which address the problems that exist in idea evaluations in business practice. To gain an overview, the problems and approaches have been assigned to different factors that cause these problems. In some cases it has been very difficult to perform an unambiguous assignment as a number of problems or approaches are caused by more than one factor. However, as the assignment only serves for an improvement of the overview, the results are not falsified.

Some of these approaches are often mentioned in the relevant literature. For example, it is not a very new approach to use a clearly defined set of evaluation criteria that includes all relevant aspects. For instance Messerle [Messerle 2011] has examined in detail which criteria are relevant for an evaluation

of product ideas. Other approaches such as systematic evaluation procedures are also very common and respected by several existing evaluation methods. In spite of the fact that these approaches are generally known, the problems described in Section 4 exist in business practice. The main reason for this is that academia has failed to transfer and to implement knowledge of idea evaluations and evaluation methods into business practice sufficiently [Sandau 2006].

Other approaches that have been described in Section 5 are not stated or generally accepted in the relevant literature but mentioned within this paper. For example, the approach of carefully describing and classifying ideas as a step before the evaluation itself is not particularly common. The description of product ideas with respect to their novelty in different dimensions is also not described extensively in the relevant literature. Such approaches must be seen as hypotheses that must be verified in further studies.

The paper can serve as a basis for the further development of evaluation methods for product ideas. However, several approaches that are discussed in this paper can only be seen as the very first step and must be put in more concrete terms in future work. They are partially formulated very generally (for example “adaptation of evaluation method for decision making culture”). In these cases, it is firstly necessary to examine how this approach can be followed up. Afterwards, it is possible to draw them up and implement them in an evaluation method.

Some of the approaches are already connected to concrete ideas, for example to describe an idea by means of analysing its novelty, the business model and services connected to the idea and the different stages of customer interaction with the new product. Others, such as the development of a relevant set of evaluation criteria, have already been developed by other studies. In these cases, the question of how the problem will be solved is already answered, at least partially. Therefore, the approaches must be drawn up and afterwards implemented in an evaluation method in order to verify them. In this context, it has to be analysed critically, if the stated approaches can completely overcome the problems, if other approaches seem to be more promising and if other problems are generated by following up the new approaches.

Another problem is that not all approaches that are described in this paper can be drawn up and implemented in the evaluation method to the same degree as they are in parts contradictory to a number of the main problems in business practice. Many of the approaches lead to increased effort that is necessary for an evaluation, for example the involvement of all relevant actors of the company or the description and classification of ideas as an additional step before an evaluation. At the same time, the time for evaluations in business practice is limited. Furthermore, it is not always possible to separate the evaluation team from the development team of certain projects because of limited human resources. These examples show that most of the approaches can only be drawn up to a certain degree in order to respect other problems that are addressed by other approaches.

Additionally, it has to be examined if all problems connected to idea evaluation in business practice are summarised in this paper in order to ensure that no important problem has been neglected.

7. Conclusion

In this paper, problems that occur during the evaluation of product ideas in business practice are described. Therefore, mainly empirical literature examining evaluations in business practice has been reviewed. Additionally, expert discussions with 15 R&D managers have been conducted. After classifying the problems by means of their causes, namely the people, the used method, the company in which the evaluation takes place and input parameters, approaches have been developed to overcome these problems. The overall goal is to arrive at transparent, comprehensible and well-founded evaluations with more reliable evaluation results in business practice.

Several approaches have been discussed within this paper. It has been shown that not only the ideas themselves but also the criteria used for the evaluation must be described or discussed in a way that every evaluator is able to understand them and to comprehend the core of an idea. In this context, the novelty of an idea in different dimensions, the business model and services connected to an idea and the steps a customer must take in order to buy, obtain, use and discard a product can be a means of describing an idea in detail.

Egoistic objectives of single evaluators should be excluded. Furthermore, transparent and comprehensible sets of evaluation criteria and procedures should be used. Evaluation methods should be adapted to the evaluation situations in business practice by means of a modular structure. The knowledge and experience of experts can be respected by involving all relevant employees and assigning evaluation criteria to the particular expert. The evaluation procedure must be adapted to the decision making culture of the company. The knowledge of an evaluation method must be implemented in a company very carefully and with a view to the evaluation's environment.

All of these approaches address one or more problems that occur during idea evaluations in business practice and are therefore a tool to improve the current situation. They do not only aim to improve some details of existing evaluation methods but are helpful for the improvement of the cooperation during the process of idea description, evaluation and selection [Piippo 1999]. Furthermore, more values such as raising new questions, the further development of ideas and an increased communication between different actors can be achieved by implementing the approaches into an evaluation method [Cabral-Cardoso 1996].

In order to solve the problems of idea evaluation, the approaches must be put in more concrete terms and implemented in an evaluation method. Only if it is possible to develop a concrete evaluation method that uses these approaches as a basis is it possible to improve the current situation.

Regarding the approaches stated above, the development of such an evaluation method does not finish with the end of theoretical analyses. The evaluation method must be implemented in different companies and applied to several product cases in order to be able to see whether the problems discussed above could be solved.

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