Research Report

"Assessment of market potential for innovations with new technology in an existing market"

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Bart de Vries, 8 December 2011

Management summary

The aim of this research is to find out how important insights on market potential are for an innovation with new technology in an existing market. Many of the TKH Group's innovations fit within this profile and in academic literature this is a specific field in which there is a lack of knowledge.

The most important finding is that for the cases of this research innovation success is related to the level of insight. Insight is the knowledge obtained on certain variables of an innovation, which together lead to the knowledge on market potential for an innovation as a whole. Innovations, for which more insights were obtained during the development, have a higher level of success. An analysis of the differences in insights and success between the cases shows that on a number of variables the level of insight is directly related to the success of the innovation.

Next to the relation between insight and success, a number of variables show a relation between the level of insight and the score on these variables, while a number of variables are related to each other as well. Product advantage, acceptation, market structure and competition are the variables that show a direct relation to the successfulness of the innovation. For all these variables but competition the level of insight is also related to the score on the variable. The scores for market newness, regulation and the influence of market structure are related to product advantage, acceptation, market structure and each other and are thus to be taken into account as well. As the scores on product advantage and acceptation are related to the level of insight, these are especially important. Insights on these variables can actually be used to improve the performance of the innovation. Competition is independent from these variables, which could be explained by reasoning that competition is an important factor for every new product, regardless of its innovativeness.

As the results of this research indicate that success is influenced by insights in the market potential of an innovation, the obtaining of insights should be incorporated in the development program for innovations with new technology in an existing market. That insight in market potential of an innovation should be made up from insights in a number of variables.

However, this research has only focused on those variables that determine innovation success. This scope offers not the full insight that a company needs to make development decisions. An innovation could be massively successful in a certain market, but if this market is very small, the revenues could still be too low to justify development. Therefore additional variables are needed to determine the fit of the innovation with the company's strategy. These variables should be deducted from that strategy. When these variables are included, management can use the complete set of variables to assess market potential of innovations and make innovation development programs more successful.

Preface

This report is the result of research that I have conducted between May and December of 2009 as my graduation assignment for the Master of Business Administration at the University of Twente, with the specialization of innovation management & entrepreneurship. A lot of hard work and effort is put in it and to me it has been an experience that was both instructive and pleasant.

The scope of the research has developed throughout the research, which made it sometimes challenging to get and stay on the right scientific track. However, the right direction was found and the research has led to a number of interesting findings, which can be valuable to both practice and theory.

I would like to thank TKF, as member of the TKH Group, for giving me the opportunity to perform this research. Furthermore, I am grateful for the guidance and cooperation of the people involved in the research process, namely my supervisors at the University of Twente, Dr. A.M. von Raesfeld – Meijer and S.J.A Löwik, Msc, my supervisor at TKF, ing. L.D. Pots and Mr. Adrie van Schie and Mr. Hans van der Kuil, who have put a lot of effort in supporting the research. Over 40 people, within the TKH group, as well as external parties, have provided input for the research and without naming everyone individually, I am thankful for their contribution as well. Finally, I would like to thank my family and girlfriend for the support throughout my study and this research. I really appreciated this.

Enschede, December 8th, 2011.

Bart de Vries

Index

1. Research problem & questions

1.1. Research problem

The TKH Group NV develops sophisticated systems and networks for information- distribution-, telecommunication-, electric- and industrial production and is listed at the AscX index of Euronext. It consists of 62 subsidiaries, varying in size and activities. While the largest subsidiary, TKF, exists for 80 years and employs around 400 people, smaller subsidiaries like USE Technology and BB-Lightconcepts have less than 10 people employed and are relative young organizations. Despite the difference in size and focus, all the subsidiaries that produce goods have to comply to the innovation targets, which means they have launch new products regularly. Giving the nature of the companies, the products are aimed for B2B activities and aimed at existing markets.

Over the recent years, not all innovations developed within the TKH Group proved to be successful. Many people within the organization feel this was the result of developing a product that was not needed by the market. They claim that had there been insight in whether there was a need within the market for the product, many of the failures could have been prevented from happening. Although this claim is made, it is not yet known what kind of knowledge is needed to have insight, nor how this influences the successfulness of an innovation. For the management of innovation development within the various TKH companies this is an important question.

When looking at literature on this topic within the field of innovation management, this lack of knowledge can be explained there as well. Often literature on innovation management focuses on either incremental innovations or radical innovations. Incremental innovations have only technical and/or market newness on a micro level, thus are small enhancements to existing products in an existing market, while radical innovations are completely new products for an entirely new market and therefore have both technical and market newness at micro and macro level. In between is a gap, as illustrated by Garcia & Calantone (2002). New technology for existing markets is located in this gap. Incremental innovations have little technical newness in existing markets and will thus be compared to the existing alternatives available to customers. The little newness enables customers to compare the innovation to the existing products on the same criteria as to which the existing products are compared to each other. For a company that develops the innovation it is therefore most important to know what criteria are important to its customers and what the performance of the innovation is on those criteria. Radical innovations create a new market and can therefore not be compared to existing products by its potential customers. For companies who develop these innovations, this means that a whole other set of questions arise, such as how fast a market for the innovation will emerge, what that market will be and how the possible customers will react to the innovation. As incremental and radical innovations therefore have very different uncertainties, the methods used to cope with these uncertainties and thus the functioning of insights in market

potential is quite different as well. The lack of innovation management literature on the specific situation for new technologies in existing markets indicates that there is a need for more knowledge on the importance of insight in market potential. If insights in market potential are important, there is a need to know what insights that should be. All of this in order to improve the development of technological ideas towards successful innovations in an existing market. More insights on this topic would be beneficial for both the TKH group and literature on innovation management.

1.2. Research questions

The described problem of insights in the market potential of innovations as expressed within the TKH Group means that this study is focused on finding out how assessment of market potential influences the successfulness of innovations within the TKH Group. This is reflected in the central question for this research:

"What factors are important to gain insight in market potential for innovations with new technologies in existing markets within the TKH Group?"

This basically says: is insight in market potential important, and if so, on what factors should we have insight. In order to get a good answer to this question, we use a layered approach which is explained below. We define insight as the knowledge that is obtained on a certain factor or on the market potential of an innovation as a whole. The insights on separate factors are constructed to insight on market potential for the innovation as a whole. We will explain how we do this later on. Innovation success is defined as the extent to which the sales of an innovation are exceeding the investments in its development. With all cases in the research originating from SME's operating in a B2B business, this sets a boundary for the generalization of the research findings.

The central question consists of a number of items. "What factors are important to gain insight" has two dimensions. One is that of importance of individual variables that make up insight on an innovation as a whole and the other is insight on an innovation as a whole in relation to innovation success. The relation between innovation success and insight in market potential is a relation that is often researched (for example, Ernst, 2002). However, what "insight" is and from what insight on market potential of an innovation is constructed, is often unclear. New technology in an existing market is the boundary for this research. We will now explain how everything comes back in this research.

The answer to the central question will follow from the formulated sub questions. The following research questions are formulated:

1. *What is the relation between degree of insight and influence on innovation success for separate variables?*
   a. *For factors that can be influenced by the innovating company.*
   b. *For factors that can not be influenced.*

These questions are aimed at finding out on what factors insights are obtained in order to determine market potential for an innovation according to literature. In addition to this, it aims at finding out whether certain levels of favorability for innovation success are related to the level of insight on the variable. The knowledge that is built up by researching these relations, offers insights in what variables are used and how the insights in the factors potentially are influenced for certain values of the variables.

As already mentioned, we make a distinction between factors that can be influenced by the innovating company and factors that can not be influenced. That distinction is important in practice as it will affect practical implications. Influencing the factors that can be influenced can be a part of an innovation development program, while factors that can not be influenced are more or less the circumstances with which an innovation has to deal with. Therefore this distinction should be made in the research itself as well.

2. *What is the relation between the individual variables on which insights are obtained?*

This research question will focus on interfering or influencing relations between the factors on which insights are obtained in order to determine the market potential of an innovation. This means we focus on the factors that are already determined for the first question. Relations between these variables affect the influence of these factors on the market potential and therefore it is important to have knowledge on these relations. Knowing what variables influence each other is important when deciding on what variables knowledge should be obtained. If one variable is found to be influential for success, but strongly influenced by another variable, that other variable must be included in the market assessment as well. When not having this knowledge, it could happen that an indirect influence is overlooked and insights are not complete or possibly incorrect.

3. *To what extent are overall insights in market potential related to innovation success?*

The final sub question focuses on the relation between insight in market potential and innovation success. The answer to this sub question will show whether insights obtained in market potential are related to the actual success of an innovation. Following previous research on various types of innovations, we expect that insight is positively related to success (De Brentani, 2001; Song et al., 1998). Knowledge on this relation offers not only knowledge on the actual importance of insights,

but by looking deeper into the circumstances that lead to the relation also incorporates outcomes of the previous questions.

What we will do is determine whether there is a relation between a score on a variable and the level of insight on this factor. This relation is an indicator of importance of insight. After determining whether there is a relation between a score on the factors and the level of insight on these variables we research whether these variables are related or even influence each other. Finally, we look at the relation between insight in market potential of the innovation as a whole and innovation success. Within this relation it is important to stress that we consider that insight in the market potential of an innovation is constructed from insights on the individual variables. This makes it possible to not only look at the plain relation between market potential and success, but also relate to the 'pieces' of knowledge that make up insight in market potential. This is important as it gives the opportunity to have stronger focus on those variables that deliver the most important pieces of knowledge. This opportunity to have a better focus is important considering the ever presence of more innovation ideas than resources to deal with them.

The relations between the research questions are shown below:

Image 1.:
Research model
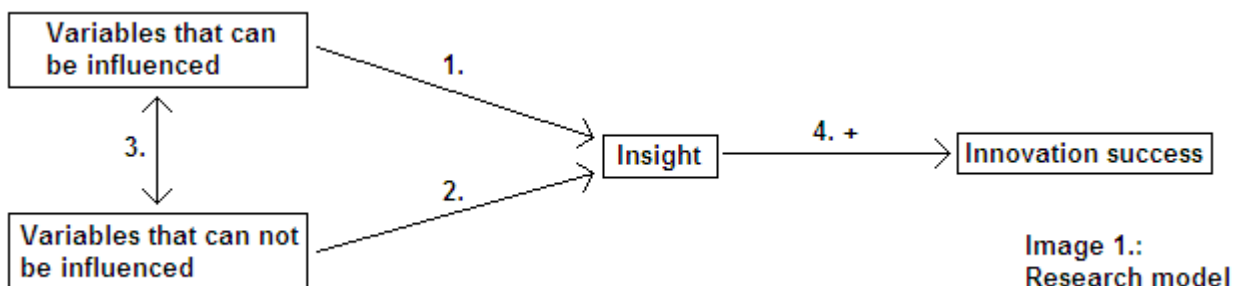
The model consists of four relations:

1. That of variables that can affect innovation success which can be influenced, and the presence of insights on those conditions.
2. That of variables that can influence the success of an innovation which can not be influenced by the innovating company, and the presence of insights on those factors.
3. That of the potential relation between the individual variables.
4. That of insights in the influence of variables and innovation success. As mentioned earlier, we expect a positive relation here.

Each relation within the model is researched through one of the sub questions.

1.3 Research structure

The research is structured in the following manner. Chapter one explains the setting of the research and the research problem. Chapter two focuses on the academic literature that we use in

order to set the variables of the research and operationalize them for the analysis. In chapter three the methodology of this research is explained. This includes the manner of analysis and the case study setup. The fourth chapter is where the cases are analyzed. This is followed by the conclusions and implications in chapter 5. The research structure as explained here is visualized in the figure below:
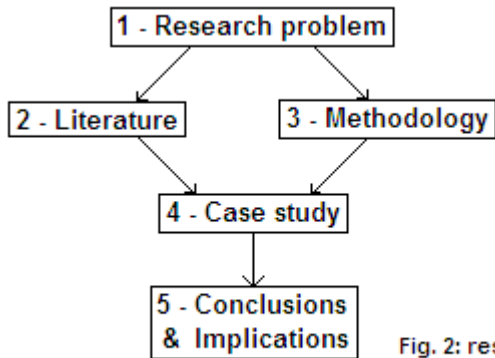
Fig. 2: research structure

1.4 Goals

The aim of the research will be to provide an understanding on the factors that are important for insight in market potential in relation to the successfulness of an innovation. These understandings will be an extension to scientific literature on technological innovations in existing markets. In particular this is relevant for those innovations in a B2B environment and within small and medium sized enterprises, to which the individual entities of the TKH Group can be addressed, as this is the scope of the research. Next to this, it is useful in practice; as the insights can be used as base for a list of factors on which insights have to be obtained in the development of an innovation. This will improve the successfulness of innovation development programs at the TKH Group, but is generally applicable to other companies who operate within the same scope as well.

2 Literature review

The main role of literature in this research is to set the variables that will be reviewed. In particular this means that we want to determine what variables can influence the success of an innovation, with the distinction of those that can be influenced by the company and those that can not be influenced.

Because of our focus on individual innovations, items like organizational culture are out of scope. This is because these are related to the success of innovation programs, rather than the success of one specific innovation. Those variables that a company uses to determine the fit of the innovation with the company's strategy are also out of scope. The market size for an innovation is important to a company, but not related to the success of an innovation in that market. For instance, when an innovation is such successful that it captures an entire market, this market can still be too small for the innovation to meet demands on market size. With also the research focus on innovations with new technology in an existing market in mind this sets a narrow scope for the literature study, with a strong focus on the variables that actually influence success for this kind of innovations.

We started this research with noticing that innovation literature is most often focused on either incremental or radical innovations and we are lacking knowledge on what is in between (Garcia & Calantone, 2002). According to Garcia & Calantone, many times the innovativeness of product development projects is not named at all and all are just labeled 'innovations'. In practice this means that research results on 'innovations' are difficult to compare even though they seem to have similar subjects. This is especially the case for the area of innovations with new technology in an existing market, which is 'in between' the focus areas as well.

Looking at the specific focus of our research, the measures that Garcia & Calantone use for defining innovativeness are two factors that can influence the success of an innovation. The newness of a market and newness of technology are not only determinants for innovativeness, but can obviously also influence the innovation success. The main question is what other variables can influence innovation success. In order to find these variables, we scan literature on innovation management with the specific focus as described above. The goal here is to get those variables that are the commonly named variables that are specific for an individual innovation and can influence innovation success. The method we use to determine the variables is further described in paragraph 3.1.

Following our literature study we select nine different studies that fit within the constraint that we formulate in our methodology in paragraph 3.1; that a study must name at least two relevant

variables and must be related to the research subject. These studies have –within the field of innovation management- differentiated subjects and therefore properly fill in our broad scope for literature. The articles all mention multiple potential influencing variables. In total eight variables keep coming up in these articles; all more than once. These are also the only variables that come up in research that are directly related to the innovation itself instead of variables that say something about the company capabilities or other subjects that are not directed at the innovation itself. The table below shows the variables and the articles from which they are derived.

Table 1: variables in literature

	Product advantage	Acceptance	Technological change	Market familiarity	Market newness	Regulation	Market structure	Competition
O'Conner (1998)	x							x
Atuahene-Gima (1996)			x	x	x		x	x
Cooper & Edgett (2008)	x					x	x	x
Cooper & Kleinschmidt (2000)	x	x		x			x	
De Brentani (2001)	x		x				x	x
Hill & Rothaermel (2003)		x	x	x	x			
Griffin & Page (1996)	x	x	x	x	x			
Huang et al. (2004)	x	x						
Deszca (1999)		x	x			x	x	x

As we can see in table 1, there is no consistency in the use of these variables, nor are all variables used in a single research, despite the extensive search within the boundaries set by the methodology. In fact, most researches focus on only one variable or not name any variables at all that are specifically related to an individual innovation. This makes that the nine researches that are named above stand out and confirms our initial reasoning that there is a gap in literature on this subject.

The following paragraphs of this chapter will look into the variables in more detail. There the distinction between variables that can be influenced by TKH and that can not be influenced is made as well. First we discuss the variables that potentially affect innovation success and can be influenced (2.1). Next, the focus is on the variables that potentially affect innovation success and can not be influenced (2.2). For each variable we explain our reasoning for determining whether they can be influenced or not. After this, all variables of the research are known, including the already mentioned variables of insight and innovation success. After determining the variables and their distribution into the two categories we give the full research model and explain once more how this functions in the research (2.3).

2.1 Variables that can be influenced

This paragraph deals with variables that affect the potential of an innovation and can be influenced by the company. Here we explain why four of the variables fit within this 'group' and will describe the variables in detail.

Product advantage

The first variable that is often named in innovation management literature as important to the success of an innovation is product advantage. Many studies within this field describe this as one of the main performance drivers (for instance Cooper & Kleinschmidt, 2007; De Brentani, 2001; Griffin & Page, 1996 and Zirger & Maidique, 1990), as well as within the field of industrial marketing (for instance: Sharma et al., 2008). The line of reasoning in these studies is clear: an innovation that offers a better performance than existing alternatives shall easier be chosen instead of these alternatives. This is a variable that can obviously be influenced by the company as they create the innovation and thus determine its characteristics.

Acceptation

A second variable that is often named in literature is acceptation. Acceptation is the extent to which it is possible to get the innovation accepted by the market as an alternative to existing products or solutions. For innovations where technological novelty is involved acceptation is crucial, according to Hill & Rothaemel (2003) and Griffin & Page (1996). Grimpe & Slofka (2009) and Huang et al. (2004) specifically claim that obtaining revenue is strongly dependent on market acceptance. The reason why acceptance is important is that when an innovation is not accepted as an alternative for existing solutions or products, it will simply not be used. In our view acceptation can be influenced by the way the innovation is marketed and by making the characteristics such that it fits with market preferences. An example of this is the strong focus on product quality from Japanese car manufacturers to overcome nationalistic feeling with better price/quality levels compared to American car manufacturers. The low level of acceptance as a result of being foreign and unknown was improved by superior quality.

Technological change

The next variable is technical newness. We define this as the degree of technological change compared to existing technology. As Descza (1999) argues, insight on the technological state and novelty is needed to determine success. There is no certainty on how the level of change influences success. Howell & Higgins (1990) suggest that a greater level of change can lead to resistance to the innovation, but such innovations can also provide a breakthrough (Sood & Tellis, 2005). Technological newness can be influenced by the company as the company determines the characteristics and the technology of the innovation. As the company decides on the technology that it uses it is imperative that it also influences this variable.

Market familiarity

The fourth and final variable that can be influenced is the familiarity of the market to the company. We assume that this variable can be influenced as familiarity can be obtained by the company by either building up knowledge and a network or purchasing this knowledge. This makes it possible to for a company to influence the variable. While mentioned by various researches within the field of innovation management, market familiarity in particular was the subject of a research of Souder & Song (1998). In this research they concluded that this was an important variable in relation to the success of an innovation and that companies should improve their familiarity if the level of familiarity is too low. Therefore they propose that gathering information on this variable is important as well.

2.2   *Variables that can not be influenced*

The second type of variables that are determined are those that potentially influence the success of an innovation and can not be influenced by a company. The variables in this paragraph can influence the success of the innovation, but are beyond the sphere of influence of the company. These form the conditions in which the innovation is launched. The remainder of the eight influencing variables fills in this type of variable.

Market newness

The first variable is that of newness of the market. This research is focused on existing markets, but when looking at all existing markets there is obviously a difference in degree of newness between these existing markets. Like Garcia & Calantone (2002), we take the perspective of newness from the market's point of view. This variable is often named in literature also in different manners. Tidd et al. (2005) name it market novelty, Malerba et al. (2007) refers to the life cycle theories and Shapiro (2006) uses the label of market newness. Despite using different names, the content to which the authors refer is the same. It all comes down to whether a market is young and shows a lot of growth or that it is more settled. This variable is commonly regarded as a factor that is related to the stimulus of technology to that market (Rehfeld et al., 2007). In a young market the technology has a bigger stimulus than in a market that is in a later stage (Pavitt, 1984). This would mean that it should be relatively easier to launch an innovation in a market that is in an early stage, with strong market growth and development, of its life cycle then in a later stage, in a firmly established market. The newness of the market for an innovation in a certain existing market follows from the entire market environment and we therefore consider this something that can not be influenced by one single company.

Regulation

A completely different aspect is that of regulation. Research of Chang et al. (2003) indicates that for the telecom industry regulation are influential on innovation success. Recent research by Walz et al. (2008) shows that also within renewable energies regulation has influence on the diffusion of innovations. This can be the case for other innovations with new technology in an existing market as well. In our view especially the scope of regulation has impact on innovation success. A broader scope offers more opportunities than a narrow scope. Regulation for an entire market is not created by just one company and therefore can not be influenced by the company.

Market structure

The third variable that can not be influenced is the structure of the market. The market structure is made up from the structure and relations between companies in a value chain. This subject was brought to attention by a well-known research of Garud & Karnøe (2003). They showed that the market structure in a certain market can be used by companies to increase the performance of their innovations. Hashmi & Van Biesebroeck (2007) found a relation between the number of innovations and market structure as well. This indicates that market structure can be more or less favorable and this can influence innovation success as well. Like newness of the market, the structure is given for an existing market and thus can not be influenced.

Competition

The final variable is that of competition. This variable is applicable for almost any kind of innovation. Therefore it is named as an important variable to have information on by many authors (for instance: Cooper, 2008; Urban et al., 1996; Aschhoff, 2008), as well as in multiple settings. The reasoning is roughly the same for all authors: stiff competition can lead to resistance for the innovation and thus could cause problems. This variable can not be influenced as within an existing market a company can not influence other, competing, companies.

2.3 Conclusions

In the previous paragraphs we have set the eight variables that will be analyzed in the following parts of this research. Our analysis of innovation management literature confirms our initial thoughts about a lack of knowledge on what specific variables insights are essential for innovations with new technology in an existing market.

For variables that potentially affect the success of an innovation and can be influenced we have determined product advantage, acceptation, technological change and market familiarity. For all these variables the definitions are set and a scale is made in the following chapter.

The variables that can not be influenced are market newness, the influence of regulation, the influence of market structure and competition. For these variables also scales are made in the following chapter.

Finally, based on the literature findings on the variables the research model including the variables is updated and shown below:
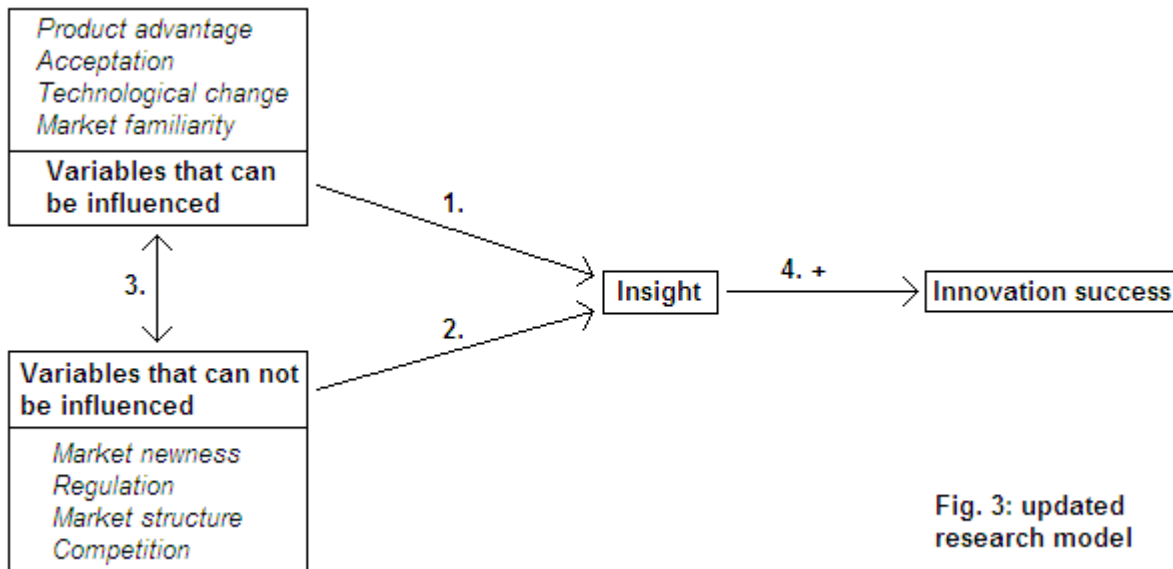

Fig. 3: updated research model

This model shows the relations for all variables that are in this research. For each variable, the operationalization is given in the next chapter.

The first relation that is tested is that of the score on the variables that can be influenced, namely product advantage, acceptation, technological change and market familiarity, and the level of insight on that variable. For instance this means testing the relation between the level of product advantage and the level of insight on product advantage for an innovation. From innovation management literature there is no information on whether there is a relation between this, let alone whether this is positive or negative. The second relation to be tested is the one between the scores on the variables that can not be influenced, namely market newness, regulation, market structure and competition, and the level of insight on these variables. Like with the variables that can be influenced by the company; no information about such a relation is found in innovation management literature.

The third variable that is tested is whether the eight variables that we determined have intermitting relations. Finally, the fourth relation is where everything comes together. The insights on individual variables are constructed to insight on market potential for the innovation as a whole. Then the relation between insight in market potential and innovation success is researched. As we said, we expect this relation to be positive. We don't just determine this relation, but take it a step further as we look at where the differences between cases come from and what drives the relation between insight and innovation success. How we do this is explained in the next chapter.

3 Research approach & goals

In this chapter the approach to this study will be elaborated (3.1), the case study (3.2), case selection (3.3), case protocol, operationalization (3.5) and the method of analysis (3.6).

3.1 Approach

The setting is such that there is information on a number of older innovation projects and that a present case is available. This makes a case study the best approach to this research. The cases give the opportunity to establish whether the gathering of certain information was related to success and also whether variables are influencing each other in practice. A case study is well suited to get the depth required in this setting. In the case study, the past cases are used to perform the analysis and the present case for reflection on the results. The reason for this is that for the present case no proper analysis can be done in relation to success of the innovation, as it is not launched yet. However, it does offer a understanding that can be used for reflection on the outcomes of the analysis on the past cases.

3.2 Case study

Quality within the case study is essential, as for case study based researches the execution of the case study approach determines the quality of the research. Therefore the four criteria for the quality of research (as described by Yin, 2003) are used as a guideline to ensure the quality of this study. For this case study this means:

- Construct validity: construct validity follows from the way the data is collected. Yin (2003) identities 2 steps that will lead to increased construct validity. First the selection of the specific types of changes to be studied and second to demonstrate that the selected measures of changes reflected the specific types of change that have been selected. To achieve this, we have systematically set up both the selection of variables and the operationalization of these variables.

We do this by searching using the keywords "innovation management" in combination with "market potential" and "market orientation". We intentionally use keywords that have a broad scope. This has two reasons. The first is the lack of focus on this specific type of innovation in innovation management literature. The second is that the variables that make up the knowledge on innovation potential are not a specified research topic, but are rather part of a broader scope of either determining market potential or market orientation. In other words; the variables that we are looking for are in order researches mostly constructs that make up another variable. This is also why there is not a research that we can use as a base for the formation of the variables for this research. By looking for variables with the focus that we determined in the second paragraph of this chapter we are able to distract those variables that can influence the success of an individual

innovation. For this we look at the articles that come up with these keywords as well as the articles that refer to these articles and the articles to which are referred. We will identify the variables that come up most often in studies that use more than one of such variable and use these for our research. The reason for only including researches that use more than one of such variable is that this prevents from having 'accidental hits' but rather deriving variables from articles that have a focus at least somewhat similar to this research. In our view this strengthens the focus of our literature search.

The operationalization is done in such a manner that all variables have the same scale and are thus comparable. Their influence and relations will be researched in the case study.

● Internal validity: the extent to which the research 'proves' event x leads to event y without the interference of a third variable z, this follows from the data analysis. The way to assure internal validity for case studies is by using an analytic tactic. This research uses pattern matching, as the cases offer a good opportunity to use pattern matching for rival explanations, given the differences between the cases (which will be discussed later on). More information on the manner of analysis is given in paragraph 3.6.

● External validity: the extent to which the results are generalizable beyond the study itself. For this case study, the variance in the cases and the link to related theories give ground for at least some generalizability. This is limited to the scope of the cases. The cases are all innovations based on new technologies in an existing market and in a B2B environment.

● Reliability: the extent to which the findings and conclusions will be the same when another researcher will follow the same procedures and perform the same case study again. We use a case study protocol with procedures for case selection, data collection, reporting and formulation of questions (3.4). Furthermore the data collection is done through the use of various sources (where possible), by interviewing at least two people per case and use of documents, emails and observations as other sources.

3.3 Cases

The selection of the cases is explained in this chapter. First the reasoning for the selection of the cases is given and then the cases themselves are named and elaborated.

3.3.1 Selection reasoning

As Yin (2003) argues, multiple case studies are based on replication logic, rather than sampling logic. The choice for the cases can be made to represent either similar results (literal replication) or contrasting result for which the reasons can be identified (theoretical replication). To achieve

theoretical replication, the cases must have the same characteristics but different outcomes, which therefore have to be caused by a difference on a certain variable. This study is focused on finding out how assessment of market potential influences the successfulness of innovations within the TKH Group and therefore looks for theoretical replication. As these innovations are all within a B2B environment and almost every innovation concerns a new technology in an existing market, this will be the base for replication.

The characteristics that have to be different and similar are already partly mentioned. The same characteristics are the B2B environment and the new technologies for the existing markets. The differences are expected to be in the various characteristics of both the innovation and the success factors that will be assessed for the innovations. For all variables that are named in the theoretical chapter, we expect differences as well between the cases, which make analysis possible. Next to these, the successfulness of the innovations will be one of the characteristics which certainly will be different.

Four cases will be examined, with two cases showing somewhat positive outcomes and two showing negative outcomes. Next to this there is a reference case for which the successfulness is not known yet as this innovation is currently in development. The CEDD case is used for as anecdotic, supportive evidence. It will not be used in the pattern matching. The number of cases is sufficient for pattern matching in a multiple case study according to Yin (2003) and Eisenhardt (1989).

3.3.2 The cases

In this part, the selected cases are presented and briefly elaborated.

3.3.2.1   EasyPower case

The first case is that of EasyPower. It is considered a failure, as major investments were made in both the product as well as in the in the organisation, with a solid amount of sales in mind, while not a single product has ever been sold. It has been developed together by TKF and Lovink Enertech, a manufacturer of electric sockets. EasyPower was a box that consisted of all the materials that an installer needs for installing a house to the electrical network, including cable and electric sucket. Usually, these materials are all carried separately by the installer. To combine the material and sucket was a technological novelty, as well as the aluminium used in the cables. Therefore this also was new technology aimed at the existing electric installation market.

3.3.2.2   KISS case

The second selected case is that of KISS. KISS is an innovation that has been developed by Hager, in which TKF has supplied the cables, which made up a substantial part of the product. The product was an all-in-one solution for home-installation cable. From a main station (usually located in the meter box), an all-in-one cable must be laid in the floor to substations in each room of the house, after which the individual cables can be distributed from this substations through the plinths in the room, giving the end-user flexibility in placement of various connections. In a conventional situation, all these cables are placed individually in the walls of the house and not to each room. The system included any type of cable used in houses, including fiberoptic-cable and cable for domotica, so it was ready for future developments.

3.3.2.3   DAC-cable case

The third case is that of the DAC-cable. The DAC-cable has been developed by TKF as an alternative to existing fiberoptic cables for the connection of houses to a fiberoptic main cable. The existing technology was to place the cables and then blow the fibers into the cable. The DAC-cable already had the fibers inside, so it could be installed directly and thus making the installation easier. As the technology was new and an alternative for the existing technology, it is implied that this is new technology for an existing market.

3.3.2.4   BB-Lightpipe case

The fourth case is that of the BB-lightpipe. This product consists of modular tubes in which light sources are utilized efficiently through reflection. Therefore, the product is an alternative to a fluorescent lamp for applications in large spaces. As this is an alternative with a different and new technique compared to an existing product with an established market, this product also represents a new technology in an existing market.

3.3.2.5   CEDD case

The CEDD case consists of two parallel market potential assessment tracks that are done to determine potential for two possible applications for the CEDD technology. To get a better understanding of why there are two possible applications, we first explain what the technology consists of. CEDD is a newly developed technology at USE Technology, with help of other TKH companies, such as TKF and Eldra, both cable manufacturers. The acronym CEDD stands for Contactless Energy and Data Distribution. Normally, USE develops solutions to customer demand, but for CEDD the story was the other way around. When USE was working on dynamic roadmapping devices, they found out that conventional galvanic connections were problematic when used in tarmac. This was due to the extreme behavior of asphalt under temperature and pressure changes. To cope with this, Hans van der Kuil, owner and director of USE, was thinking about solutions to this problem. His solution was to use a technology with data and energy transfer

through magnetic fields. While other technologies need conventional galvanic connections to achieve energy and data distribution, this technology does not need it. This makes it suitable for applications where safety and reliability is needed and for harsh conditions. Conventional galvanic connections for instance often need special expensive casings to cope with these. From a technological point of view, it is application based and fairly straightforward, so it can be adapted to various applications.

Given the characteristics and the expected advantages, the technology of CEDD can be used in various applications. At the starting point of the research, the technique was at a stage where there was already proof of concept and the question got stronger on the possible applications and target markets where this technology could be exploited. While the idea has originated during work on dynamic roadmapping, this market was unattractive, as Rijkswaterstaat has stalled the roll-out of such systems for an indefinite period, while there could be applications with far greater potential. As said at the start of the paragraph, the case study focuses on two parallel market assessment tracks for possible applications of CEDD, namely emergency guidance systems in tunnels and airfield lighting. Emergency guidance systems consist of lights that are located on the wall or step-up barriers in a tunnel and are used in case of emergency to guide people towards emergency exit doors. Such systems are obligatory under European regulations. Airfield lighting is powered by a medium voltage cabling system, with a transformer for each light. With the increased use of LED-lighting, CEDD could be interesting here. Both these possible applications are researched on their possibilities for success and the experiences are used as a reference case.

3.4 Case protocol

The case protocol is discussed here. The protocol consists of a project overview, field procedures, questions and the report outline.

Project overview

The cases that will be analyzed for this case study are retrospective. The aim for this case study is to get insights on the relation various variables influencing the market potential for innovations and insights on these variables, as well as the relation between insight in market potential and success of an innovation. A more detailed description on the selection of the cases is given in paragraph 3.3.1 and a more detailed case description is given in paragraph 3.3.2.

Field procedures

The data is collected through interviews with people who were involved with the projects and by using information from relevant documents and emails. These documents and emails will be provided by the interviewed persons.

Interviews are conducted with:

Case	Easypower	KISS	DAC	BB-Lightpipe
Interviewed	Harold Wiggers	Jeroen van Velzen	Jos Boddaert	Chiel Dekker
	Dirk Heuker of Hoek	Adrie van Schie	Jan van Kemenade	

These interviews are conducted in a semi-structured manner. This manner is chosen because it offers the possibility to go in-depth where needed, but also for getting the answers to a number of questions that are formulated up front. Therefore it is the best suited way to get the information that is required.

The documents and emails will be searched through for information that says something about the process of getting insight in the market potential. If for a variable there is no information available in the case material, the score is constructed based on the market situation as it was during the development of the innovation. For instance for regulation, this means that the applicable regulation of the time of development is analysed to determine its scope.

Questions

The questions are focused on finding out how the process of getting insight in the potential of the innovation was performed and whether the innovation is successful. As we will explain in more detail in the following paragraph, success is defined as the extent to which sales of an innovation exceed investments. To achieve this, relative broad questions were used to get the relevant information to answer all the research questions. On these broad questions additional questions are added during the conversation, in order to cover all research variables. This approach is used in order to get not only those answers that cover the research variables, but to build a deeper understanding of how the innovation was developed. The questions that are asked are therefore aimed at finding out on:

- what the innovation was about.
- what its origins were.
- what was the newness for the innovation.
- how research was done on the attractiveness of the market.
- how research was done on the attractiveness to the market
- to what criteria these were evaluated.
- the extent to which that research was successful.
- whether the innovation as a whole was successful.

These questions will lead to a lot of information, within which we will structurally filter out that information that is relevant for the research variables. We do this by determining for each variable what information is coming from both the interviews and the extensively available documentation. The guideline for determining what information fits with which variable follows directly from the operationalization of the variables. Since the operationalization gives the measures to determine the scores of the variables, the information has to fit with these measures. With this structure we distribute the information that we receive from the broad questions into pieces of information that fit to the variables in our research questions. The operationalization of the variables is given in paragraph 3.5.

Report outline

The first part of the case analysis is presenting all case findings per case per variable as described above. After this, the sub questions are sequentially answered through the pattern matching based on the case findings. Upon this analysis conclusions are drawn.

3.5   Operationalization

After determining all variables in the previous chapter, we now have to operationalize the variables. For each variable we first set the definition and then specify the values that the variables can have. For each variable we define three values. This is a significant contribution to the comparability of the variables and therefore important to the reliability of the analysis. Many of the variables are rather abstract and qualitative in nature and therefore clear boundaries between categories are difficult to define. However, we define the categories in such a manner that there is a clear distinction between them and with a clear explanation when rating the cases for each variable, we are more than able to overcome this obstacle.

Innovation success

Innovation success is defined as the extent to which the sales of an innovation are exceeding the investments in its development. This follows from research of Griffin & Page (1996), who identify return on investment (ROI) as a major measure of innovation success for innovations which require investments in new product development. Its values are unsuccessful, moderate and success. Unsuccessful means the innovation has by far not exceeded its investments. The ROI is negative. When the score is moderate, the innovation is not far from meeting its investments or has the potential to do so in the foreseeable future. This means ROI is around 0 and has the potential to become positive. An innovation is a success when sales have met or exceeded investments; the ROI is positive. We measure this by comparing sales to investments.

Insight

The definition of insight is the knowledge that is obtained on a certain variable or on the market potential of an innovation as a whole. This knowledge follows either from the use of experience (Solberg, 2002) or market orientation activities that build up the knowledge (Slater & Narver, 1998). We base our measure on these two sources of knowledge. The level of insights the companies had can either be little, moderate or high. When there is little insight, there is no use of knowledge from experience and there are no activities to build up knowledge. Insight is moderate when there are some insights following from either limited use of experiences or limited activities to build up knowledge, leading to insights which are not in detail and/or of an unknown reliability. A high level of insights means there are detailed and reliable insights following from either extensive use of experience or extensive activities for the building up of knowledge.

Product advantage

Product advantage is the first of the research variables. This is defined as the advantage of the innovation to fulfil its application compared to existing alternatives. We follow the findings of Cooper & Kleinschmidt (2000) who conclude that the main driver for construct variable for product advantage is superior product performance (compared to alternatives). Based on this we measure product advantage by comparing the performance of the innovation to existing alternatives. The values are less, similar and better. Less means there is no advantage in practice compared to existing alternatives. Alternatives then offer better value for money, performance or quality. Similar means some advantages compared to existing alternatives, having no significant impact. A significant advantage means major advantages when using the innovation compared to existing alternatives which have a significant impact on product performance. These innovations outperform existing alternatives.

Acceptation

We define acceptation as the extent to which it is possible to get the innovation accepted by the market as an alternative for existing alternatives. According to Angelmar (1990) acceptation is higher for products that are compatible with customer behaviour and values. We base our operationalization on his findings. Acceptation can be difficult, possible or easy. It is difficult when there is little fit with the customers' current behaviour and values (for instance major changes in infrastructure are required). Acceptation is possible when there is fit with either customers' values or behaviour, but not with both. Finally it is easy when there is a fit between the customers current behaviour and values and the product characteristics.

Technological change

For technological change we follow the theory of Sood & Tellis (2005). For technological change Sood & Tellis have defined a scale in which they define three types of changes: platform, component

and design. A platform change (e.g. LP to CD also meant change from magnetic to laser technology) has the highest degree of newness as it radically changes an entire industry. Such innovations often completely change or create an entirely new market as well. A component change uses new parts or materials within the same technological platform (e.g. diesel instead of steam-powered locomotives) and a design change as a reconfiguration of layout or linkages of components within a technological platform (e.g. floppy disks decreasing from 14 to 8 to 5.25 to 3.5 to 2.5 inch over a number of years).

Market familiarity

Market familiarity is the final variable that can be influenced. We use the company's perspective and define it as the extent to which the company is familiar to the market of the innovation. A similar variable is used by Garcia & Calantone (2003) to determine 'market newness to the company'. As market newness is the exact opposite of market familiarity, we can use the same determinants as their research. We define three levels: a new market, a side market and a main market. A new market means no contacts, position or knowledge in or of the market. A side market means some contacts, a minor position and/or knowledge of the market. The company has marginal influence. A main market means multiple contacts, major position and plenty of knowledge on the market. Such a market is related to the key business of the company and the company can be influential in the market.

Market newness

The market newness has many definitions in literature. As mentioned in paragraph 2.2, we use the market's point of view as our perspective for newness. For the operationalization we define it as the stage in the market life cycle. This definition is helpful for defining different levels of newness for the innovation. The stages that we define are early, middle and late, based on growth (Li & Chen, 2009) and developments (Maksimovic & Phillips, 2008). A late stage means little growth (<5%) and a strongly settled market. A middle stage means a relative settled market in which there are some development and moderate growth (5-15%). An early stage means a young market, not settled and significant growth (>15%).

Regulation

The definition of the influence of regulation is as follows: the extent to which regulation restricts the broadness of possibilities for solutions to a question. Following Cook et al. (1983) we use the scope of the regulation as the measure for its influence. Their reasoning is that the scope of regulation has a significant influence on the possibilities for organizations to response to circumstances. The same also applies for the possibilities to develop specific solutions for certain problems. We have three levels for this scope which are narrow, middle and broad. For a narrow scope regulation defines in detail how a product should be (bits-and-pieces level). Middle means

regulation defines how a product should function (functional level) and broad means no defining regulation.

Market structure

The next variable is the influence of the market structure. This is defined as the extent to which the structure of a market is favourable for the innovation. This topic is researched by Wonglimpiyarat (2005). From this research follow two measures which we will use to measure the influence of market structure, namely the ease of product distribution and the existence of competing revenue streams. There are three levels for the influence of market structure, namely unfavourable, no influence and favourable. Unfavourable: the structure is restrictive towards the innovation because intensive involvement of the industry is required for distribution of the product *and* there is an existing competing revenue stream. No influence: the structure has no significant influence. We determine this is the case when there is either intensive involvement required *or* there is a competing revenue stream. Favourable: the structure has a positive influence. There is neither intensive involvement of the industry required nor an existing competing revenue stream.

Competition

Finally, we define competition as the level of competition in the market of the innovation. We base the measure on Caves & Porters' (1977) reasoning that the number of competing firms in a market is predictive for the level of competition. Again we have three scores; these are fierce, medium and little. The number of competitors for each category is derived from Hultink et al. (1999), as they claim that within the B2B environment –in which this study is situated as well- the market is more concentrated and there are less competitive parties involved. Therefore fierce means there is heavy competition with three or more competitors in the market. This influences characteristics like pricing, marketing, developments, etc.. Medium means one or two competitors. There is competition, but this does not directly influence price levels, etc. Little means that there is no serious competition, for instance because the innovation offers unique possibilities or applications that no alternative can offer.

3.6   Analysis

The analysis is made through the use of pattern matching. Pattern matching means that differences between the cases are determined and the patterns in differences are then analysed. We will now explain per research question how the relation is analysed.

The analysis of the relations in research questions 1a and 1b are done in the same manner.
1. *What is the relation between degree of insight and influence on innovation success by individual variables?*
    a. *For factors that can be influenced by the innovating company.*

b. For factors that can not be influenced.

From four past cases the values for the variables are determined and it is determined whether insights were obtained for these variables. Where the available information does not clearly give a score on a variable or the level of insight the researcher determines the score by logic reasoning. There are two reasons that justify this: first is that extensive information is available and if both this information and the interviews do not provide sufficient information, it has to be determined in another way. Second is that the way the research is set up provides the researcher with a lot of knowledge on how the innovations were developed. This increases both the reliability and usability of logic reasoning.

For each variable then a graphic is made in which one axle represents the score on the variable and the other axle the degree of insight on this variable for each case. An example of how this graphic will look like is given below. In this example, case 1 has a score of 'high' on the variable and the company has a high level of insight on the variable as well:
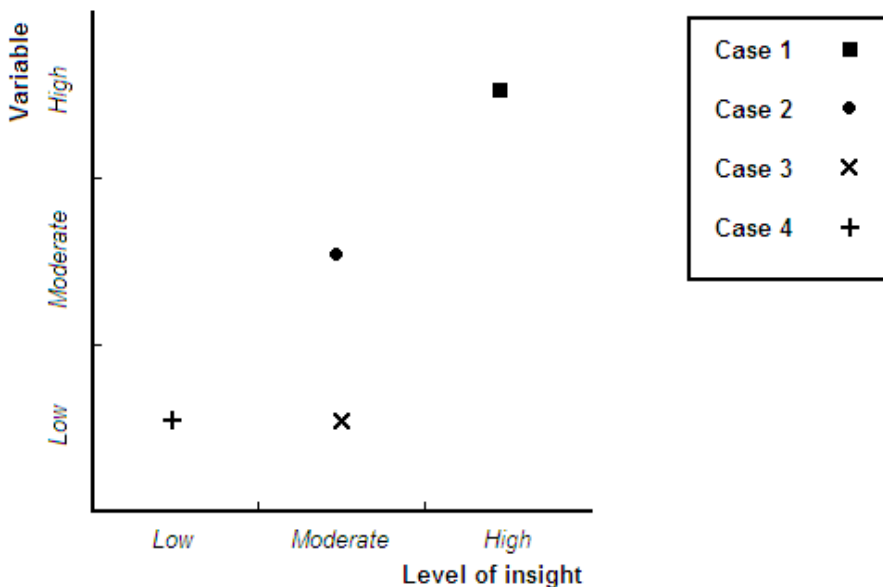

Fig. 4: example of graphic

The pattern that follows from this is analysed by reasoning how and why the pattern has emerged. This is then reflected through the experiences with the present case.

The analysis of the relation in the second research question is done by determining per case whether each variable is related or even influences another variable.

2. What is the relation between the individual variables on which insights are obtained?

We determine the relation between variables by comparing the outcomes for each of the variables for the first two research questions. Because of the limited number of cases, we do not make use of multivariate analysis, which requires more cases (Green, 1991). Instead, we compare case findings per variable and try to determine clusters through reasoning. The results are given in a table, in which a relation is shown by colour (more colour for stronger relation) and + and/or – signs

for positive and negative influence, indicated in bold if the influence is shown in two or more cases. Again, these relations are reflected by the experiences with the present case. An example of the table is given below:
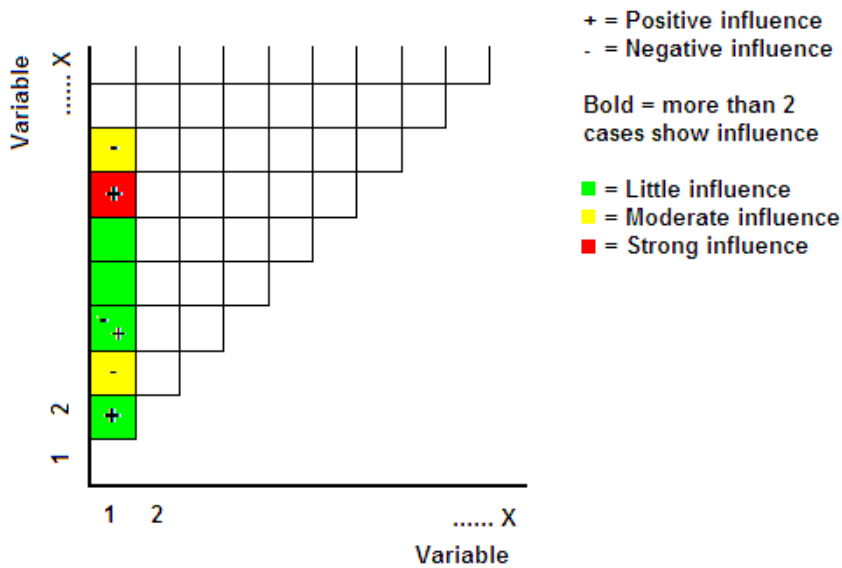

Fig. 5: example influencing variables

3. To what extent are insights in market potential related to innovation success?

For the fourth research question, the level of insight for each of the four cases is determined by making an average of the level of insight for all variables as determined for the analysis of the first two relations. Low insight is equal to 1, moderate equal to 2 and a high level of insight is equal to 3. As insight is measured by a scale with three values, the sum of outcomes for each variable can be divided by the number of variables to give the average level of insight.

The level of successfulness of the innovations is also to be determined. Then these two are used to set up a graphic in which, for each case, the relation between level of insights and successfulness is shown. This graphic is similar to that of the first and second research question. This relation is then deeper analyzed by looking at where the differences are that cause different outcomes between the cases. For this deeper analysis, the results of the previous questions are used. This couples the insights on individual variables to the success of an innovation. After this, the outcomes of the deeper analysis are reflected by the present case.

4 Analysis

This chapter gives the analysis of the case study and thus leads to the answers to the research questions. First we give the case study findings. Then we analyze these findings following the sequence of the research questions. For each research question, we follow the same structure: first the results are given, then the pattern is analyzed, then the results of the pattern analysis are reflected through the present case and finally conclusions are given. For research questions 1a and 1b, this sequence is done for each variable individually.

4.1   Case findings

In this paragraph the case findings are given. The findings are presented for each case and then divided per variable. Except for the level of success –as it is not applicable for this variable- for each variable the level of insight is given as well. For each variable the results are summed up in a table afterwards.

4.1.1 EasyPower case

Success

Easypower has never led to sales (interview Dirk Heuker of Hoek) and is therefore unsuccessful as its ROI is below 0.

Product advantage

Insight

Nothing was done to verify anything related to product advantage, despite TKF being active in the market already (interview Dirk Heuker of Hoek). The meeting minutes of the development show that while there were originally plans to assess product advantage through market research, this never actually happened. As no existing knowledge was used and nu knowledge was build up as well, the insight was low.

Score

Easypower did not prove to have any advantage over existing alternatives. In practice it led to problems instead of solving them. An example of this are the fixed lengths provided, which was thought to be useful, but only caused problems as in practice fixed lengths were far from practical (interview Dirk Heuker of Hoek). As a result of this, existing alternatives were of greater practical use and thus the advantage is none.

Acceptation

Insight

"No efforts were made to get knowledge on the customers' reception of the innovation" (interview Dirk Heuker of Hoek). In all documents on EasyPower there is not any reference to acceptation at all as well. In contrary, the meeting minutes throughout the entire development show a strong sense of "just do it" rather than asking any questions. With no use of existing market knowledge and no activities of building up knowledge insight was low.

Score

"To get the product to the customer was not that much of a problem for Easypower, as a number of close relations would be willing to try out new ideas" (interview Harold Wiggers). This shows that customers are willing to corporate but are not encouraging new ideas. Because of the willingness to cooperate with their customers to try out a new idea the innovation fits within the customers' values. However, the innovation did not fit within practical behavior and thus acceptance is possible.

Technological change

Insight

In the interviews no mentioning was made of any activities or use of knowledge concerning knowledge on technological change. The development meeting minutes do not mention anything as well. Based on this we conclude that there was no use of knowledge nor building up of knowledge on technological change. Therefore insight was low.

Score

For Easypower aluminum was used instead of copper for the wires and both wire and cables were delivered as one package. This is a change that is a reconfiguration of linkages within the existing platform and therefore a design change.

Market familiarity

Insight

The emails and meeting minutes for Easypower show that the company was well aware of its market familiarity. This is confirmed by references in both the interviews to partners in the market for possible pilots.

Score

TKF was an established party in terms of cable delivery to this market. In fact, the energy distribution companies are major customers and this is one of their main markets. Therefore market familiarity is high.

Market newness

Insight

With the market being one in which TKF was already active for a long time, they had plenty of knowledge and therefore insight was high.

Score

Easypower was intended to be used for connecting new houses to the electricity grid and thus market growth was directly related to the number of newly build houses. CBS figures show that the growth in the number of newly build houses was below 5% growth and therefore the score for market newness is a late stage.

Regulation

Insight

The company had knowledge of the applicable regulation. This can be deducted from the development of the innovation to fit regulations for the product.

Score

For the connection of houses to the electrical grid, the functional demands were prescribed in the Dutch electro technical regulations. The demands are on a functional level.

Market structure

Insight

There was no notion of influence of the market structure in any of the documents or emails for the development. In addition to this, no knowledge was build up by talking to customers to get insight in the impact of the innovation on working methods (interview Dirk Heuker of Hoek). We therefore conclude insight was low.

Score

To use Easypower the customers had to adapt their working methods (interview Dirk Heuker of Hoek). This means involvement of the industry was required for the distribution of Easypower in the market. Meanwhile there was not a competing revenue stream, as the innovation was an intended to be used within the same revenue stream as TKF was already serving (interview Harold Wiggers). As industry involvement was required, but there was no competing revenue stream. Therefore the influence of the market structure is rated as none.

Competition

Insight

Competition was not included in any analysis for the potential of Easypower. None of the documents, meeting minutes and emails for the innovation mentions something about competition, nor is it mentioned in the interviews.

Score

For Easypower there was one major competitor in the market, being TKF's main competitor Draka. There are other companies operating in the market as well, but these don't even get close to the market power that both Draka and TKF have and therefore don't have a lot of impact (interview Dirk Heuker of Hoek). With one major competitor, the level of competition is medium.

Findings overview

Table 2: case findings EasyPower

Variable	Level of insight	Score
Success		No
Product advantage	Low	None
Acceptation	Low	Possible
Technological change	Low	Design
Market familiarity	High	Main market
Market newness	High	Late stage
Regulation	High	Middle
Market structure	Low	No influence
Competition	Low	Medium

4.1.2 KISS case

Success

KISS was a multi-million investment. Significant efforts were made to promote the product, such as TV-advertising and 6 people fulltime working on sales. However, it was never able to get a major share in the Dutch home installation market and to achieve the accompanying revenues, in fact being a major disappointment (interview Adrie van Schie). As a result of this the ROI is negative and KISS is thus unsuccessful.

Product advantage

Insight

"The advantage of KISS was assumed by Hager but was not validated in any way" (interview Adrie van Schie). Within the extensive documentation available on KISS, there is not any evidence that shows that knowledge was obtained on this variable, which confirms this. Therefore, insight on product advantage was low.

Score

KISS was more flexible than existing alternatives, but was also more expensive (interview Jeroen van Velzen) and its cosmetics were not appreciated by a lot of customers (interview Adrie van Schie). Because its flexibility was an advantage but it also had downsides, KISS has a similar performance compared to existing alternatives.

Acceptation

Insight

For KISS expectations on market shares were drawn which indicated a dramatic switch from the entire market to KISS in only a small number of years (email 24th of January 2003). In another email (2nd of July 2002) it is explicitly mentioned that Hager expected an enthusiastic reaction from the market. However, no actions were taken to validate any of this (interview Adrie van Schie). Based on this in combination with no mentioning at all of actions to validate acceptation or anything related in the available documents we conclude hardly any knowledge was build up or no use was made of experience in the market. Insight therefore was low.

Score

KISS was a "closed system" and locked competing companies out, as well as leading to resistance from installation companies which were in fear of losing man-hours (interview Adrie van Schie). The closed system was contradictory to the values of the market, which wanted to be able to make their own choice and the fear of losing man-hours showed that it was going against customer behavior as well. Therefore acceptance is scored low.

Technological change

Insight

For KISS the market share projections were based on the market switching from one method to another. This implies knowledge of a change and thus insight is high.

Score

KISS was significantly different to existing alternatives. Its flexible and holistic approach is quite different compared to commonly used materials like wires. This means a significant change in configuration.

Market familiarity

Insight

KISS was developed by Hager, which already had a 30% market share in this market (in 2002, email 24th of January 2003). This indicates that there was a good knowledge on the market familiarity.

Score

The 30% market share in the market shows the importance of the market to Hager. They had a main position with plenty of contacts. Therefore this is a main market.

Market newness

Insight

Following their intense market involvement, Hager had good knowledge of the market and its growth (email 6th of June 2003). This means insight was high.

Score

The market of KISS was initially mainly consisting of newly build houses. CBS figures show that there was little growth (< 5%) and therefore the score for market newness was a late stage.

Regulation

Insight

The insight for KISS in applicable regulation was high. We deduct this from innovation being developed to fit the regulations for the product.

Score

KISS was developed to fit the regulation for domestic electrical installations. For the combination of cables and sockets these regulations define on a bits-and-pieces level how a product should be like. For example for the cables used this is up to the level of what specific compounds should be used. This means the scope of regulations was narrow.

Market structure

Insight

No use was made of market experiences to determine the influence of market structures (interview Adrie van Schie). There was no notion of this in any of the documents or emails for the development. This can be illustrated as they faced significant opposition due to the market structure, but had not seen this coming at all (interview Adrie van Schie).

Score

The structure of the market proved a significant barrier for KISS, as the involvement of installation companies was vital for product distribution and these companies saw KISS as a potential threat (interview Adrie van Schie). Next to this, the competition actively opposed KISS, creating competing value stream (interview Harold Wiggers). As there was both intensive involvement of the industry required and there was an competing value stream, the influence of the market structure is negative.

Competition

Insight

Competition was not included in any analysis for the potential for KISS. None of the documents and emails for KISS mentions something about competition. This shows that market experiences were not used and no knowledge was build up on competition. An illustration of this were the expectations drawn for KISS of complete market domination without regarding any influence of competition (email 24th of January 2003).

Score

KISS competed on multiple levels with companies producing switching gear, electrical wires, pvc-tubes and some installation companies saw KISS as competition as well (interview Adrie van Schie). As a result of this, KISS had to compete against multiple competitors and competition was fierce.

Findings overview

Table 3: case findings KISS

Variable	Level of insight	Score
Success		No
Product advantage	Low	Some
Acceptation	Low	Difficult
Technological change	High	Component
Market familiarity	High	Main market
Market newness	High	Late stage
Regulation	High	Narrow
Market structure	Low	Unfavorable
Competition	Low	Fierce

4.1.3 DAC case

Success

The DAC-cable was quite a success as its ROI was significantly above zero. The production capacity for the product has quadrupled since the introduction due to higher than expected sales and all competitors now use similar principles for this kind of cable (interview Jos Boddaert).

Product advantage

Insight

The product advantage of the innovation was a crucial part of the obtaining of insight for both the DAC-cable (interview Jos Boddaert). The result of the efforts to obtain this was good knowledge of the advantages and disadvantages of the innovation (interview Jan van Kemenade). Based on this, we conclude that insight was high.

Score

The DAC-cable offered a significant advantage over any existing alternatives. It helped its end-users to use far more efficient working methods and thus great cost savings (interview Jan van Kemenade).

Acceptation

Insight

For the DAC-cable, TKF had plenty of knowledge on acceptance by the customers since the customers were also closely involved in the development (interview Jos Boddaert). This means insight was high.

Score

The targeted customers for this cable were closely involved in the development (interview Jos Boddaert) and actually wanted TKF to develop the cable to improve their own working methods (interview Jan van Kemenade). This shows that the innovation fits with customer behavior because they requested a cable to improve their own methods as well as a fit with customer values as they were involved in the development. Therefore acceptance was easy.

Technological change

Insight

TKF was asked to develop a cable that would lead to significant application changes (interview Jan van Kemenade). As a result of this it is imperative that there was knowledge of the technological change. Insight therefore ranks high.

Score

The DAC-cable was intended to be a significant change to overcome practical technical obstacles (interview Jos Boddaert). It therefore led to a different use of parts within the same platform and is thus a component change.

Market familiarity

Insight

The cable was developed with a lot of input from an existing customer, which asked TKF because of its experience in the market (interview Jan van Kemenade). This shows awareness and knowledge from experience and therefore insight is high.

Score

"TKF was a key player in the market for fibre optic cables which was one of the reasons that the customer wanted to develop this cable in close corporation with TKF." (interview Jan van Kemenade). This shows the market was a main market to the company.

Market newness

Insight

One of the main reasons why the customer had asked TKF to develop a new cable type was that the market was looking for more efficient operating methods to accommodate further growth (interview Jan van Kemenade). This combined with the experience of TKF in the market indicates solid knowledge of market newness. Insight was high.

Score

The fact that the cable was developed to improve operation methods and to accommodate market growth clearly shows that the market was in a stage where it was not yet settled. Next to this, the fiber-to-the-home market showed significant growth already (interview Jan van Kemenade). Based on this, we conclude that the market was in an early stage of its life cycle, as its growth exceeded 15%.

Regulation

Insight

The insight in applicable regulation was high. This can be deducted from the development of the innovations to fit regulations for the product.

Score

For the fiber-optics of the DAC cable the regulation had such a broad scope that various technological directions were possible (interview Jos Boddaert).

Market structure

Insight

For the DAC-cable insight in the influence of the market structure was an important piece of knowledge, which actually led to the question to develop the cable (interview Jan van Kemenade). Because of this use of experience we conclude that insight was high.

Score

For the development of the DAC-cable the industry partners were actively involved as a positive effect of the short chain (interview Jan van Kemenade). The innovation was such that there was no competing revenue stream as it made other methods of operation for the customers instantly obsolete.

Because of the positive effect of the short chain and the absence of a competing revenue stream the market structure had a positive influence.

Competition

Insight

For the DAC-cable there were some efforts made, mostly to compare product performance in order to get a solution to establish a new working method (interview Jos Boddaert). Because of the limited activities in building up knowledge there is a moderate level of insight.

Score

The DAC-cable faced little competition as in fact there was no other company offering a similar solution in the fiber-to-the-home market at that time (interview Jan van Kemenade). Therefore competition was low.

Findings overview

Table 4: case findings DAC-cable

Variable	Level of insight	Score
Success		Yes
Product advantage	High	Significant
Acceptation	High	Easy
Technological change	High	Component
Market familiarity	High	Main market
Market newness	High	Early stage
Regulation	High	Broad
Market structure	High	Favourable
Competition	Moderate	Little

4.1.4 BB-Lightpipe case

Success

The BB-Lightpipe is not that long on the market. Sales of the product have still to outgrow the investments in its development. Despite this it is already in use in several parking garages and also in several other large buildings. Sales numbers already surpass one million Euro's (TKH Annual Report 2008) but still have to grow to call the product a real success. However, it shows good potential as the outlook is that sales will exceed investments in the foreseeable future (interview Chiel Bekker). Therefore it is a moderate success.

Product advantage

Insight

The product advantage of the innovation was a crucial part of the obtaining of insight the BB-Lightpipe. Because the company had no experiences to make use of, this knowledge was purposely built up (interview Chiel Bekker). This knowledge is reflected in the review of product advantage in the market research report that was formulated. As a result of the knowledge build up, insight was high.

Score

The BB-Lightpipe had some advantages, as well as some disadvantages. Its efficient use of energy and very good light distribution were advantages, but the higher initial price was a disadvantage with which the company has to deal with in order to make sales (interview Chiel Bekker). Because there were some advantages but no major performance difference, the product advantage is ranked as some.

Acceptation

Insight

Since the BB-Lightpipe was not initially developed for a particular market, the insights were a guide for choosing the right market for the innovation. Therefore a lot of knowledge was obtained (interview Chiel Bekker). Based on this, we conclude that the level of insight was high.

Score

The feedback from the market was that they were open for the technical solution that the BB-Lightpipe offers and it therefore fits customers' values. However, the behavior of the customers shows a tendency to make decisions based on pricing, which was not favorable (interview Chiel Bekker). Because the innovation fits values, but does not fit with behavior of the customer, acceptance is possible.

Technological change

Insight

"We adapted our market research based on the fact that our technology was different to existing solutions" (interview Chiel Bekker). This shows awareness and therefore the level of insight on technological change was high.

Score

The BB-Lightpipe was performing the same functionality (lighting), by using a different linkage of components. Therefore the technological change was a design change.

Market familiarity

Insight

"The lack of knowledge on the market was a main driver for performing an extensive market research" (interview Chiel Bekker). The market research has resulted in a lot of market knowledge, following from various analyses. The actions performed to build up knowledge led to a high level of insight.

Score

The BB-Lightpipe was launched into a market in which the company had no position. Therefore the company had to find out just about anything about that market (interview Chiel Bekker). Based on this we conclude that the market was new for the company.

Market newness

Insight

For the BB-Lightpipe this specific knowledge was not available, nor was it researched, but the research to other market characteristics led to some insights on this particular variable

Score

The market for the BB-Lightpipe has been there for some time, but there have been a lot of developments in lighting over the last years and this makes the market not settled

Regulation

Insight

For the BB-Lightpipe there was good insight on regulation. We deduct this from the development of the innovation to fit regulations for the product. Therefore insight was high.

Score

For both Easypower and the BB-Lightpipe, the functional demands were prescribed

Market structure

Insight

For the BB-Lightpipe insights on the distribution channel were part of the market research and on this part there is good insight as this was also used to determine the best market for the product (interview Chiel Bekker). However, no attention was paid to the presence of another value stream (market research documents) and therefore insight on the influence of the market structure was moderate.

Score

For the distribution of the BB-Lightpipe it was essential to get the product pre-specified for use (interview Chiel Bekker). This was a complicating factor and therefore not favorable.

For Easypower and the BB-Lightpipe the market structure had no significant influence on the market potential of the innovation

Competition

Insight

The company had little experience and therefore had to build up knowledge. Significant efforts were made to do this (interview Chiel Bekker) and it was specifically addressed in the market research.

Score

Following the market research, there were two main competitors, for which the target market of the BB-Lightpipe was more or less a niche market. Because of the number of competitors, the level of competition was medium.

Findings overview

Table 4: case findings BB-Lightpipe

Variable	Level of insight	Score
Success		Moderate
Product advantage	High	Some
Acceptation	High	Possible
Technological change	High	Design
Market familiarity	High	New market
Market newness	Moderate	Medium stage
Regulation	High	Middle
Market structure	Moderate	No influence
Competition	High	Medium

4.2   Variables that can be influenced

The first part of this chapter is focused on the relation between those variables that can influence the performance of an innovation and can be influenced by the company, and the level of insight on these variables.

4.2.1 Product advantage

This section covers the relation between product advantage and insights obtained on this variable.

4.2.1.1   Case findings

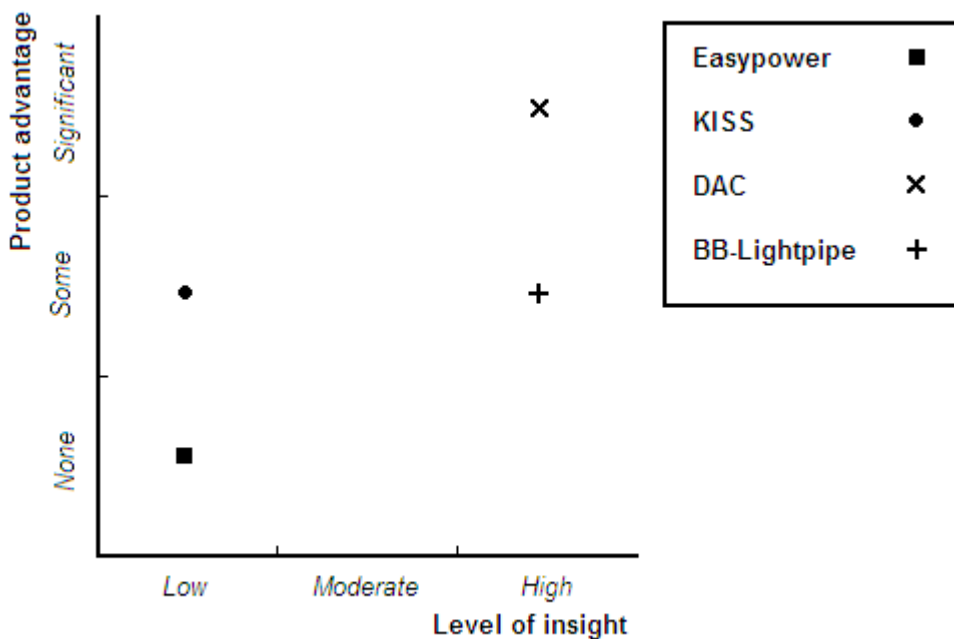The findings as given in paragraph 4.1 are visualized in the graphic below.

Fig. 6: product advantage

4.2.1.2 Pattern analysis

There is a clear distinction between two innovations for which the insights are high and two innovations for which the insights are low. Between these two sets, the innovations with a low level of insight have less product advantage than those with a higher level of insight.

In particular for the innovations that have the most differentiating values, the DAC-cable and Easypower, we can see a relation between the level of insight and product advantage. Looking at Easypower, we see that is the only innovation for which there is no advantage over existing alternatives. We can deduct a logical relation to the lack of insight, as it is obvious that when you have insights for an innovation with no product advantage, you will not launch it. The exact opposite goes for the DAC-cable. Its product advantage was the result of extensive research into the practical demands from the market. With this in mind, we can see that there is at least some relation between the level of insight on product advantage and the product advantage of an innovation.

For the CEDD case, the product advantage for two possible applications is researched. This search for insights on product advantage indicates at least some conformation on the findings from the past cases. During the research it was straight away very clear that when the innovation had no advantage in a certain application, this application would not be developed. This confirms the line of reasoning as made for the past cases in the previous paragraph. The relation here is clear: if you have insights in product advantage of an innovation, you will not launch an innovation that has no advantages over existing alternatives.

4.2.1.3   Conclusion

The conclusion of the pattern analysis for the relation between product advantage and the level of insight on this variable is that there are strong signs of an influencing relation. This influence works two ways. The first is that when a company has insight in the product advantage of an innovation, it is less likely to launch an innovation without an advantage over existing alternatives. The second way is that the search for insight in product advantage can be used in obtaining that advantage by adapting the innovation. The first way of influence was also found in the present case.

4.2.2   Acceptation

This section covers the relation between product advantage and insights obtained on this variable.

4.2.2.1   Case findings

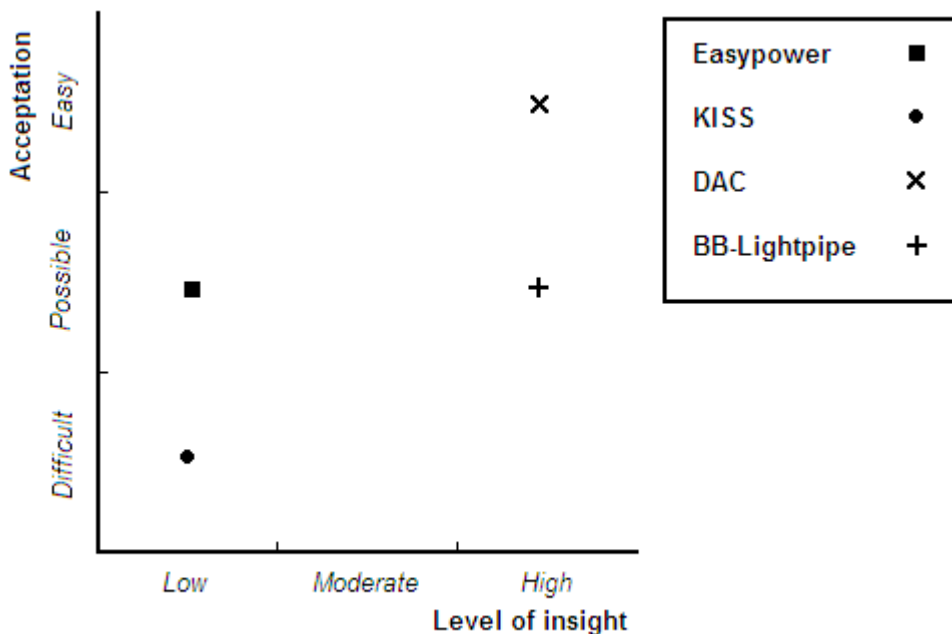The results as given in paragraph 4.1 are visualized in the graphic below:

Fig. 7: Acceptation

4.2.2.2   Pattern analysis

We can see a difference between two sets of innovations here. Again, it stands out that the less favorable score for innovation is linked with a low level of insight and the most favorable score on acceptation links with a high level of insight.

Except for Easypower, the level of insight for every innovation was influencing the level of acceptation. For KISS, no actual insight was gathered on acceptation, but looking at the sales expectations there were never any concerns about this as well. If they would have obtained insights, they could have used a different approach towards the market and have better acceptation. The opposite was applicable for the BB-Lightpipe. For this innovation the search for insights in acceptation was used to position the innovation in a market. This has improved its score

on acceptation. For the DAC-cable, the close corporation with customers gave both insights in acceptation as well as easy acceptance.

The above shows a pattern where insights can improve acceptation and where a lack of insights can lead to unpleasant surprises.

For the CEDD case, insights on acceptation are considered important. The pattern as found in the past cases is therefore not applicable here, but there was a relation between the level of insight and the score on acceptation. As insight was build up on acceptation, the decision was made not to launch development for the airfield lighting solution, where acceptation is difficult. In this respect, insights in acceptation of an innovation will unlikely be related to a difficult acceptation.

4.2.2.3 Conclusion

The relation between insight in acceptation and the score on this variables is related in the sense that insights can be used to improve acceptation and prevent from launching an innovation for which acceptation is difficult. This relation is supported by findings in both the past cases and the present case.

4.2.3 Technological change

This section covers the relation between the technological change of the innovation compared to existing alternatives and insights obtained on this variable.

4.2.3.1 Case findings

The results as given in paragraph 4.1 are visualized in the graphic below.
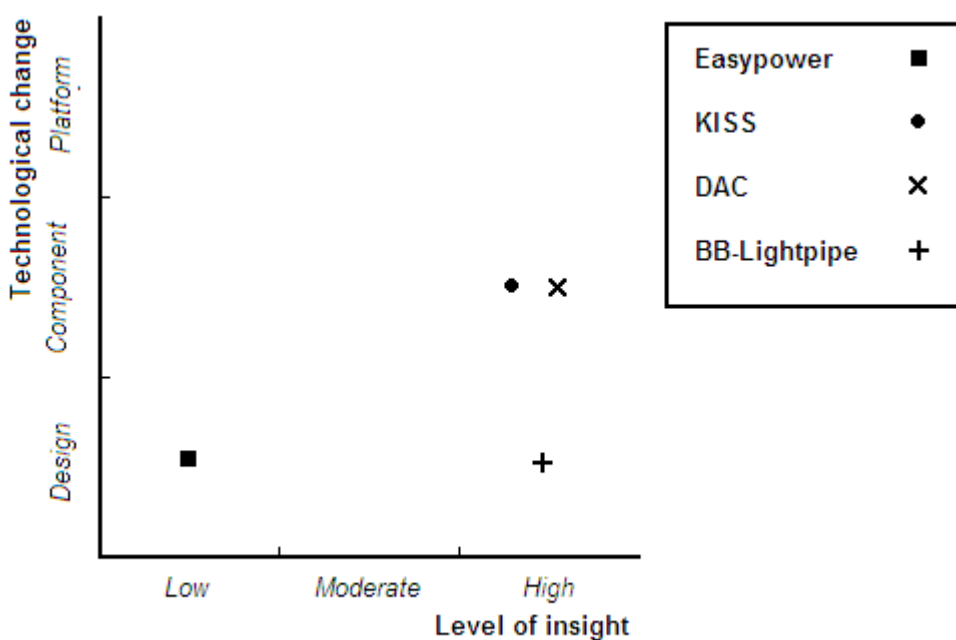

Fig. 8: Technological change

4.2.3.2   Pattern analysis

As we can see, the difference is that both component changes are coupled with a high level of insight, while this is only for one of the innovations with a design change. With the other innovation with a technological change on a level of a design change also having a high level of insight on this variable, we can hardly speak about a pattern. There is an explanation for the high level of insight for the greater changes, though. The reasoning is that the larger the change, the more aware you are that there is a change. However, this deductive reasoning does not confirm the actual presence of such a relation.

The research for the CEDD case does not offer any additional insights on the relation between technological change and insight. For all possible innovations the involved team was well aware of the changes it brought compared to existing alternatives and there was not the feeling of this being enforced by a lesser or greater change.

4.2.3.3   Conclusion

The conclusion of the analysis of the relation between technological change and insight is that there is not a clear link, but there is some reason to suggest that a greater level of change may lead to more insights on the level of change.

4.2.4 Market familiarity

This section covers the relation between the familiarity of the company to the market of the innovation and insights obtained on this variable.

4.2.4.1   Case findings

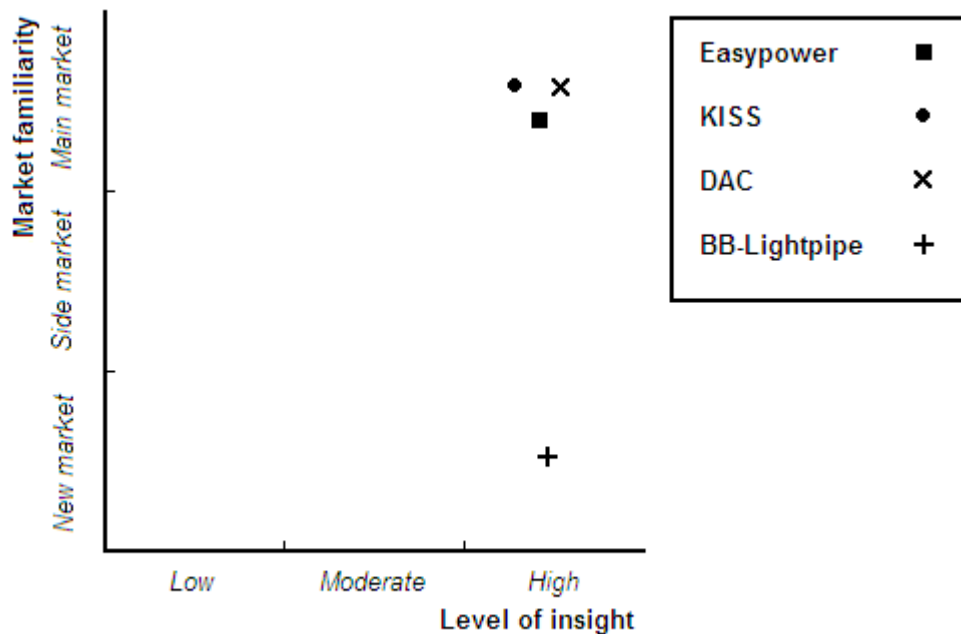The results as given in paragraph 4.1 are shown in the graphic below.

Fig. 9: Market familiarity

4.2.4.2   Pattern analysis

The most interesting thing in the findings is that all innovations show a high level of insight. There is a sense of logic in this as well, as when you are very active in a certain market; you obviously know that you are familiar with this market as well. There is not any other pattern that we can deduct from these findings.

The CEDD case experiences confirm the line of thought in the pattern analysis. When gathering insights on various variables, you just know whether you are familiar with a market or not.

4.2.4.3   Conclusion

Insight in market familiarity is often available. When a company is already active in a market it is obviously aware of its familiarity and when it gathers insights for an innovation it is automatically confronted with be familiar to a market or not.

4.2.5   Conclusions on variables that can be influenced

For all variables that can potentially affect innovation performance and can be influenced, there is some degree of a relation with insight. The strength and manner of the relation is different for each variable. For both product advantage and acceptation having insight can improve the score on this variable, as well as preventing from launching innovations that have no advantage or have difficulties for acceptation.

The technological change and market familiarity show a similar relation to insights. Both a greater change and a greater familiarity can lead to a higher level of insight. Therefore the relation of these two variables to insight is a different one than that of the other two.

4.3 Variables that can not be influenced

This second part of this chapter is focused on the relation between those variables that can influence the performance of an innovation and can not be influenced by the company, and the level of insight on these variables.

4.3.1 Market newness

This section covers the relation between the newness of the market and insights obtained on this variable.

4.3.1.1 Case findings

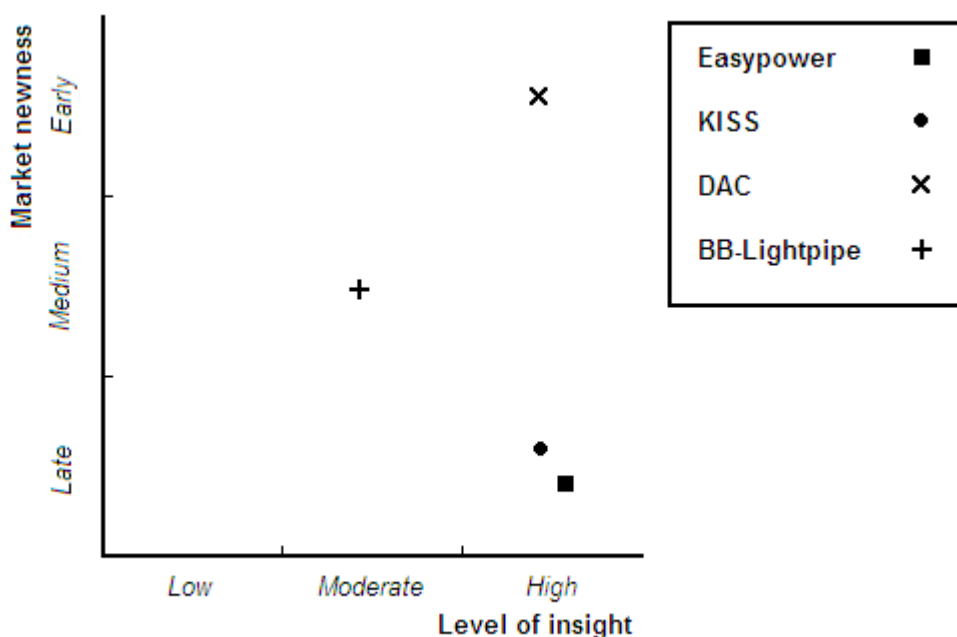The case findings as given in paragraph 4.1 are shown in the graphic below.

Fig. 10: Market newness

4.3.1.2 Pattern analysis

What stands out is that most innovations show a high level on insight on this variable, despite little efforts have been made to in particular get information on this variable. There is no pattern between the level of insight and the market newness.

The lack of a relation between the level of insight and the newness of the market is also found in the present CEDD case.

4.3.1.3 Conclusion

The case findings do not show evidence for a relation between the level of insight and the newness of the market. It is remarkable to see that for all innovations there was a high level of insight.

4.3.2 Regulation

This section covers the relation between the influence of regulation and insights obtained on this variable.

4.3.2.1 Case findings

The findings as given in paragraph 4.1 are shown in the graphic below.
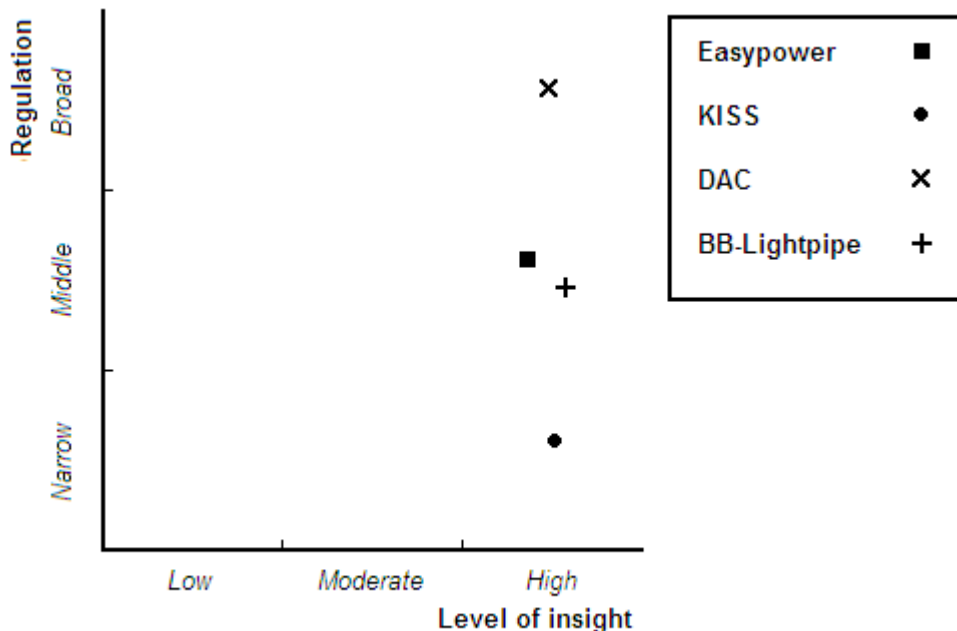

Fig. 11: Regulation

4.3.2.2 Pattern analysis

The case findings show that for all innovations the level of insight on regulation was high. This indicates that for all these innovations, insight on regulations was considered important. There is a logical reason behind this. If an innovation does not fit with regulation, it simply can not be used in practice.

The need for insight in regulation is also seen for the CEDD case. Without knowledge on applicable regulation, you can spend a lot of time on all kinds of activities for an innovation, but it is useless unless it is known whether an innovation fits within the applicable regulation. For both the tunnel application and the airfield lighting application insight in regulation was a base to build further insights on.

4.3.2.3 Conclusion

Insights on regulation are important to any innovation. We can deduct this from the level of insights that was high for every innovation. There is not a relation between the scope of research and the level of the insight obtained.

4.3.3 Market structure

This section covers the relation between the influence of the market structure and insights obtained on this variable.

4.3.3.1 Case findings

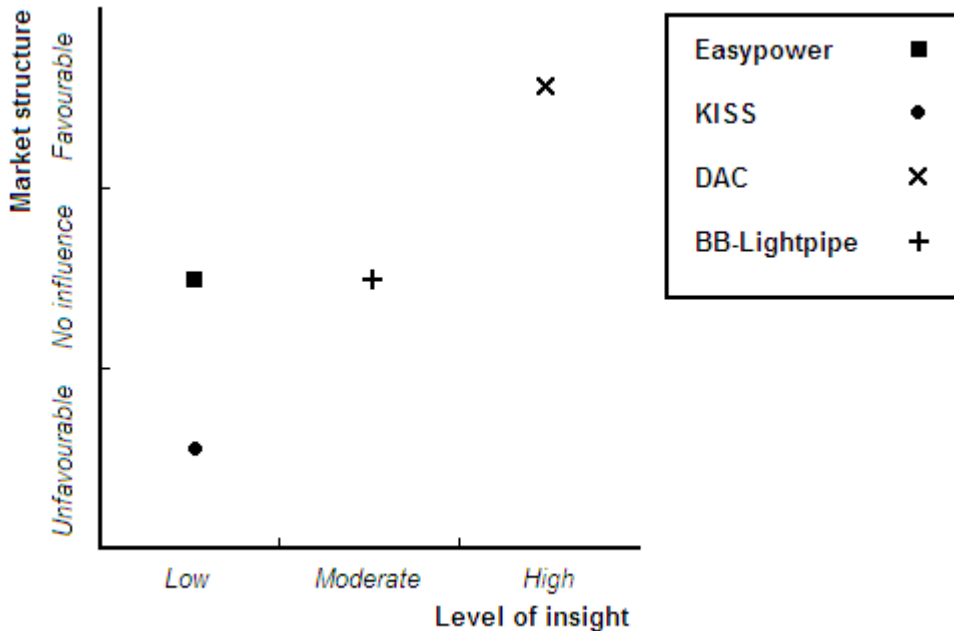The findings as given in paragraph 4.1 are visualized in the graphic below.

Fig. 12: Market structure

4.3.3.2 Pattern analysis

The graphic shows a pattern in which a more favorable market structure is related to a greater level of insight. There is no clear explanation from the cases findings on the reason for this pattern. Two possible explanations are that a high level of insight can be used to alter a market approach and thus turn a market structure into your favor. The other possibility is that when you have insight, you are less likely to launch a product in an unfavorable environment and you are therefore more likely to have an unfavorable market structure for innovations for which fewer insights are obtained.

The findings for the CEDD case don't show a clear pattern. For the tunnel solution a different market structure is seen for different geographic markets. Based on this, one market is far more interesting than the other. This indicates that having insight in the influence of the market structure would prevent from entering markets with an unfavorable structure. This confirms the second possible explanation for the relation.

4.3.3.3 Conclusion

The findings indicate a positive relation between the influence of market structure and insight on this variable. However, there is not a clear explanation for this relation in the case findings. Potential explanations are that a high level of insight helps to make use of a market structure into

ones favor and that insight in the influence of a market structure would prevent from launching an innovation when there is negative influence. The latter is conformed by the recent case.

4.3.4 Competition

This section covers the relation between competition for the innovation and insights obtained on this variable.

4.3.4.1 Case findings

The results as given in paragraph 4.1 are shown in the graphic below.
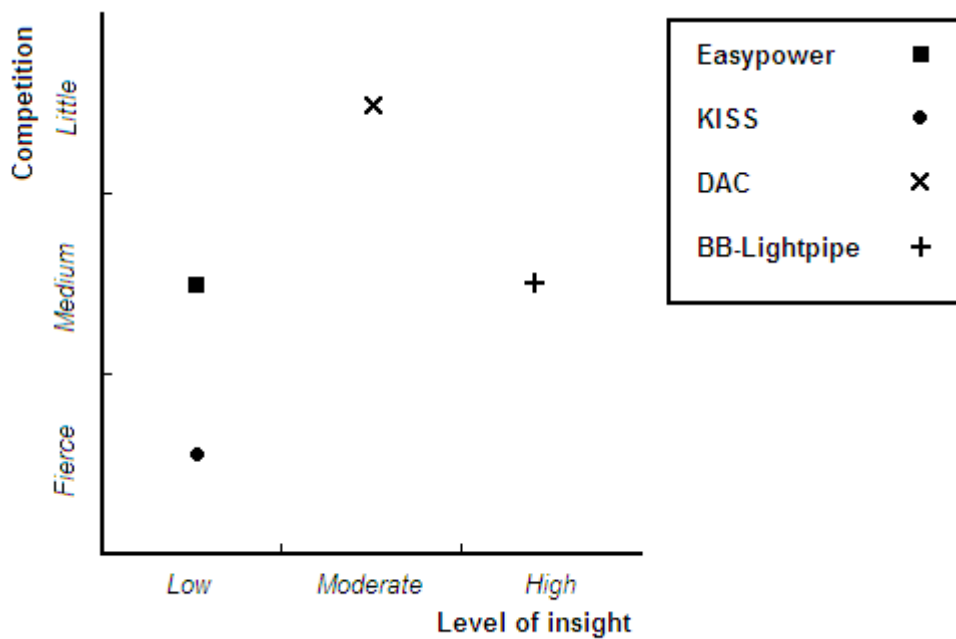
Fig. 13: Competition

4.3.4.2 Pattern analysis

From the data that is visible in the graphic, no pattern can be indicated.

A relation between the level of competition and the insight on this variable can not be found for the CEDD case as well.

4.3.4.3 Conclusion

From the case data, no relation between the level of competition and the level of insight on this variable can be established.

4.3.5 Conclusions on variables that can not be influenced

The case findings for market newness and regulation show that for all innovations there is a high level of knowledge. This high level is not related to a specific score on the variables. A positive relation between the level of insight and the influence of the market structure was found in the case

data. There is no direct clear explanation for this, although insight can prevent from launching an innovation into a hostile market and can also be used to turn a market into the innovation's favor. No relation was found between the level of competition and the level of insight on this variable.

4.4 Relations between variables

The third paragraph of this chapter is focused on the relation and potential influence on the eight variables that have been examined in the previous paragraphs. First we give the case findings of variables that show similar results (4.4.1). Then we look at whether this also means that those variables influence each other. For this the patterns in these findings are deducted and analyzed (4.4.2). This analysis is then reflected to the present case study and this leads to the conclusions.

4.4.1 Relations between variables

The case data from the variables of the previous two paragraphs is compared to each other. All this is reflected in the table below.

	Product advantage	Acceptation	Technological change	Market familiarity	Market newness	Regulation	Market structure	Competition
Competition	+	+						
Market structure		+			+	+		
Regulation		+			+			
Market newness	+	+						
Market familiarity								
Technological change	+	-						
Acceptation	+							
Product advantage								

+ = Positive influence
- = Negative influence

Bold = more than 2 cases show influence

■ = Weak relation (green)
■ = Moderate relation (yellow)
■ = Strong relation (red)

Fig. 14: relations between variables

The colour of the cells shows the extent to which the findings as presented in the previous paragraphs on both variable score and level of insight for the variables are related. The plus and minus signs show the mutual influence of solely the scores on the variables.

The graphics for the relation of insight and product advantage, acceptation and competition showed remarkable similarities. The same goes for those of the relation between insight and market newness and insight and regulation. Between the results for acceptation and market structure was also a correlation. For all the variables that showed similar overall graphics there was obviously a relation between the scores on the variables as well. This relation is also found for

the score on market structure and both market newness and regulation. Both product advantage and acceptation show a relation with market newness and regulation. The score for acceptation also has a correlation with the score on influence of market structure and technological change. Only the scores on acceptation and technological change show a negative relation, all other relations are positive. Market familiarity is the only variable not to be related to any of the others. One would expect that market familiarity could be related to acceptation, but this is not the case. A possible explanation for this is the fact that we see that knowledge on market familiarity follows from experience, but knowledge on acceptation has to be build up, as found in the previous paragraphs. That is also where the differences between the cases appear.

The next step is to see whether the relation in outcomes is the result of actual influence between the variables. We will do that in the following paragraph.

4.4.2 Patterns

As visible in the table, the scores for product advantage, acceptation, market newness, regulation, market structure and competition all indicate a relation with other variables. In this section we look at whether this supposed relation means there is influence between the variables and what that influence is.

The scores on product advantage show a strong correlation with acceptation, market newness and competition. When looking at the case information, there is little support of a direct relation between product advantage and both market newness and competition. Between product advantage and acceptation the relation is clearer. For instance for the DAC-cable, the close cooperation with the customer that came up regularly in the case findings in paragraph 4.1 led to both greater acceptance and a greater product advantage. Next to these strong correlations in data, product advantage also has some correlation with regulation. This relation can be explained as products for which the regulations offer more room for change have more possibilities for optimization.

Acceptation has, apart from the relation to product advantage, strong correlation to market newness, market structure and competition, while having a less strong correlation to technological change and regulation as well. Most relations can be explained here. A higher level of market newness means that the market is less settled to certain technologies and it is thus easier to get new technology in. This was for instance visible in a positive manner for the DAC-cable, while the case findings show that KISS faced this relation as well, but then in a negative manner. A more favourable market structure and less competition makes acceptance of any innovation easier. There is no direct influence between acceptance and regulation for the cases. We argue that this is more likely an indirect influence through the relation between acceptation and market newness,

which has a strong correlation with regulation. The influence between acceptation and technological change was the only one where the relation was negative in the data. This was especially applicable for the KISS case, where the significant change in technology was a major barrier for acceptance. This was however not a direct influence but rather an indirect one through market newness.

Market newness is, next to the already mentioned product advantage and acceptation, related to regulation and market structure. The relation with regulation can easily be explained as newer markets are more likely to have less detailed regulation. This was clearly visible for the DAC-cable case. The relation between market newness and the influence of market structure was visible there as well. As the market was in a relative early stage of its life cycle, there wasn't a complex, rigid structure that was restricting for innovations, like the market for KISS.

Finally, market structure and regulation show a correlation in findings. There is not a direct influence noticeable for the cases. The most likely explanation is that the relation is indirect through market newness.

The case findings showed a relation between product advantage and acceptation. This relation is also found for both applications in the CEDD case. Here a greater product advantage leads to greater acceptation. The relation between regulation and product advantage was also found. More freedom in regulation offered more opportunities to create a product with greater advantage.

The relations as found for acceptation with market newness and market structure are also there for the present case. For the airfield lighting application these variables form a serious barrier, while this offers an opportunity for the tunnel safety solution. Like with the past cases, the application in a market with greater market newness is expected to get acceptation easier than the application in a market in a later stage of its life cycle. The relation to the influence of the market structure is in a similar fashion. Unlike the past cases, between acceptation and technological newness no direct relation is seen. For the CEDD case this relation is an indirect one through market newness, this is particularly visible in the airfield lighting development.

Market newness was found to be related to both regulation and market structure. This is also the case for the CEDD case. The same reasoning applies here as well for both possible applications.

4.4.3 Conclusions

As already mentioned, knowing what variables influence each other is important when deciding on what variables knowledge should be obtained. If one variable is found to be influential for success,

but strongly influenced by another variable, that other variable must be included in the market assessment as well.

An analysis of the data shows that there are a number of relations between the variables. These are between product advantage and acceptation, product advantage and regulation, acceptation and market newness, acceptation and the influence of market structure, market newness and regulation and finally market newness and market structure. Technological newness can have a negative influence on acceptation.

4.5 Relation between insight and success

The final paragraph of this chapter is focused on the relation between insights in market potential and success. First we determine the level of insight for each innovation in the case study and the successfulness of the innovations. From this data we construct a graphic which shows a pattern of the relation between insight and success. We will then analyze this pattern by looking at where the differences are between the cases, using the findings from the previous paragraphs.

The outcomes of this analysis are reflected through the CEDD case experiences and then we will draw conclusions.

4.5.1 Case findings

The first piece of data is the average level of insight for the cases. This is constructed by taking the average scores on the level of insight on the eight variables for each case as described in paragraph 3.6. This means a high level of insight stands for 3, moderate for 2 and little for 1.

Table 2: insight levels

	Product advantage	Acceptance	Technological change	Market familiarity	Market newness	Regulation	Market structure	Competition
Easypower	1	1	1	2	3	3	1	2
KISS	1	1	3	3	3	3	1	1
DAC	3	3	3	3	3	3	3	2
BB-Lightpipe	3	3	3	3	2	3	2	3

The constructed average for Easypower is 1.75, for KISS 2, for the BB-Lightpipe 2.75 and for the DAC-Cable 2.875.

The level of success follows from the case findings in paragraph 4.1. Together these findings are visualized in the graphic below:
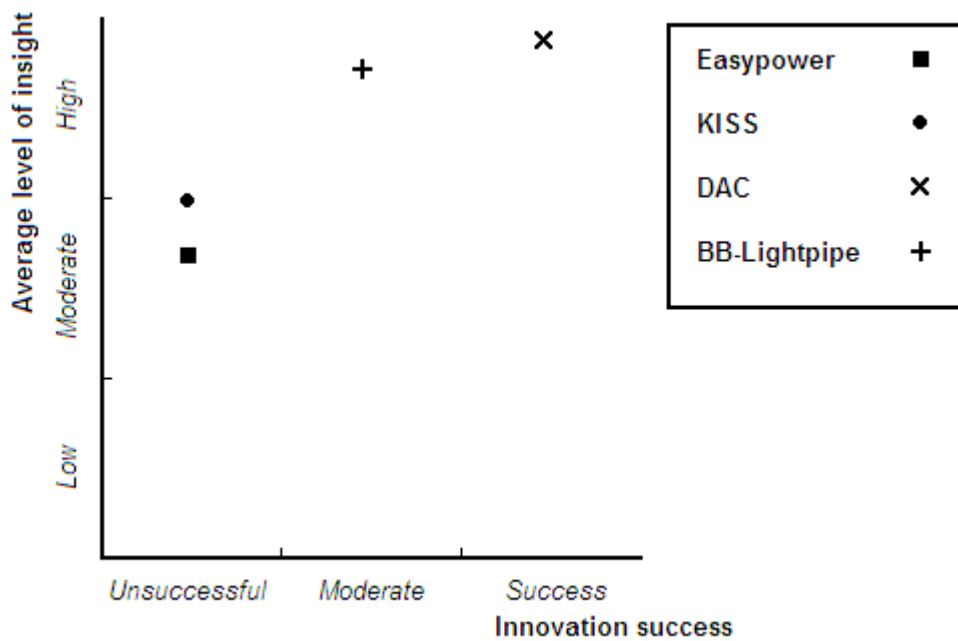
Fig 15.: Relation between insight and success

4.5.2 Pattern analysis

Two things stand out in the graphic of the findings. The first is that for all innovations the average level of insight is moderate or higher. The second and most important thing is that the higher the average level of insight, the greater the success is.

The next step is to analyze where the differences between the cases are. We can see that the main differences are at product advantage, acceptation and market structure. See the highlighted sections in the table below:

Table 3: insight levels lightened out

	Product advantage	**Acceptance**	Technological change	Market familiarity	Market newness	Regulation	**Market structure**	Competition
Easypower	**1**	**1**	1	2	3	3	**1**	2
KISS	**1**	**1**	3	3	3	3	**1**	1
DAC	**3**	**3**	3	3	3	3	**3**	2
BB-Lightpipe	**3**	**3**	3	3	2	3	**2**	3

These differences indicate that the most likely explanation for the difference in success is the difference in insights on the product advantage, acceptation and the influence of the market structure.

For all three these variables there was a relation found between the level of insight and the score on the variable. This relation between the level of insight and the score on the variable offers a good explanation for why these variables are making the difference in the relation between insight and success.

When looking at paragraph 4.4 and how these three variables are influenced by other variables, we see that competition is a fairly independent factor. Product advantage and acceptation are influenced by market newness, market structure and regulation. On these three variables, the more successful innovations have higher scores than the unsuccessful innovations, what supports reasoning on their influence. Competition is a different story as it was not found to be linked to the other variables. This is therefore a variable that has an influence independent from the other variables. This is sensible as competition is always an important factor for any product to be launched.

For the CEDD case all people involved have said that the high level of insights obtained was very beneficial in the decision making process for the development of the innovation. As the innovation is not launched yet, no statements can be made on the actual relation to the success of the innovation.

4.5.3 Conclusion

From analyzing the data of the past cases, we can determine that there is a relation between insights in market potential and innovation success. The variables on which insight is especially important are product advantage, acceptation, market newness, regulation, the influence of market structure and competition. The presence of insights on product advantage and acceptation show a relation to the successfulness of the innovation. For both these variables the level of insight is also related to the score on the variable. The scores for market newness, regulation and the influence of market structure are related to product advantage, acceptance and each other and are thus to be taken into account as well. Next to these, insights on competition also proved to be a difference, but these are not directly related to the other variables.

These findings shine a new light on the ambiguity in innovation management literature on what variables insights should be obtained. From our literature analysis we concluded that insight in innovation potential in most researches is composed of only parts of insight through a limited number of variables. In relation to this we now have determined the variables that are most important in building up knowledge on an innovations potential and that some variables are in fact more important than others.

5. Conclusions & implications

In this chapter the conclusions and implications from the research are presented. First we give the conclusions and then the implications.

5.1 Conclusions

We have managed to determine a relation between the level of insight and the successfulness of an innovation. In addition to this we have been able to link insights on individual variables and the relation between insights and scores on these variables to the successfulness of an innovation. We go through the conclusions following the research questions. We first show the research model as given in paragraph 2.3.
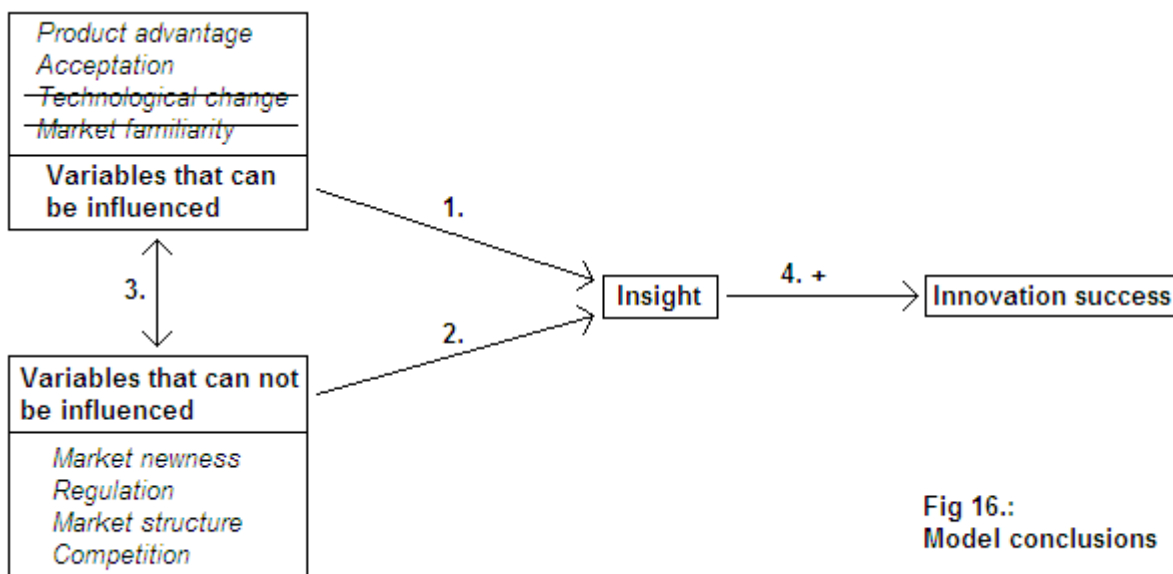

Fig 16.:
Model conclusions

In the graphic we have already striped those variables that did not show an influencing relation in this research. All of this will be explained below.

The first research question was:

"*What is the relation between degree of insight and influence on innovation success by individual variables?*"

    a. *For factors that can be influenced by the innovating company.*

    b. *For factors that can not be influenced.*

Following the variables that are set based on literature, the analysis of the findings of the past cases and the reflection to the present cases, we can conclude that a number of variables show a relation between the score on the variable and the level of insight. All variables that can potentially affect innovation performance and can be influenced show a relation with the level of insight. The strength and manner of the relation is different for each variable.

For both product advantage and acceptance having insight can improve the score on this variable, as well as preventing from launching innovations that have no advantage or have difficulties for acceptance. The level of technological change and market familiarity shows a similar relation to insights. Both a greater change and a greater familiarity are likely to lead to a higher level of insight. Therefore the relation of these two variables to insight is a different one than that of the other two.

The case findings for market newness and regulation show that there is a high level of knowledge for all innovations. This high level is not related to a specific score on these variables. A positive relation between the level of insight and the influence of the market structure was found in the case data. There is no direct clear explanation for this, although insight can prevent from launching an innovation into a hostile market and can also be used to turn a market into the innovation's favor. No relation was found between the level of insight and the level of competition.

The focus of the following research question was on the relations between the variables that were researched in the previous questions. This was reflected in the question:
 "*What is the relation between the individual variables on which insights are obtained?*"
A number of relations between the variables are revealed in the analysis. These are between product advantage and acceptance, product advantage and regulation, acceptance and market newness, acceptance and the influence of market structure, market newness and regulation and finally market newness and market structure. Technological newness can have a negative influence on acceptance.

Finally, the last research question looked at the relation between insights and success:
"*To what extent are insights in market potential related to innovation success?*"
The average level of insight compared to the successfulness of the innovations showed that more insight the innovations had, the more successful they were. The variables on which insight is especially important are product advantage, acceptance, market newness, regulation and the influence of market structure. The presence of insights on product advantage, acceptance, market structure and competition show a direct relation to the successfulness of the innovation. For all these variables but competition the level of insight is also related to the score on the variable. The scores for market newness, regulation and the influence of market structure are related to product advantage, acceptance, market structure and each other and are thus to be taken into account as well. As the scores on product advantage and acceptance are related to the level of insight, these are especially important. Insights on these variables can actually be used to improve the performance of the innovation. With the score being influenced by the level of success, this confirms the reasoning behind making the distinction between variables that can be influenced and those that can not be influenced. Competition is independent from these variables, which could be explained by the importance of this variable for every new product, regardless of its innovativeness.

These findings confirm the expected positive relation between insights and innovation success. Next to this, we have determined what components of insight in the market potential of an innovation are important for innovations with new technology in an existing market. By doing the latter we have been able to make a clearer view of what variables are most important when obtaining insight in market potential. This is an improvement on innovation management literature, where this is highly diffused and no clear vision is given amongst scholars.

5.2. Implications

This section will cover the implications that the findings of the research might have for the TKH Group and the execution of its future innovations, as well as the impact of the findings on literature.

As the results of this research indicate that success is influenced by insights in the market potential of an innovation, the obtaining of insights should be incorporated in the development program for innovations that fit the characteristics of this research. This means innovations with new technology in an existing market. This research also specifies on what variables these insights should be obtained. Currently there are no specific procedures for the assessment of market potential within TKF. Therefore it is necessary incorporate assessment of market potential in product development procedures or to create a separate procedure. In addition to this TKF should look at specific tools that support the assessment of market potential. As an example of such a tool we propose a checklist in which the variables are included as part of the innovation development process. Another option is to make research on the specified variables an obligatory part of development processes, with no further actions being allowed after a certain stage of development when no knowledge has been build up. This was for instance incorporated in the research for CEDD and proved very effective there.

However, this research has only focused on those variables that determine innovation success. This scope offers not the full insight that a company needs to make development decisions. An innovation could be massively successful in a certain market, but if this market is very small, the revenues could still be too low to justify development. Therefore additional variables are needed to determine the fit of the innovation with the company's strategy. These variables should be deducted from that strategy.

A second implication is that variables on its own do not form insight. The next step is to determine how to obtain these insights. If the gathered information is not tested for reliability, or even worse, just consists of assumptions, this can lead to significant problems. This was the case for Easypower where assumptions were used as facts, leading to not actually having any insights.

Therefore methods are needed to obtain the information. Many authors have written on this subject, proposing different methods. For instance Lynn et al. (1996) suggest using a trial-and-learn principle to develop discontinuous innovations. Another principle that follows the same kind of reasoning is the lead user approach. The idea of using lead users to get information on the market potential for a new product originates from Von Hippel (1986). Both these methods demand that the innovations are developed to such a stage that a usable product is made in order to test it in practice. From the testing, the information will follow. Other authors like Cooper (1994), Zirgir & Maidique (1990), Griffin & Hauser (1996), Gupta (1985), and Rocheford (1991) claim that this information can be obtained prior to the development. There are also some intermediate views, such as seen in the research of Veryzer (1998/1 & 1998/2). The way of thought of Cooper is successfully applied for the DAC-cable case, where the information was obtained prior to development. The recent CEDD-case also follows a similar path to the satisfaction of the involved people. An explanation for this can be found in the influence of having early insights on product advantage and acceptation. Despite these positive signals about this methodology, this does not implicate that this manner is always the right one and the other manners are not successful. To really determine this, more research is required on this specific subject.

This research has delivered a number of interesting findings on innovations with new technology for an existing market. It offers support for the claim that insight in market potential is positively related to innovation success, in particular for innovations with these specific setting. We have managed to shine a light on what variables are most important when building up insight in market potential. However, this research focus also gives a number of limitations. First is that the number of cases is limited. For this research this was on a purpose of keeping the research manageable, but further validation requires more (case) evidence. More cases are necessary to perform multivariate analysis on interfering influence between the research variables as well. The scope of the research is also quite specific. All cases are within companies that are either small or medium sized enterprises. In addition to this, the companies all operate in a B2B environment. The companies are also used to product development and they all launch new products regularly. As findings can only be generalized to the scope of the research (Yin, 2003), the scope to which the findings can be generalized is that of small and medium sized enterprises that operate in a B2B environment and have at least some experience with product development. Therefore, more research is needed to find out whether these findings hold up for other circumstances, for example larger companies, B2C environment or for companies who rarely innovate. Next to this, it could be interesting to research what the relation is between having insights on the variables that we researched and the actual influence of these variables on innovation performance. This would be an extension to this research and could give further knowledge on both the importance of variables and the importance of knowledge.

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