

**Improve the assessment of applications of innovative  
agrifood projects, with LTO Noord Fondsen**



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# Preface

This master thesis is written by Koen Kromhof, graduated in Business Administration & Agribusiness at HAS University of Applied Sciences in August 2011. He is currently completing the master Management, Economics and Consumer studies at Wageningen University and Research Centre. In this two-year master he specializes in the field of management. This thesis started in March 2013 and is ended in October 2013.

Supervisors from the WUR in this thesis project are both from the Management Studies Group. The first supervisor is Dr. C. Kolympiris and the second supervisor is Dr. W.W.M.E. Schoenmakers.

This thesis is written for LTO Noord Fondsen, part of LTO Noord. LTO Noord is a Dutch organization that has 21.000 (agricultural and horticulture related) members and is working on the economic and social position of their members. LTO Noord Fondsen its function is to realize a stronger positions for agricultural and horticulture entrepreneurs by financing innovative projects. Supervisors from LTO Noord Fondsen are F.J.E.A. v/d Lindeloof and W.A.M. Siemes.

The aim of this thesis is to improve the assessment of applications of innovative agrifood projects, with LTO Noord Fondsen. Therefore success factors of innovative (agrifood) projects are researched and tested on successful and unsuccessful projects financed by LTO Noord Fondsen.

I would like to express my thanks to all supervisors for their guidance throughout this research.

K.B.J. Kromhof

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# Summary

Several studies pointed out the importance of innovation for the economic performance of a firm. Geroski and Kleinnecht stated that innovative firms make higher profits and grow more quickly (Geroski et al., 1993; or Kleinnecht et al., 1997). This research focusses on innovation in the agrifood sector. Agrifood plays an important role in the economic sector of Europe and the Netherlands. In the Netherlands it contributes almost 10% of the GDP. Innovation is more and more important since the sector is facing with several challenges e.g. the ageing population and related health problems; the worldwide growing demand for food; and the increasing demand for scarce resources.

LTO Noord Fondsen is part of LTO (agricultural branch organization) and its ambition is to realize a stronger position for agricultural and horticulture entrepreneurs. This is realized by funding innovative projects. In order to invest in potential successful projects, LTO Noord Fondsen has some criteria that they use to assess the applications for funding. A good assessment of applicants is of vital importance for effective funding by LTO. This is the reason why this research with the following aim is started:

**The aim of this thesis is to give recommendations on how to improve assessing applications of innovative agrifood projects**

Chapter 3 discussed several definitions of innovation. The focus in this research is on product and process innovations. Product innovations are new strong improved products and services. Process innovations are implemented improvements or renewals in the production process. Product and process innovations projects show a high failure rate (Cozijnsen et al., 2000). Moreover, 33% percent of the Dutch agrifood innovation projects make use of innovation subsidies, so the need for completing successful innovation projects is high. So, success factors of general innovative projects and success factors of innovative agrifood projects are collected and shown in two separated lists. In chapter 4, the final list with success factors is composed using literature and the input of innovation experts. The 9 success factors within this list are:

**Product superiority:** an innovation can only be successful if it is considerably of better quality, has unique features and fulfills customer needs. **Market oriented:** the developing organization has to know what is needed in the market. **A cross-functional team:** a project team with different expertise and leadership working toward a common goal. **Cooperation:** cooperation with different stakeholders such as: competitors, supplies and Universities. **Communication:** the innovator needs to work in cooperation with others, improve network relations, be informed about actualities, stay in good contact with customers and convince others within the team/company. **Protocol:** clear definitions of the customer's needs and preferences, product concept and product specifications. **Proficiency of technological activities:** the technical and R&D process is well planned and executed. **Familiarity:** newness or unfamiliarity with the innovation is not conducive for success. **Sustainable:** environment-friendly and/or sustainability is an element of the innovation.

In chapter 5 the success factors are tested on 15 successful and 10 unsuccessful projects financed by LTO Noord Fondsen. A better statistical reliability can be achieved by increasing the sample size. The test showed that **communication, cooperation, a cross-functional team, product superiority** and **sustainability** are the most important factors for success.

Combining these important success factors with the assessment of applications of LTO Noord Fondsen toward their own projects, the following conclusions are made in chapter 6:

For the success factor **communication**, communication skills of team members and the open communication when problems occur need extra attention when assessing applications of new projects. This is the same for having a common goal, strict rules for working together and authority of the projects leader, as part of the success factor **cross-functional team**. **Cooperation** with competitors, suppliers and customers, need also more attention. The underlying variables of the success factor **product superiority**; customer loyalty, the newness and relevance of the innovation, also need extra attention. Finally, **sustainability** has to be included in the assessment of applications of innovative projects.

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# Chapter

# 1 Introduction

What is the reason innovation is so important for firms? Several studies point out the importance of innovation for economic performance of firms. Geroski and Kleinknecht stated that innovative firms make higher profits and grow more quickly (Geroski et al., 1993; Kleinknecht et al., 1997) Vuylsteke (2010) describes innovation as an important source for competitive advantage for companies and industries, but it also contributes economic growth. Knowledge creation and the transformation of knowledge into innovation are the main drivers for the economy and so the prosperity. Innovation is not only created by research or entrepreneurial performance. Management and marketing experience, organizational experience, social, economic and administration knowledge are important as well (Vuylsteke et al., 2010).

In the agro-food sector innovation became a key to stay competitive. On the other hand the sector is faced with several limitations, which make it difficult to be innovative. (Vuylsteke et al., 2010) In Europe and the Netherlands, the agro-food sector is an important economic sector. Europe has a leading role in exporting agro-food products and stimulates regional and national economies in Europe. The agro-food industry in the Netherlands is distinguished as one of the top sectors by the government. Being distinguished as a top sector means that it represents an essential part of the Dutch economy. The agrifood sector in the Netherlands contributes almost 10% to GDP. Innovation is more and more important within the agro-food since the sector is facing several challenges; the ageing population and related health problems, the worldwide growing demand for food, and the increasing demand for scarce sources. More and more, innovation in agro-food plays an important role for changes in economic, environmental, social, technological and ethical fields. (Tepic, 2012)

The report 'Innovation in the agricultural sector' describes innovation as important because standing still is the same as moving backwards. Innovation leads to more efficiently using the technology, surprise the consumer with less perishable products, serve new market segments just a little earlier than the competition, more conveniently packaged goods and reduce the adverse external effects of the farming operations to keep the 'license to produce'. (Galen, 2008)

The government's interest in agro-food innovations has an economic background, but also consists of the drive to find solutions for social related problems as



environment, landscape, animal welfare, etc. (Galen, 2008).

Pavitt (1984) called the agricultural sector a 'supplier dominated' sector, which means that it creates a small amount of technology by own initiative. To create new technology the agricultural sector needs suppliers. The agricultural sector consists of numerous small and financial weak companies, which are mainly producing a homogeneous product. The bulk is produced for the processing industry or sold to the auction as an undifferentiated, unbranded output for consumption. Sectors with these characteristics mostly have a lack of incentives for innovative behavior. Most small companies do not have the resources to invest in research and development, labor and patents.

Research on what the highest barriers for innovation in the agricultural sector are, showed that 'uncertainty in legislation' was the highest barrier for innovation for entrepreneurs in the agricultural sector in 2000 (Van Galen & Bunte, 2003). In 2008 the report 'Innovation in the agricultural sector' stated that the highest barriers are the high costs of innovations and a lack of funding opportunities (Van Galen, 2008).

Heughebaert & Manigart's (2010) report showed that funding projects with high risks are an important boost for innovation and job creation, but also result in companies which have a negative cash flow, a couple of years after funding. So it is important to create a mature firm in a short period (2 to 3 years) in which other stakeholders want to reinvest.

LTO Noord, a Dutch organization that has 21.000 (agricultural and horticulture related) members, is working on the economic and social position of their members. LTO Noord Fondsen is a part of LTO Noord and its function is to realize a stronger position for agricultural and horticulture entrepreneurs by financing innovative projects. These projects focus on five different areas: market position, sustainable development countryside, labor on a sustainable business, stronger entrepreneurial knowledge and skills, and a stronger social and economic position of the entrepreneur and their business. The funding of LTO Noord Fondsen consists of subsidies and loans.

## Chapter

# 2 Conceptual research design

## 2.1 Research objective

As mentioned in the introduction, innovation is important for the economy and is a main driver for the economic performance of firms. However, in practice innovations are not by definition successful, and many innovations even end in failure. US research by Carr (1996) indicates that 70-80 per cent of the projects failed, either completely or partly. Cozijnsen et al. (2000) did research in 50 Dutch companies and concluded that more than 39 % of the innovation projects failed, either completely or partly. Therefore it is crucial for funding companies to choose the right innovation projects and quit the potentially unsuccessful ones in an early stage of development (Cooper, Edgett, & Kleinschmidt, 1999). However, it is difficult to predict success or failure in such an early stage of development.

This research is concerned with the question: How can LTO Noord Fondsen improve the assessment of innovative agricultural projects?

To receive funds from LTO Noord Fondsen, entrepreneurs with an innovative idea, which contribute to a stronger position of agricultural and horticultural entrepreneurs, can ask for a contribution of LTO Noord Fondsen. The assessment commission will decide whether the project will receive funds. In order to invest in the right projects LTO Noord Fondsen has some criteria, which they use to assess the applications for funding on. To optimize the results of the different projects it is important to know where to assess an application on.

Cozijnsen et al. (2000) noticed that no success or failure factors have an enormous influence on the success of all types of innovation projects. Therefore, success and failure factors differ per innovation project. As mentioned in the introduction, LTO Noord Fondsen has a wide variety of innovation projects, which they are funding. Within this variety of projects, two main categories can be distinguished in: 'product innovation projects' and 'process innovation projects'. Product innovations are in short: the introduction of a good or service that is new or improved (OECD/Eurostat, 2005). Process innovations are in short: an implementation of a new or improved production or delivery method (OECD/Eurostat, 2005).

The objective of this thesis is to give recommendations on how to improve the assessment of applications of innovative agricultural projects, with LTO Noord Fondsen

## 2.2 Research questions

In order to develop an objective, it has to be clear which knowledge is useful for realizing the objective. In this chapter the central research question and several sub questions are formulated. The central research question is:

How to improve the assessment of applications of innovative agrifood projects for LTO Noord Fondsen?

In order to answer the central research question, sub questions are formulated. The first part of this research consists of general information about innovation. After the general information about innovation the research needs to describe success factors of general innovative projects. General innovative projects are projects from all different sectors. After studying the success factors of general innovative projects, literature also provide information about innovation in agrifood and success factors for innovative agrifood projects. For both, differences between ‘product’ oriented projects and ‘process’ oriented projects is made where possible. This will result in the first two sub questions;

1. Which factors influence success of general innovative product/process projects, found in literature?
2. Which factors influence success of agrifood innovative product/process projects, found in literature?

Answers on both research questions can be found in chapter 3. The agrifood sector is a specific sector, especially the projects LTO Noord Fondsen are funding. To create a list that is as specified as possible, innovation experts on agricultural projects will refine the lists with success factors of general and agrifood success factors into one final list with success factors, useful for innovative agrifood projects. A distinction between ‘product’ and ‘process’ innovations is made where possible. Innovation experts also use their practical experience to finalize the final list, but literature is creating the basis of this final list. Therefore some factors might be supplemented or deleted from the original two lists. This content results in sub question 3;

3. What are the main factors that influence success of innovative agrifood ‘product/process projects, according to literature and experts?

The answer on research question can be found in chapter 4. To check if the list actual match with the projects, the final list is tested with the already existing innovative LTO Noord Fondsen projects. To check the final list LTO Noord

Fondsen determined a group with successful projects and a group with unsuccessful product/process. Finally 25 projects are used for this check, the information is collected with surveys. After checking the final list with successful and unsuccessful projects, the relation between them is derived. Sub question 4 is formulated as follows:

4. What is the relation between successful/unsuccessful product/process projects and the product/process innovation success factors list?

The answer on sub question 4 is given in chapter 5. The outcomes of sub question 4 are used to rank the factors (factors that influence success) on importance and results in an optimal list with success factors for LTO Noord Fondsen. To give recommendations on the assessment of applications of innovative agricultural projects, the existing criteria from LTO Noord Fondsen is analyzed. The list with success factors and the existing assessment criteria are used to give recommendations for improving the assessment of applications of innovations agricultural projects. Sub question 5 is as follows:

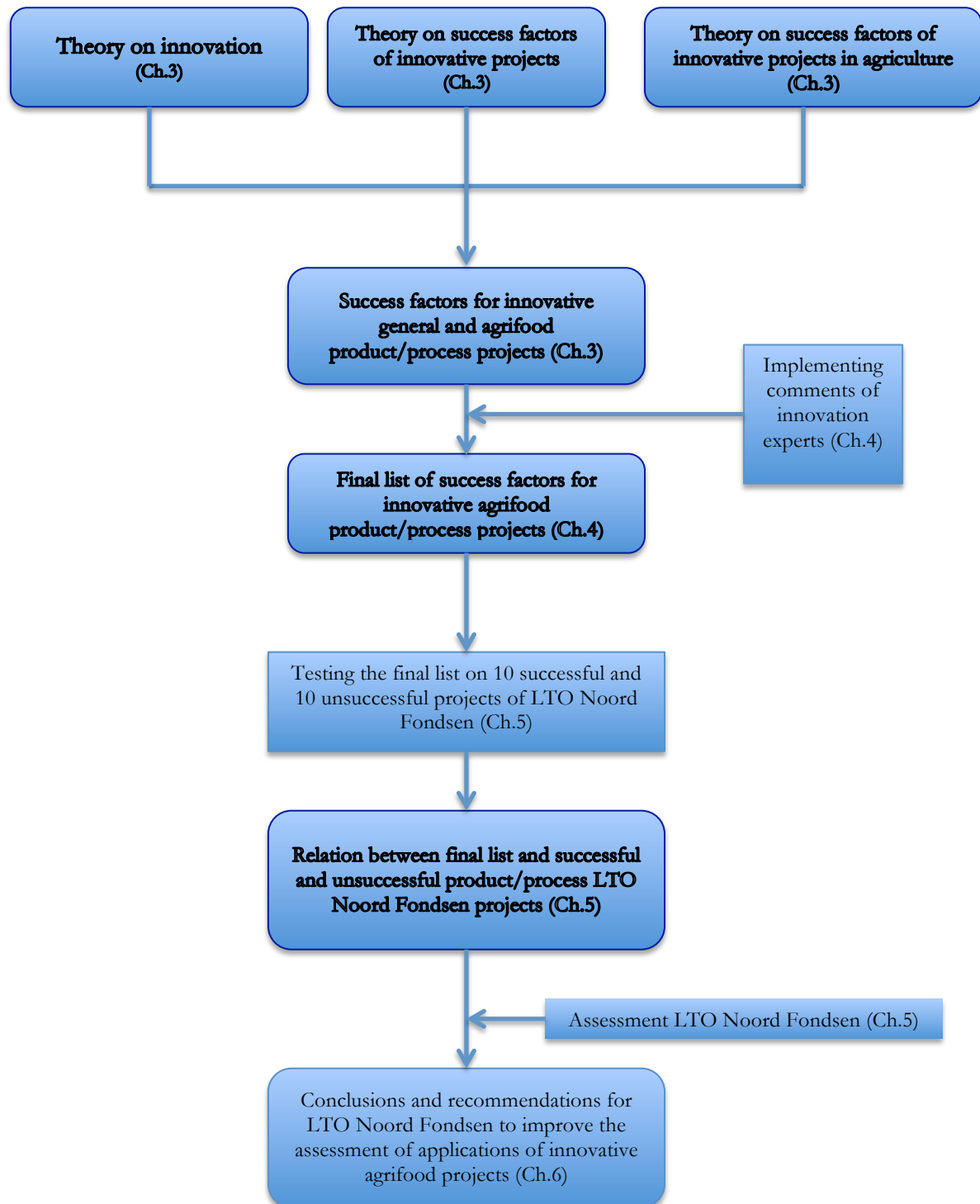
5. Which factors are useful for improving the assessment of applications of innovative agricultural product/process projects on future success?

An answer on this research question can be found in the conclusion, chapter 6. General conclusions and recommendations are given for product/process related projects. Finally optimal success factors are provided for the assessment of applications of innovative agricultural projects with LTO Noord Fondsen.

## 2.3 Research framework

To attain the objective several steps are taken as described in chapter 2.2 Research Issue. An overview of these steps is presented in Figure 1.

Figure 1: Research framework



# Chapter

## 3 Innovation

Literature provides different perspectives on innovation. Therefore chapter 3.1 presents the most important motives for innovation and defines the definition of innovation. After defining the definition of innovation in general, this chapter provide a definition of innovation in agrifood and will clarify the different types of innovation within the context of this report.

Moreover, chapter 3.2 provide information about success factors and give inside in studies on general success factors, which are considered as forerunners. Finely the most important general success factors are collected and presented. Furthermore, the agrifood success factors are discussed, so chapter 3.2 has the focus on the same aspects but now for innovation in agrifood. The results of chapter 3.2 are a list of success factors for innovation projects in general and a list of success factors for innovation projects focussing on agrifood.

### 3.1 Defining innovation

Over the years, the topic of innovation has been studied from different perspectives. Therefore an introduction and definition of innovation in general is given. After the delimitation of innovation in general, this is done for innovation in agrifood.

#### 3.1.1 Innovation in general

Joseph Schumpeter (1883-1950) is considered one of the founders of the economic innovation theory (Schumpeter, 1934). Schumpeter connects his innovation theory and entrepreneurship with economic growth. An important element in his theory is the possibility that economic growth arises by (radical) innovations in which existing systems (companies and/or their products) will be replaced by new ones. Geroski stated that innovative firms grow more quickly and make higher profits (Geroski et al., 1993).

Besides the positive effect on economic growth and profits of a country, innovation contributes to the compatibility of a country, region or sector (Vuylsteke, 2010). The European report: "Innovation Tomorrow", stated that innovation, as core characteristic of the knowledge-based economy, is a major source of competitiveness for firms and industries (Lengrand, 2002). Therefore it is important for public-sector organisations (to deliver services to society) as well as for private businesses (to new goods and services in markets). Innovation is also important for clusters, networks, cities, regions and nations (Lengrand, 2002).

The causes of innovation are mainly determined by the rate of competition in the sector, so the more competition the more innovations will arise. Besides the rate of competition, the market demand (environment) is determined by the level of

product diversification, and so the interest for new product innovations. A high level of process innovations is mostly caused by fierce price competition. The search for new innovations is an economic activity, which is significantly influenced by the economic circumstances. Innovations exist as a result of scarcity and economic opportunities (Galen, 2003).

### **Definition of innovation in general**

Although innovation has been studied extensively, there is no general definition of innovation. Innovation is a complex understanding and has different elements that can be interpreted in different ways. However, Schumpeter is mentioned in many reports as the founder of the economic innovation theory. According to Schumpeter (1934), innovation of a product, process or business model can be expressed as the level of output novelty. Output novelty can be seen as a new good, a new method of production, a new market, a new source of supply, or a new organisational structure. An important element of his theory is the possibility that economic growth is caused by (radical) innovations where existing systems (companies and/of their product) are replaced by new ones. While Schumpeter gives a well-known general definition of innovation, the approach to innovation has developed over the years.

In 2002, King en Anderson came with a new broad definition of innovation after studying different studies on innovation. They defined innovation as something new what is introduced for the social setting, focussing on realising benefits, limited to deliberate attempts to realize benefits out of change. In general an innovation can only be called innovation when a new idea is applied or introduced to the market. Some elements of this definition need some more detailed explanation. So first the 'social setting' in this definition can be interpreted as the company which is introducing or adopting the innovation. A social setting can also be interpreted as the sector, the region, a country or a cluster of companies. Second, 'focussing on realising benefits'. Innovation is a process where organizations and entrepreneurs try to reach specific strategic goals. Not only profit, also company growth, less environmental impact, reducing employees work pressure or more spare time can be goals. The third, 'deliberate attempts to realize benefits out of change'. It has to be the intention to invent something new. If the company telephone is defect and the company results are increasing because employees have to visit customers, its not an innovation. After all, an innovation can only be seen as an innovation when a new idea is applied or introduced to the market (King et al., 2002). Within the definition of King and Anderson, a wide range of projects can be classified as innovations.

### **Different types of innovation**

To get innovations more structured, the research OECD (OECD/Eurostat, 2005) made a distinction in four types of innovations: product innovations, process innovations, organizational innovations, and marketing innovations.

- Product innovations are new strong improved products and services
- Process innovations are implemented improvements or renewals in the production process
- Organizational innovations are implemented improvements in strategy, orientation and organization of the company
- Marketing innovations are renewals of the product design (without changes on content), packing, promotion and price setting.

Within these different types of innovations, product and process innovation are classified as technological innovations. With technology is meant, the way how inputs are converted into final products or processes. Organizational innovations and marketing innovations are classified as not-technological innovations.

Within this research the focus is on technical innovations, so on product and process innovations. According to OECD/Eurostat, 2005 a broader definition of product and process innovation is given:

‘A product innovation is the introduction of a good or services that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics’ (OECD/Eurostat, 2005).

The first digital camera is an example of a new product using new technologies. The first portable MP3 player is an example of a product innovation that combined existing software standards with miniaturised hard-drive technology. Product innovations also include minor changes to its technical specifications, for example a chemical composition that was originally used as an intermediary for coating production only. Product design changes that do not involve a significant change in a product’s functional characteristics or intended uses cannot be classified as a product innovation. Product innovations in services can imply the addition of new functions or characteristics to existing services, significant improvements in how they are provided, or the introduction of completely new services. Some examples are the addition of home pick-up and drop-off services that improve customer access for rental cars, and significant improvements in the speed and ease of use in Internet banking services (OECD/Eurostat, 2005)

‘A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software’ (OECD/Eurostat, 2005).

Process innovations are planned to increase quality, decrease unit costs of production or delivery, or to deliver or produce new or significantly improved products. An example of new production methods is the implementation of new automation equipment on a production line. Delivery methods include the logistics of the firm and encompass equipment, software and techniques to source inputs, allocate supplies within the firm, or deliver final products. An example is a bar-code goods-tracking system. Process innovations also contain new or significant improved methods for the creation of provision of services, for example a GPS tracking devices for transport services. Significant improvements of the efficiency and/or quality of information and communication technology (ICT) can be interpreted as process innovations (OECD/Eurostat, 2005) For process innovations as well as for product innovations, different phases exist.



### **Different phases in innovation**

Innovation as defined earlier in this research is not a simple action but consist of different steps. Therefore Myers and Marquis (1969) described innovation not as a single action but a total process of interrelated sub processes. It is not just the conception of a new idea, not the invention of a new device, not the development of a new market. The process is all of these things acting in an integrated fashion, so the innovation process involves activities and decisions from idea generation to the final launch of the product/process into the market.

Most companies organize the innovation process (from the early stage of an innovation development on till the innovation gets introduced to the market) in projects. Innovation projects can be defined as plans and routes of development and implementation to finally result in a new product to the market, or new process to business. (Fortuin et al., 2007).

Innovation in general will not differ extremely from innovation in agrifood but can have a different meaning. Therefore the next chapter defines innovation in the agrifood.

### **3.1.2 Innovation in agrifood**

Innovation in agrifood has to deal with its own specific innovation motives. The agrifood sector is facing several challenges, such as the increasing worldwide demand for food, the ageing population and the related health problems, and increasing competition for scarce resources. Therefore, innovation plays an important role in the agrifood sector (Tepic, 2012) Innovation in agrifood gained increasing importance to be able to face the fast changes in the technological, economic, environmental and societal fields. Technological developments, such as genetic mapping or DNA marker technology, offer new possibilities of change and innovation. Even innovations on efficiency, improvements on the expiration date of products and easier and smarter packaging contribute to new possibilities of change and innovation. The Dutch government has an important interest in the Dutch agrifood sector based on financial and society motives. The agrifood sector is responsible for almost 10% of GDP but needs some serious solutions for society problems. Societal innovations could be seen as improvements to reduce the negative external effects of the agricultural sector (to keep the 'licence to produce') Besides a better economic position, innovations in agriculture can help to improve animal welfare and reduce the environmental damage. Even social organizations as unions, animal welfare organisations and environmental organisations are pushing government to stimulate innovations on social and environmental improvements (Galen, 2008)

### **Definition of innovation in agrifood**

The agrifood industry can be separated in scale-intensive (especially food), and supplier-dominated (especially agriculture) industry, according to the theory of Pavitt (1984). Supplier dominated firms are generally small and have weak R&D and engineering capabilities. Most innovations can be dedicated to suppliers of equipment and materials, in some cases large customers and governmental-financed research and extension services are also responsible for an important amount of innovations.

Pavitt (1984) dedicated scale intensive firms are relatively more focussed on product innovations and supplier-dominated firms more to process innovations and technological trajectories.

Within the definition of OECD/Eurostat (2005) this research clarifies technical innovations (product and process) in agrifood as in chapter 3.1.1 Innovation in general, but illustrate it with agrifood examples. Therefore a repetition of the earlier stated definitions of product and process innovations is written down. A product innovation is: 'the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics' (OECD/Eurostat, 2005) Examples for product innovations within the agrifood industry are improved or new cultivars and varieties, genetic modified crops for disease resistance or pesticide resistance and new applications of existing cultivations.

The definition of process innovation is as follows: 'the implementation of a new or significant improved production or delivery method. This includes significant changes in techniques, equipment and/or software' (OECD/Eurostat, 2005) Process innovations in agrifood aim to a decrease of production and/of logistic costs, a quality improvement, more animal welfare etc. Examples of process innovations in the agrifood industry are automatic pruning, integrated crop protection, an automatic fruit-picking robot, sensor technology, and the use of GPS systems in agriculture.

For many agrifood companies, it is essential to participate in collaborations with different disciplines and chain actors to innovate using technological developments, such as innovative market concepts, new breeding techniques or probiotics. Collaboration can also help to achieve innovation goals in fields with societal pressure. An example of societal pressure in agrifood can be explained as consumers that wary about changes in their food, especially when changes take place that conflict with their norms and ethics. Social pressures in agrifood could be, genetic modification, neglect of animal welfare and the environment (Tepic, 2012).

For example large food processors may focus on innovations in additives to improve the taste or smell of food. While the sort of innovations differ even within the agrifood, the level of innovativeness does not have to differ between the farmer and the food processor (Tepic, 2012).

### **Innovation in practice**

Where 48% of the Dutch agrifood companies indicated that they invest in products new to the company, only 25% of the companies invest in products that are new to the market. The total share of Dutch agrifood firms innovating in processes is 44% (Batterink et al., 2006).

Innovation subsidies reach a large share of firms in the Dutch agrifood industry, 33% of the firms indicated that they used innovation subsidies (Batterink et al., 2006). Moreover, the Dutch agricultural sector shows that after 'high costs', 'no financing possibilities' is the biggest barrier for innovation (Galen, 2003).

Concluding from this, the need for successfully using the money for innovative projects is important. Therefore indicators/factors, which can determine on forehand success of innovative projects, are interesting.

## **3.2 Success in innovation**

In 1986, Tushman and Nader already predicted that managing innovation would become an important organizational task for the future. Nowadays the attention in several reports focuses primarily on how innovation projects can be carried out most successfully. However, many innovation projects end up in failure. Research under 50 innovation projects in Dutch companies concluded that more than 39 per cent of the innovation projects failed, either completely or partly (Cozijnsen et al., 2000). These figures raise the question; what are the differences between innovation projects that succeed and those that fail. So in short, what are factors that lead to success and what factors lead to failure? It is crucial for funding companies to choose the right innovation projects and quit the potentially unsuccessful ones in an early stage of development (Cooper, Edgett, & Kleinschmidt, 1999). Therefore, success factors that can predict success on forehand are very important.

### **Success factors**

This research defines a success factor as a factor that has a significant positive effect on the success of an innovation project and so contributes to the explanation of the difference between success and failure of innovation projects.

A reason to use success factors is because several studies have provided an extensive set of such factors, which facilitates the comparison between different studies.

### **3.2.1 Different perspectives on general success factors**

While Cooper stated that there is often no systematic identification of the factors determining success or failure (Cooper, 1999), the amount of success and failure factors for innovation projects, discovered in the previous decades, is almost uncountable. In some reports, success factors even seem to be in contradiction with each other (Stijnen, 2002). A number of studies identify characteristics and factors leading to innovations success as well as failure. The main focus of these studies was to get an understanding of how products are actually developed within companies. Some of these studies explicitly compare successful with failed projects. Most of these studies concentrate on product innovations.

How to measure success of these factors is widely described in literature. Mostly, success of product innovations is expressed in financial indicators. The criteria used for determining success differ per specific situation. Hultin & Robben (1998) stated that the use of 1 criterion to determine success or failure is insufficient. Examples of financial indicators are sales and profit. Not-financial indicators of success are for example quality. (Stijnen, 2002) In general, objectives with regard to the human aspect are more complex to quantify than the more “solid” organizational objectives. To measure the results of an innovation project objectively both the organizational and the human aspects must be included in the success measure (Cozijnsen et al., 2000)

Each study about success and failure factors has it's own view toward the relevance of factors behind innovative success. Some studies claim a certain group

of factors being important, other studies ignore these factors and choose other factors as being responsible for success of innovation. Methods differ in for example a qualitative or quantitative approach. Also, the way of assessing success is responsible for different views on success factors. However, this research will compare different studies (different industries, methods, way of assessing etc.) and will use the factors, which are used frequently in different studies. In order to get an overview of success factors in general this research picked several studies with different backgrounds. Most studies focus on success and failure factors of product innovations. Some studies focus on success and failure factors of product and process innovations. The factors related to success and failure of innovation projects have been accumulated through the means of the research such as SAPHHO study (Rothwell, 1972; Rothwell et al., 1974), Cooper' study NewProd (1979) and (Maidque et al., 1984) These are considered as forerunners of an extensive number of studies which focused on a large number of independent variables which affect innovation project success and failure factors.

One of the first studies that explicitly compared successful with failed projects was SAPPHO and conducted in the early 1970s in the United Kingdom. It was designed to discover differences between successful and unsuccessful technological innovations, so product and process innovations. The project used paired comparison, in which it used successful innovations to compare with an unsuccessful innovation. The criterion for success is commercial, a success being defined as an innovation that obtains a specific market share and profit, and a failure being defined as an innovation that fails to achieve this. The project was divided into two phases. In phase 1, 29 pairs were investigated in both chemical processes and scientific instruments. Out of 27 characteristics found between successful and unsuccessful innovations, five main areas of difference between success and failure were explored. These areas of difference can be summarised as follows (Rothwell, 1972):

- 1) Successful innovators were seen to have a much better understanding of user needs.
- 2) Successful innovators pay more attention to marketing and publicity
- 3) Successful innovators perform their development work more efficiently than failures but not necessarily more quickly
- 4) Successful innovators make more use of outside technology and scientific advice, not necessarily in general but in the specific area concerned.
- 5) The responsible individuals in the successful attempts are usually more senior and have greater authority than their counterparts who fail.

The first two SAPPHO findings can be further categorized into 'market factors' while the last three can be seen as 'organizational variables'. Phase 2 included 43 new pairs. The results of phase 1 have been confirmed with the same 5 areas of difference between success and failure, with more individual measures emerging as being significant for success for chemical and the scientific. Therefore some points became more important than found in phase 1 (Rothwell et al., 1974). These points are given below:

\* User needs must be precisely determined and met. Many successful firms achieve this deep and imaginative understanding of user needs through interaction with a representative sample of potential customers throughout the development. Also

important is to learn user in the right uses, advantages and limitations of the innovation and to help users to overcome acceptance problems.

- \* Another factor is good communication skills. Management have to make sure that information flows smoothly throughout its own organisation

- \* Market intelligence. It is important that a firm is aware of developments outside its own environments including the behaviour of competitors. It is of great importance to create integration in the innovations process between marketing and development functions. The R&D department must produce designs that match user requirements, rather than satisfy their own egos.

- \* Technique of high quality production procedures is obvious even as formal management techniques can be of great assistance to management. Therefore the manager's skills as communicator and co-ordinator are really important.

- \* Innovation is a multi-functional process, success cannot be explained by an single factor, or several, factors alone.

In 1979, Cooper wrote an important article about industrial product success, called Project NewProd. The key question in that research is: "what is the key to success in industrial product innovation?" (Cooper, 1979) His goal was to identify the determinants of commercial success in industrial product innovation. The success or failure is determined by the interaction of the commercial entity with the marketplace. In 1999, Cooper distinguished two classes of success factors of new product projects. The first one deals with doing the right projects; the second deals with doing the projects right! Success factors that capture doing the right projects are mostly not in control of the project team. These external or environmental success factors include characteristics of the new product's market, technologies, a competitive situation and the ability to equal internal competencies. Choosing the right project is an important step in succeeding an innovative project successful (Cooper, 1999)

The second class of success factors (Cooper) emphasizes doing the projects right and focus on process factors or action items. These factors capture the things the project team does or does not do. Cooper described these factors as the invisible, but controllable ones. Studies of these second-class success factors reveal just what makes the difference between successful and unsuccessful product innovations.

The studies of cooper and hundreds of other cases reveal just what makes the difference between winners and losers. Part of the study; 'The invisible success factors in product innovations' consist of a review of these success factors. Cooper selected eight common denominators of successful new product projects (Cooper, 1999).

**1) Solid up-front homework:** *to define the product and justify the project.*

Research shows that inadequate up-front homework is a high valued reason for failure. Solid up-front homework shows new product success and is strong correlated with financial performance and profitability. Good up-front homework (more time, money, and effort; and better quality work) is mostly done by successful projects.

**2) Build in voice of customer:** *a slave-like dedication to the market and customer inputs throughout the project*

New products projects that feature high-quality marketing actions, preliminary and detailed market studies, customer tests, field trials, and test markets, as well as launch, reach a 70% higher market share and double the success rate than those projects with poor marketing performance.

**3) Product advantage:** *Differentiated, unique benefits, superior value for the customer*

Cooper rated product advantage as one of the top success factors. Product advantage is in terms of a differentiated product with unique customer benefits and superior value for the user. Superior products have five times the success rate and four times the market share and profitability than product without this success factor

**4) Sharp, stable, and early product definition:** *before developments begins*

Having a clear view on the concept, benefits, positioning, requirements, features and specs of a product, will help to succeed a new product. However, firms constantly perform poorly here.

**5) A well-planned, adequately resourced, and proficiently executed launch**

A strong and well-organised market launch underlies successful products. Successful product developments invest more than twice as many person days and money to the launch as do failure product developments.

**6) Tough go/kill decision points or gates:** *funnels, not tunnels*

Research showed that once a project begins, there is very little chance that it will ever be cancelled. Most firms are operating without serious scrutiny, this result in many marginal projects approved, and scarce resources are misallocated. With tough go/kill decisions points on profitability in different phases of the project, this could be avoided. However, tough go/kill decision points are the weakest ingredient of all process factors studied.

**7) Accountable, dedicated supported cross-functional teams with strong leaders**

Good organizational design is strongly linked to successful projects. A good organizational design means projects with a strong leader that is dedicated, accountable for the entire project and focussed. Another part of the organizational design is that projects are organized as a cross-functional team. Therefore a cross-functional team is a group of people with different functional expertise working toward a common goal.

**8) An international orientation:** *international teams, multi country market research, and global or "glocal" products.*

New products at international markets and products that capture international requirements are more successful. This results in a global product (one version for the entire world) or a glocal product (one product concept, one development effort, but several variants to satisfy different international markets).

These commonly cited success drivers are based on fundamental research. However, the research showed that many businesses and project teams fail to build in the eight success drivers (showed by Cooper).

Although the studies SAPPHO and Cooper show similarities, the results also show some differences. For example, the SAPPHO study highlights the organizational factors as seniority and authority of responsible managers. The results of Project NewProd focus on product characteristics, in addition to the market and organizational variables.

In 1984 Maidique & Zirger introduced 'A study of success and failure in Product innovation. The focus was on the U.S. Electronics Industry. The research identified eight broad areas that appear to be important for new product success. These broad areas were realised by an open ended survey of 158 new products in the electronics industry.

- 1) The developing organization, through in-depth understanding of the customers and the marketplace, introduces a product with a high performance-to-cost ratio.
- 2) The developing organization is proficient in marketing and commits a significant amount of its resources to selling and promoting the product.
- 3) The product provides a high contribution margin to the firm.
- 4) The R&D process is well planned and executed.
- 5) The create, make, and market functions are well interfaced and coordinated.
- 6) The product is introduced into the market early.
- 7) The markets and technologies of the new product benefits significantly from the existing strengths of the developing business unit
- 8) There is a high level of management support for the product from the development stage through its launch to the market place.

In comparison with the Rothwell and Cooper study, it has several agreements and areas of differences. A clear agreement between the studies is that only a combination of factors can account for success. Moreover, all three studies discovered that a good understanding of the market place is essential for new product success.

In 2007 the study: 'Key success factors of innovation in Multinational agrifood prospector companies' started with a review of different studies on success factors of innovation in general (Fortuin et al., 2007). The reviewed studies are for example SAPPHO by Rothwell, Stanford project by Maidique & Zirger, NewProd project by Cooper etc. From these studies and some reviews of these studies, Fortuin et al., 2007 listed the 5 most central key success and failure factors. This research collected the most central key success factors by making clusters of the success and failure factors of Sappho, Cooper 1999 and Maidique & Zirger 1984. Therefore some key factors of Fortuin are used.

**1) Product superiority:** the product uniqueness and superiority from the customer's perspective. Product advantage is in terms of a differentiated product with unique customer benefits and superior value for the user. (Fortuin et al., 2007; Cooper, 1999)

**2) Proficiency of marketing activities;** the developing organization pays more attention to marketing and publicity (Rothwell et al., 1972). Therefore 'up-front' activities such as initial screening, preliminary market assessment, detailed market

study and/or marketing research is important (Fortuin et al., 2007; Cooper, 1999). Cooper added high quality field trials and test markets as important factors for success (Cooper, 1999). Maidique & Zirger (1984) also stated that the developing organization has to be proficient in marketing.

**3) Proficiency of technological activities** The R&D process is well planned and executed (Maidique et al., 1984). Also Up front homework as technical assessment and business/financial analysis are important (Fortuin et al., 2007). Successful innovations perform their development work more efficiently than failures (Rothwell et al., 1972)

**4) Protocol:** clear definitions of the target market; the customers' needs, wants, and preferences; the product concept; and the product specifications and requirements (Fortuin et al., 2007) Successful innovators where seen to have much better understanding of user needs (Rothwell., 1972; Rothwell et al., 1974) Cooper (1999) stated that having a clear view on the concept, benefits, positioning, requirements, features and specs of a product, will help to succeed. Rothwell stated that successful innovators where seen to have a much better understanding of user needs. To realize products with a high performance to cost ratio, the developing organization need in-depth understanding of customers and the market place (Maidique et al., 1984)

**5) Organizational relations:** cross-functional integration, team communication and cooperation (Fortuin et al., 2007). A good organizational design is that projects are organized as a cross-functional team. Therefore a cross functional team is a group of people with different functional expertise working toward a common goal, therefore a management strengths and strong leader who is dedicated to the project is needed (Cooper, 1999; Rothwell, 1974) The responsible individuals in the successful attempts are usually more senior and have greater authority than their counterparts who fail (Rothwell et al., 1972 Communication in here is a crucial part (Rothwell et al., 1972)

In the 5 most important key success factors as listed above, not all specific factors which are mentioned in the different studies, are included. To get inside in the other factors, the factors which are not included in the central key factors above, are mentioned below. Most factors below are only mentioned by one study and/or do have a low ranking in that specific study. So concluded Rothwell (1974) also that successful innovators make more use of outside technology and scientific advice, not necessarily in general but in the specific area concerned. Cooper (1999) focussed also on well-planned, adequately resourced, and proficiently executed launch of the product even as an international orientation. Maidique & Zirger (1984) mentioned that products, need to be introduced to the market early. And the market and technologies of the new product benefits significantly from the existing strengths of the developing business unit.

Important for this research is to realize that most research on success and failure factors of innovations are based on research in high-tech industries, such as pharmaceutical, biotech or computer industry, as described in chapter 3.1.1 The agrifood industry, as a supplier dominated industry, is underexplored in success and failure factors of innovations (Fortuin et al., 2007)



### 3.2.2 Different perspectives on agrifood success factors

While Fortuin (2007) stated that success and failure factors in the agrifood industry are underexplored, there are some studies focusing on success and failure factors of innovation in the agrifood industry. Therefore this research selected the most relevant studies on success and failure factors focusing on agrifood product/process innovations.

An example is the study of Pannekoek, Van Kooten, Kemp & Omta (2005) of 74 entrepreneurial product and process innovation projects in Dutch greenhouse horticulture. This industry is typified by a large number of family-owned entrepreneurial firms. Research concluded that innovations by horticultural firms that show the following characteristics have a high chance of becoming successful in the market (Pannekoek et al., 2005)

*Product or process superiority:* Product or process superiority is the most important success factor for horticulture innovations. An innovation can only be successful if it is clearly of better quality, has unique features and fulfils customer need better than existing products and processes. In terms of process innovations, the entrepreneurs must be well informed about benefits, internal costs and needs within the company.

*Cooperation with supply chain partners*

Chain and network relations are a prime source of innovative ideas. Companies in a cluster are clearly more successful innovators than companies not situated in a cluster.

*Market needs:* To develop a superior product or process you have to know what is needed in the market (Verhees, 2005) The entrepreneur must follow actualities and have frequently contact with customers or other market sources to investigate customer wishes and demand. For example environment-friendly production is a hot issue in the glasshouse industry. So, most successful innovations improve the environment-friendliness of production.

*Environment:* In the glasshouse industry environment-friendly production is a hot issue. So, most successful innovations improve the environment-friendliness of crop production and/or decrease the energy consumption per product.

*Company fit:* The company need sufficient knowledge and skills to implement the innovative process into the companies and chain existing processes to be successful.

*Team communication:* Innovations in glasshouse industry are mostly conducted by the owner/entrepreneur. Therefore the responsible owner/entrepreneur need good communication skills to innovate successfully. Communication is important because you need to convince others within the company, to work in cooperation with others, improve the network relations, be informed about actualities and stay in good contact with customers. Furthermore, companies that have an open communication attitude will have more success than companies that try to hide their knowledge (Pannekoek et al., 2005)

The research concluded that variables for determining product superiority, market need and environmental protection stand out as important factors for success or failure of an innovation project. Especially environmental protection is an important issue in glasshouse production and agriculture in general. Fulfilling user needs and quality come out as especially important for success in entrepreneurial innovations in the agro-food sector (Pannekoek et al., 2005).

In 2006 the study of Batterink indicated that successful innovating agrifood companies have a strong market orientation (Batterink et al., 2006)

Fortuin et al., 2007 provide insight in the key success factors for new development in the agrifood industry. The research is focussing on success factors for innovation projects. Within this study Fortuin identified the key success factors for innovation projects (for product, process, organizational and market innovations) in the agrifood industry: Therefore team communication, product superiority and market volume made a significant difference between success and failure. These three factors, which are related to success of innovation, are more clarified below:

6) Team communication

Team communication consist of the completely understanding of the potential problems of the project even. Members also have to be satisfied with the product development process used.

7) Product superiority

Product superiority exists of a sufficient production of resources or skills. The innovation also has to be mechanically and/or technically complex.

8) Expected high market volume

High market value is coupled with many competitors and characterized by intense price competition.

The overall conclusion of the report on success and failure factors of agrifood prospector companies is that companies which have had business success because of their technological expertise, nowadays should realize that the need to pay more attention to market and product related up-front activities. Examples of market and product related op up-front activities are detailed market studies and clear product definitions prior to product development (Fortuin et al., 2007)

Within the study 'Innovation capabilities and governance in agriculture' a research question was set about the differences between the Food and Beverages and the technology-based industries as concerns, on factors influencing innovation performance. Therefore the study concluded that newness or unfamiliarity with technologies or processes is not conducive for innovation success. Tepec (2012) also stated that upstream functional capabilities, such as engineering, resources, management, financial skills and resources, are crucial for the distinction between successful and unsuccessful innovation projects in Food en Beverages companies. So when the project is very new to a Food and Beverage company, difficulty is found in dealing with up stream functional capabilities. Successful projects are also more certain about the market and about the way to implement the innovation process (Tepic, 2012)

Concluding the agrifood factors introduced above, this research created a list of success factors for product/process innovations in agrifood. The most important

factors are selected below. Where possible a distinction between product and process is made.

**Product superiority** An innovation can only be successful if it is clearly of better quality, has unique feature and fulfils customer need better than existing products. (Pannekoek et al., 2005; Fortuin et al., 2007; Tepic, 2009)

**\* Product superiority for process innovations**

Initiators must be well informed about internal costs, needs and benefits of the company.

**Market need** To become successful you have to know what is need in the market. Mark need consist of following actualities and have frequently contact with customers or other market sources to investigate customer wishes and demand. Market need includes the need of upfront activities as detailed market studies (Pannekoek et al., 2005; Fortuin et al., 2007; Tepic, 2009)

**Team communication** The communication is a important factor because the innovator need to work in cooperation with others, improve network relations, be informed about actualities, stay in good contact with customers and convince other within the team/company (Pannekoek et al., 2005; Fortuin et al., 2007)

**Familiarity** Newness or unfamiliarity with technologies or processes is not conductive for innovation success. Pannekoek concluded that the company need sufficient knowledge and skills to implement the innovation. (Tepic, 2009; Pannekoek et al., 2005)

**Cooperation with supply chain partners (only agriculture)**

Chain and network relations within agriculture are a prime source of innovative ideas. Companies in a cluster are more successful innovators than companies not situated in a cluster (Pannekoek et al., 2005)

**Environment (only agriculture)** In glasshouse and agriculture in general, environment-friendly production is a hot issue. So, most innovations focus on the environment-friendliness of their product/process innovation (Pannekoek et al., 2005)

Chapter 3.2.1 ended with a list of general success factors and chapter 3.2.2 ended with a list of success factors for innovative agrifood projects. These two lists are created as a result of a literature study. Chapter 4 results in one useful list for LTO Noord Fondsen. Therefore literature of chapter 3 and discussions with innovation experts are used.

## Chapter

# 4 Success factors

In chapter 3 the literature about innovation is discussed, even as different studies in general and agrifood success factors. Chapter 3 ended with a list of the most important success factors in general and a list of the most important success factors in agrifood. In chapter 4 these two lists are discussed with two innovation experts. These two innovation experts are both working for organisations, which are investing in innovative agrifood projects in Holland. Innovation experts are consulted to get a better fit with success factors in practice. After the discussion with the innovation experts the final list with agrifood success factors is composed.

As presented in chapter 3, almost all studies are on ‘product’ innovations excepted some agrifood studies, these studies used the same factors for product and process innovations. Finally, a distinction between ‘product’ or ‘process’ innovation success factors, is not realized on a literature bases. Instead of a list for success factors of product innovations and a list of success factors of process innovations, this report created one combined list for process and product innovations. The way the success factors are ranked is based on the ranking in literature and finalized by the experts.

To be able to create the right value for the different success factors this research selected a couple of variables per success factor. For example: ‘the innovation will be of higher quality’ is a variable of the success factor product superiority. These variables are collected from the different studies used in chapter 3. The variables are selected on the same way as the success factors are selected. So variables that are commonly selected in different reports are used. Most variables are linked to one study, but it is possible that the variables are used in more studies. The variables have to create a value per success factor. In some cases, experts are consulted used to create a variable.

## 4.1 Input innovation experts

With the help of two innovation experts this research was able to combine the general success factors list with the agrifood success factors list into a final list with most relevant factors. The innovation experts in this research are working for two typical investment companies of innovative projects in general and agrifood. By selecting the innovation experts, the following requirements are taken into account:

- The company needs to invest money in innovative agrifood projects in terms of loans or funding’s.
- The organization has to be a well-known organisation in the Netherlands.
- The expert have to be personally concerned with judging applications for funding’s for innovative agrifood projects.

During the interviews with experts, the list with general success factors and list with agrifood success factors are presented and discussed. The success factors are structured presented and discussed. Both experts noticed that it is a complex subject and it is almost impossible to make a hierarchical list in relation to importance of the factor. Therefore the results of the interviews are presented in quit broad statements. Both experts are working in the agrifood field but expert 1 is more experienced in food innovations and expert 2 is more experienced in agricultural innovations.

Expert 1 is working for Oost NV. Oost NV is a development company for the eastern part of Holland. The government and the eastern provinces finance Oost NV. Therefore Oost NV assists and invests in innovation projects in different sectors including agro-food. The expert is responsible for the agrifood sector. Oost Nv works together with regional Universities and its main goal is a better economy by providing services and funds/loans for innovative companies/projects.

Expert 1 noticed that the sequence of the general success factors matters and are quit well ordered. More important in his point of view is the combination of the different factors. Therefore he stated that number 5, Organizational relations could move in-between point 1 and 3. Within organizational relations he highlighted the importance of the quality in terms of capability and intellectual of the individual team members. Communication skills of the project leader is an important capability. Expert 1 also highlighted collaboration as an important factor for success. If working with collaborations it is important to have clear arrangements. The business model is really important, the experts has seen lots of projects with an extremely good and innovative idea but fail due to insufficient business models. Expert 1 noticed that failure projects often do not have written collaboration arrangements for the different stakeholders within the project. Chance for failure is higher when the costs for the project are relatively high when comparing it with the revenues. Expert 1 noticed that the last agrifood key success factor, environment, could better replaced by sustainability. Sustainability should include social relevance and geographical en environmental acceptance of the innovation. These aspects are especially important for agrifood innovations.

Expert 2 is working for the Rabobank Zuid Holland-midden. Rabobank is a leading bank in agrifood in Holland. The Expert is head of the Agrifood department and is participant in a special innovation fund. This innovation fund is especially created for innovative agrifood projects with high risks.

Expert 2 stated that product superiority is not by definition the most important factor but in agrifood it is in most cases. Because high investment costs of new projects, collaboration between different stakeholders is an important factor. A lot of innovations in for example horticulture are process innovations, which have high investment costs and risks. Sharing these costs and risks with different stakeholders stimulated the success and progress of the innovation project. R&D is mostly too expensive for agricultural firms. Organisation is for expert 2 a quit important factor with special focus on the financial part. Expert 2 also stated the importance of a cross functional team. The environmental aspect can have enormous influence on the social acceptance of the innovation. It is not by definition necessary but for some innovations it is a must.

The statements of the experts are used to create the final success factors list, which is useful for agrifood projects of LTO Noord Fondsen. Therefore the two lists of general success factors and agrifood success factors out of literature are the basis for the final list. The statements of the experts are processed in this final list.

## 4.2 Final list of (agrifood) success factors

Selecting important factors, which are probably from influence on success of innovations projects in the agrifood, several reports (Fortuin et al., 2007;) and experts noted that the success of innovation projects is based on the combination of different factors. Moreover, a hierarchal ranking in importance of these factors is made in most studies. Therefore this list will provide factors that are more important above less important factors.

This research selected product superiority as most important factor because it was the overall conclusion of the list with general success factors and the agrifood factors. Experts did agree with that. Taking the general success factors list, the agrifood list and the opinion of the experts into account, this research concludes that product superiority is the most important factor.

**1) Product superiority:** An innovation can only be successful if it is clearly better of quality, has unique features and fulfils customer needs better than existing products. (Fortuin et al., 2007; Cooper, 1999; Pannekoek et al., 2005; Tepic, 2012) The following variables are used:

- Newness of the innovation (Tepic, 2012)
- Innovation will be of higher quality (Pannekoek et al., 2005)
- Prospects for protection were good
- Relevance of the innovation
- High potential for creation of additional products (Fortuin et al., 2007)
- The innovation will improve the customers loyalty

The second factor: Market oriented is combination of 2) Proficient marketing and 4) Market potential (general success factors) and 2) Market need (agrifood success factors), both important for the list with general success factors and the agrifood factors. These factors are combined because they represent more or less the same intentions, namely: to use upfront homework to get better inside in the market and use marketing to expand the position of the innovation.

**2) Market oriented:** the developing organization has to know what is needed in the market. Therefore 'up-front' activities such as initial screening, preliminary market assessment, detailed market study and/or marketing research is important. Also high quality field trails and test markets are important factors for success. Furthermore, the developing organization has to be proficient in marketing and publicity. (Fortuin et al., 2007; Cooper, 1999; Maidique et al., 1984; Tepic, 2012; Pannekoek et al., 2005; Rothwell, 1972) The following variables are used:

- Innovation is new to the market (Pannekoek et al., 2005)
- High potential need of the innovation
- Idea came from market

- Market research is conducted (Fortuin et al., 2007)
- A market trial was performed (Cooper, 1999)
- Marketing acquired in the innovation process

The following three factors; (3) Cross-functional team, (4) Cooperation and (5) Communication are originally from one factor, namely (5) Organizational relations in the list of general success factors. Both experts emphasized the importance of organizational relations, therefore this factor is moved up in the list. Moreover, factor (3) Team communication in the agrifood success factors list can be combined with (5) Communication. Also (5) Cooperation with supply chain partners (part of the agrifood success factors list) is determined as part of (5) Communication.

**3) Cross-functional team:** A cross-functional team is also seen as an important indicator for success. A cross-functional team is a group of people with different functional expertise working toward a common goal. Therefore good management strengths and a strong leader who is dedicated to the project is needed. Responsible individuals in successful projects are usually more senior and have greater authority than counterparts who fail (Pannekoek et al., 2005; Cooper, 1999; Fortuin et al., 2007) The following variables are used:

- The team is a combination of people with different expertise's
- The team have the same common goal
- The team made strict rules for working together
- The responsible project leader is senior (Rothwell et al., 1974)
- The responsible project leader has responsibility
- The responsible project leader has authority

**4) Cooperation:** cooperation with different companies is important. Cooperation with supply chain partners is especially important for agricultural related projects. Making strict rules with different stakeholders intern or extern, is essential to complete the project in the future. (Cooper, 1999; Rothwell, 1972; Rothwell et al., 1974; Fortuin et al., 2007; Tepic, 2009; Pannekoek et al., 2005; Batterink et al., 2006) The following variables are used:

- Cooperation with competitors (Batterink et al., 2006)
- Cooperation with suppliers
- Cooperation with customers
- Cooperation with University
- Cooperation with research institute
- The company made strict rules for cooperation (Expert 1)

**5) Communication:** communication is an important factor because the innovator needs to; work in cooperation with other stakeholders, improve network relations, be informed about actualities, stay in good contact with customers and convince others within the team/company. (Cooper, 1999; Rothwell, 1972) (Rothwell et al., 1974; Fortuin et al., 2007; Tepic, 2009; Pannekoek et al., 2005) The following variables are used:

- Understanding potential problems (Pannekoek et al., 2005)
- Good communication skills between team members
- Open team communication when problems occur

- Team expressed commitment to the project

Fortuin (2007) came up with Protocol and for this research it summarized a couple of factors, which are important. This factor is only named in the list of general success factors and is emphasized by experts. Experts explained it as the understanding and practical interpretation of the different aspects of the product and the commercialization of it.

**6) Protocol:** clear definitions of customers needs, preferences, the product concept, the product specifications and the business model are important for successful innovations. Successful innovators were seen to have much better understanding of user needs, having a clear view on the concept, benefits, positioning, requirements, features and specs of a product. To realize products with a high performance to cost ratio, the developing organization needs in-depth understanding of customers and the marketplace. (Fortuin et al., 2007; Maidique et al., 1984; Rothwell, 1972; Rothwell et al., 1974; Cooper, 1999) The following variables are used:

- Understanding of user requirements (Rothwell et al., 1974)
- Clear view on the innovation concept
- A clear view of the benefits of the innovation (Fortuin et al., 2007)
- A clear view of the future of the innovation
- A proficient business model (Expert 1)

Factor 7 is selected in order to fulfil the importance of R&D in several reports. In the general list with success factors, proficiency of technological activities was part of the factor (2) Proficiency of marketing and technological activities. These factors are split up because the marketing could combined better with other factors, as explained in before (2) Market oriented.

**7) Proficiency of technological activities:** the R&D process is well planned and executed. Also up front homework as technical assessment analyses are important. Successful innovations perform their development work more efficiently than failures (Maidique et al., 1984; Fortuin et al., 2007; Rothwell et al., 1972) The following variables are used:

- The R&D process is well executed (Rothwell et al., 1972)
- The R&D process is well planned

Familiarity is based on the factor, (4) Familiarity in the agrifood success factor list. The factor is not named in the general success factor list but is important enough to measure.

**8) Familiarity:** newness or unfamiliarity with technologies or processes is not conducive for innovation success. The company needs sufficient knowledge and skills to implement the innovation (Tepic, 2009; Pannekoek et al., 2005; Maidique et al., 1984) The following variables are used:

- Is the firm familiar with the technology? (Maidique et al., 1984)
- Is the innovation close to the main business area of the firm?
- The innovation is technically complex



This factor is concluded by Pannekoek (2005) en was called Environment. Experts comment on this and stated that environment/sustainable is important for innovations in agrifood.

**9) Sustainable:** In glasshouse and agriculture in general, environment-friendly production is a hot issue. So, most innovations focus on the environment-friendliness of their product/process innovation. OostNV and Rabobank focussing more on innovations that contributes to sustainability. (Pannekoek et al., 2005) The following variables are used:

- Positive effect on the environment (Pannekoek et al., 2005)
- Innovation has positive effect on sustainability

Sustainable is the last success factor selected. In order to check the influence and/or importance of the success factors for project financed by LTO Noord Fondsen, the variables are processed in a survey and send to 40 projects financed by LTO Noord Fondsen. This is worked out in chapter 5.

## Chapter

# 5 Data LTO Noord Fondsen

In order to test if the success factors in the final list actually are important indicators for success in practice, a survey is sent out. . This survey is sent to 40 project leaders of projects, which are financed by LTO Noord Fondsen. Half of the 40 surveys where send to projects that are considered as unsuccessful, the other surveys are send to successful projects.

The first part of this chapter explains the way the survey is set up. The second part of this chapter shows the outcomes of the survey tested in a statistic program (SPSS)

## 5.1 Data collection

In this chapter the subjects; projects, success and survey will be treated in order to exemplify the way of data collection.

### Projects

LTO Noord Fondsen works on the improvement of the economic and social position of agricultural and horticultural entrepreneurs. To reach this mission they want to support a broad variety of projects. Therefore they select potential successful subjects but also strategic projects for a positive contribution to the agrifood sector. For example, projects on environmental/society don't seem the most economic successful projects, but they could be really important for the future of the sector and or economic success of agrifood entrepreneurs. More detailed examples of projects are described in appendix 1. Therefore it is important to test the success factors found in literature and innovation experts on these specific cases of LTO Noord Fondsen. Projects selected for this research are all in line with the mission of LTO Noord Fondsen. All projects are financed between 2007 and 2011, so the minimum life span of a project is about two years.

### Success

Success for LTO Noord Fondsen is broader than solely economic success. Most studies are based on economic success. So for this research it is also important to test these success factors on projects of LTO Noord Fondsen, where LTO Noord Fondsen defines success. Hultin & Robben (1998) stated that the use of 1 criterion to determine success or failure is insufficient. LTO Noord Fondsen uses the following criteria to determine successful projects and unsuccessful projects.

- The innovation has to strengthen the market position by reducing costs or creating added value.
- The newness of the project
- There is cooperation between at least three entrepreneurs and each of them financially invest in the project.

## Survey

For the content of the survey, the final list with success factors and related variables is translated into statements. Each statement could have been answered with a likert scale from 1 to 5. Answering with number 1 means that they totally do not agree with the statement and number 5 means that they totally agree with the statement. For this research it is important to know how projects score at the moment when they prepared the project and are ready to request for funds/loans, and how the project scores on success factors at the moment while filling in the survey (August/September 2013). So in the survey, project leaders scored every statement on 'before' and 'now'. Not scoring a statement was an option, if the statement was not suitable for that specific project. In Figure 2 an example of a survey question is shown where A is 'before' and B is 'now'. The complete survey is shown in appendix 2.

Figure 2 Survey question (in Dutch)

### Product superioriteit:

		<i>belemaal niet mee eens</i>					<i>volledig mee eens</i>				
Het idee achter uw innovatie	a <i>vooraf</i>	1	2	3	4	5					
is totaal nieuw	b <i>nu</i>	1	2	3	4	5					

## 5.2 Results

In total, a response of 30 surveys (out of 40 requests) is received. 25 of them are filled in correctly and are used for this research. Out of 25 surveys, 15 surveys are from successful projects and 10 surveys are from unsuccessful projects.

The missing values in the surveys used in this research are filled in with the means of the associated group, so the unsuccessful or successful group.

Before analysing the data it is important to see what the general trends in the data are. Therefore this research used the frequency distribution, which is a graph plotting values of observations on the horizontal axis, with a bar showing how many times each value occurred in the data set. In an ideal world the data would be distributed symmetrically around the centre of all scores, this is known as normal distribution. In fact it looks how likely it is that a particular score will occur in the data set. While checking the normality for every variable (or survey question) the distribution is not always normal, but is concentrated between 3,5 and 4,5.

The first step of analysing the data is to see if there are differences in means between the group of 15 successful projects and group of 10 unsuccessful projects. Because of the small sample size and the data is not normal distributed, a non-paramatic test is the best way to look for differences between means. Within the non-paramatic tests this research used the Kruskal Wallis test. The Kruskal Wallis test is chosen because it simply orders the scores from lowest to highest, ignoring the group to which the score belongs, and then rank the scores.

The Kruskal Wallis test is used to search for significant differences in answers between the successful projects and unsuccessful projects. Because of the relative small sample, this research used a significance level of 0.1.

In the section 5.2.1 and 5.2.2 this chapter shows per success factor the significant difference of each variable between the successful projects and unsuccessful projects. For all variables with a significant difference, the successful projects scored higher on that variable than the unsuccessful projects. To see what the overall (successful and unsuccessful projects) score is for a specific variable, the mean of both groups is shown. If a variable is significant different, the group with successful projects scored higher than the mean and the group with unsuccessful projects scored lower than the mean.

After presenting the significant difference between the successful projects and unsuccessful projects, this research used a factor analysis on the useful success factors. Factor analyses are used to create groups of variables (components) for studies in which questionnaires are used that consist of a lot of variables (questions). Besides, it could be that some of the variables measure different aspects of a same underlying variable. Because this research collected success factors and variables from different studies, it is important to know how well the variables belong to each success factor. More important, with the factor analysis this research can exclude the variables that do not belong to the success factor.

### 5.2.1 before versus now

In the tables below a distinction is made between before and now. 'Before' is based on the moment when projects prepared the project and are ready to request for funds/loans. 'Now' is based on the moment when project leaders filled in the survey, so August/September 2013. In general, the time between before and now is 2 till 5 years. Both situations are based on the information out of the surveys.

To make it more clear: within the tables, the yellow boxes with 'yes' show that a significant difference between the successful group and unsuccessful group is found on that specific variable. The mean shows the average score of 25 surveys (so for successful and unsuccessful groups) for the variable.

For each success factor, the Kruskal Wallis test - 'before' is shown in appendix 6 and the Kruskal Wallis test - 'now' in appendix 3. The factor analyses are shown in appendix 5.

## Product superiority

Product superiority	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Newness of the innovation (Tepic, 2012)	yes	4,2	yes	3,8
2. Innovation will be of higher quality (Pannekoek et al., 2005)	yes	4,2	no	4,0
3. Prospects for protection were good	no	2,3	no	2,2
4. Relevance of the innovation	no	4,0	no	4,0
5. High potential for creation of additional products (Fortuin., 2007)	no	3,8	no	3,8
6. The innovation will improve the customers loyalty	no	4,3	yes	3,7

Table 1 Product Superiority: 'before' versus 'now'

Using the factor analysis it divides the success factor product superiority in two groups. Group 2, with variable 3 and 5, show no differences between the

successful and unsuccessful group. Therefore group 1, with variable 1,2,4 and 6 will be used for the success factor product superiority.

Before the projects actually started, successful projects are more convinced about the newness and quality of their innovation. While the projects are running, successful projects score better on the variables: Newness of the innovation and the innovation will improve the customers' loyalty. Prospects for protection are low rated by successful and unsuccessful projects.

### Market oriented

Market oriented	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Innovation is new to the market (Pannekoek et al., 2005)	no	4,0	no	3,6
2. High potential need of the innovation	yes	4,2	yes	4,0
3. Idea came from market	no	4,0	no	3,8
4. Market research is conducted (Fortuin et al., 2007)	no	3,1	no	2,9
5. A market trial was performed (Cooper, 1999)	no	2,8	no	2,9
6. Marketing acquired in the innovation process	no	3,3	no	3,8

Table 2 Market oriented: 'before' versus 'now'

Excepted variable 2, no significant difference can be found between the successful group and unsuccessful group. Therefore a factor analysis is not performed.

Successful projects score higher on the variable: high potential need of the innovation while starting the project and while running the project. Looking at the mean of the variables, successful and unsuccessful projects score both medium on market research and a market trial.

### Cross-functional team

Cross-functional team	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. The team is a combination of people with different expertise's	no	3,8	no	3,8
2. The team have the same common goal	no	4,0	yes	3,6
3. The team made strict rules for working together	no	3,0	yes	3,2
4. The responsible project leader is senior (Rothwell et al., 1974)	no	3,7	no	3,8
5. The responsible project leader has responsibility	no	4,4	yes	4,3
6. The responsible project leader has authority	yes	3,7	yes	3,6

Table 3 Cross-functional team: 'before' versus 'now'

Using the factor analysis the success factor cross-functional team can be divided in three groups of variables. The first group consist of variable 2 and 3. Variable 1,5 and 6 belong to group two. Moreover, group three consist of variable 4. The variables of group 1 and 2 will be used to explain the success factor cross-functional team in this research.

Before the projects actually started, this survey indicates that successful projects have a project leader with more authority. In the 'now' perspective, the project team of successful projects have a better common goal and have stricter rules for working together. Moreover, project leaders of successful projects show more responsibility and have more authority.

## Cooperation

Cooperation	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Cooperation with competitors (Batterink et al., 2006)	yes	2,6	yes	2,8
2. Cooperation with suppliers	no	3,6	no	3,6
3. Cooperation with customers	no	3,8	yes	3,6
4. Cooperation with University	no	3,3	yes	3,2
5. Cooperation with research institute	no	3,4	no	3,1
6. The company made strict rules for cooperation (Expert 1)	no	3,1	no	3,3

Table 4 Cooperation: 'before' versus 'now'

Using the factor analysis for the success factor cooperation, the variables are divided in two groups. Group one exists of variable 1,2,3 and 6. Group two exist of variable 4 and 5. Most variables of both groups are higher by successful groups\*. Therefore, the variables of both groups will be used to explain the success factor cooperation.

Before the project actually started, variable 2 till 5 show no statistical difference between successful projects and unsuccessful projects. Only the cooperation with competitors is on forehand more important for successful project. When projects actually started, also cooperation with customers and Universities is more important for successful projects. Based on the value of the mean, for successful and unsuccessful groups is cooperation with competitors least important.

\* When looking at statistical difference between the 15 successful projects and the 6 most unsuccessful projects, variables 1 till 5 show significant difference. (see appendix 4)

## Communication

Communication	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Understanding potential problems (Pannekoek et al, 2005)	no	4,1	no	4,0
2. Good communication skills between team members	no	3,6	no	3,4
3. Open team communication when problems occur	no	4,0	yes	3,6
4. Team expressed commitment to the project	no	4,6	yes	4,2

Table 5 Communication: 'before' versus 'now'

Using the factor analysis for the success factor communication, there is only one group founded for all variables. Therefore, all variables will be used to explain the success factor communication.

Successful projects show a more open team communication and the team is expressing more commitment to the project. Variable 1 and 2 show no difference between the successful and unsuccessful group, but when looking at statistical difference between the 15 successful projects and the 6 most unsuccessful projects, all four variables show significant difference, see appendix 5. Therefore, this research is using all four variables for the success factor communication.

## Protocol

Protocol	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Understanding of user requirements (Rothwell et al., 1974)	no	4,1	no	4,3
2. Clear view on the innovation concept	yes	4,2	yes	4,2
3. A clear view of the benefits of the innovation (Fortuin et al., 2007)	no	4,4	no	4,4
4. A clear view of the future of the innovation	no	4,2	yes	3,8
5. A proficient business model (Expert 1)	no	3,7	no	3,2

Table 6 Protocol: 'before' versus 'now'

Using the factor analysis for the success factor protocol, there is one strong correlated group founded. The group consists of variable 2,3,4, and 5.

Before the project actually started, successful projects have a more clear view on the innovation concept. While the project is running, successful innovation projects have a better view on the concept and the future of the innovation.

## Proficiency of technological activities

Proficiency of technological activities	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. The R&D process is well executed (Rothwell et al., 1972)	no	3,5	no	3,5
2. The R&D process is well planned	no	3,5	yes	3,4

Table 7 Proficiency of technological activities: 'before' versus 'now'

Excepted variable 2, no significant difference can be found between the successes full group and (partly) unsuccessful group. Therefore a factor analysis is not useful.

Successful projects plan their R&D process better.

## Familiarity

Familiarity	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Is the firm familiar with the technology? (Maidique et al., 1984)	no	3,7	no	3,9
2. Is the innovation close to the main business area of the firm?	no	4,3	no	4,2
3. The innovation is technically complex	no	3,6	no	3,6

Table 8 Familiarity: 'before' versus 'now'

No significant difference can be found between the successes full group and (partly) unsuccessful group. Therefore a factor analysis is not useful for this success factor.

## Sustainable

Sustainable	Before		Now	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Positive effect on the environment (Pannekoek et al., 2005)	yes	4,1	yes	4,1
2. Innovation has positive effect on sustainability	yes	4,5	yes	4,4

Table 9 Sustainable: 'before' versus 'before - LTO'

Using the factor analysis for the success factor communication, variable 1 and 2 belong to one group and will be used for this research.

Before the project actually started and when the project is already running, successful projects have a higher positive effect on the environment and sustainability.

Within chapter 5.2.1 this research gave inside in the situation before the project actually started and the situation when the project was already running for 2 till 5 years. Both situations are based on the opinion of the responsible project leaders. Finally this research wants to give recommendations on the assessment of applications of innovative agrifood projects (by LTO Noord Fondsen). Therefore the opinion of the LTO Noord Fondsen is also important.

### 5.2.2 Before versus Before LTO

In the tables 10-18 a distinction is made between 'before' and 'before – LTO'. 'Before' is based on the moment when projects prepared the project and are ready to request for funds/loans (same as in chapter 5.2.1.) Before is based on the surveys filled in by project leaders. 'Before – LTO' is also based on the moment when projects prepared the project and are ready to request for funds/loans, but completed by LTO Noord Fondsen. So the only difference is that this situation is based on the opinion of LTO Noord Fondsen.

For each success factor, the Kruskal Wallis test 'before' is shown in appendix 6 and the Kruskal Wallis test 'before – LTO' is shown in appendix 7.



Below the tables per success factor:

### Product superiority

Product superiority	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Newness of the innovation (Tepic, 2012)	yes	4,2	no	4,4
2. Innovation will be of higher quality (Pannekoek et al., 2005)	yes	4,2	yes	3,8
3. Prospects for protection were good	no	2,3	no	1,8
4. Relevance of the innovation	no	4,0	no	3,6
5. High potential for creation of additional products (Fortuin., 2007)	no	3,8	no	3,7
6. The innovation will improve the customers loyalty	no	4,3	no	3,8

Table 10 Product superiority: 'before' versus 'before - LTO'

For LTO Noord Fondsen, successful projects show a better quality of the innovation on forehand. Instead of project leaders, LTO Noord Fondsen don't agree with the fact that successful projects score higher on newness of the innovation.

### Market oriented

Market oriented:	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Innovation is new to the market (Pannekoek et al., 2005)	no	4,0	no	4,3
2. High potential need of the innovation	yes	4,2	no	3,8
3. Idea came from market	no	4,0	no	3,9
4. Market research is conducted (Fortuin et al., 2007)	no	3,1	no	3,6
5. A market trial was performed (Cooper, 1999)	no	2,8	no	2,8
6. Marketing acquired in the innovation process	no	3,3	no	3,3

Table 11 Market oriented: 'before' versus 'before - LTO'

LTO Noord Fondsen doesn't see differences in marked oriented variables between successful and unsuccessful projects, at the moment they ask for funding.

### Cross-functional team

Cross-functional team	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. The team is a combination of people with different expertise's	no	3,8	no	3,6
2. The team have the same common goal	no	4,0	no	3,9
3. The team made strict rules for working together	no	3,0	no	3,5
4. The responsible project leader is senior (Rothwell et al., 1974)	no	3,7	no	3,3
5. The responsible project leader has responsibility	no	4,4	yes	3,9
6. The responsible project leader has authority	yes	3,7	no	3,4

Table 12 Cross-functional team: 'before' versus 'before - LTO'

LTO Noord Fondsen noticed that successful projects show to have a more responsible project leader than unsuccessful projects, at the moment they ask for funding.

## Cooperation

Cooperation	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Cooperation with competitors (Batterink et al., 2006)	yes	2,6	no	3,2
2. Cooperation with suppliers	no	3,6	no	3,6
3. Cooperation with customers	no	3,8	no	3,5
4. Cooperation with University	no	3,3	yes	2,6
5. Cooperation with research institute	no	3,4	yes	3,1
6. The company made strict rules for cooperation (Expert 1)	no	3,1	yes	3,1

Table 13 Cooperation: 'before' versus 'before - LTO'

LTO Noord Fondsen noticed that successful projects show more intention for cooperation with Universities and Research institutions in the starting phase. Successful projects also show that they make more strict rules for cooperation, at the moment they ask for funding.

## Communication

Communication	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Understanding potential problems (Pannekoek et al., 2005)	no	4,1	yes	3,7
2. Good communication skills between team members	no	3,6	no	3,5
3. Open team communication when problems occur	no	4,0	no	3,3
4. Team expressed commitment to the project	no	4,6	yes	3,9

Table 14 Communication: 'before' versus 'before - LTO'

LTO Noord Fondsen noticed that successful projects have a better understanding of problems and expressing more commitment to project, at the moment they ask for funding.

## Protocol

Protocol	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Understanding of user requirements (Rothwell et al., 1974)	no	4,1	no	3,6
2. Clear view on the innovation concept	yes	4,2	yes	3,8
3. A clear view of the benefits of the innovation (Fortuin et al., 2007)	no	4,4	yes	3,9
4. A clear view of the future of the innovation	no	4,2	no	3,4
5. A proficient business model (Expert 1)	no	3,7	no	2,5

Table 15 Protocol: 'before' versus 'before - LTO'

LTO Noord Fondsen noticed that successful projects have a more clear view on the innovation concept and benefits of the innovation than unsuccessful projects, at the moment they ask for funding.

### Proficiency of technological activities

Proficiency of technological activities	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. The R&D process is well executed (Rothwell et al., 1972)	no	3,5	yes	3,8
2. The R&D process is well planned	no	3,5	no	3,2

Table 16 Proficiency of technological activities: 'before' versus 'before - LTO'

LTO Noord Fondsen noticed that successful projects execute their R&D process better than unsuccessful projects, at the moment they ask for funding.

### Familiarity

Familiarity	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Is the firm familiar with the technology? (Maidique et al., 1984)	no	3,7	no	3,7
2. Is the innovation close to the main business area of the firm?	no	4,3	yes	3,5
3. The innovation is technically complex	no	3,6	no	3,6

Table 17 Familiarity: 'before' versus 'before - LTO'

Instead of the project leaders, LTO Noord Fondsen noticed that successful projects have an innovation closer to the main business area of the firm.

### Sustainable

Sustainable	Before		Before - LTO	
	Statistical difference between successful and unsuccessful projects	Mean	Statistical difference between successful and unsuccessful projects	Mean
1. Positive effect on the environment (Pannekoek et al., 2005)	yes	4,1	yes	2,7
2. Innovation has positive effect on sustainability	yes	4,5	no	3,8

Table 18 Sustainable: 'before' versus 'before - LTO'

LTO Noord Fondsen is less convinced about the sustainability of the projects than the project leaders itself. Moreover, LTO Noord Fondsen is noticing that successful projects have a more positive effect on the environment than unsuccessful projects.

## Chapter

# 6 Conclusion

The aim of this chapter is to answer the research question:

**How can LTO Noord Fondsen improve the assessment of innovative agrifood projects?**

To answer this question the results from chapter 5 are taken into account. The conclusion is based on the relation between the most important success factors and how LTO Noord Fondsen rated the successful and unsuccessful projects before they financed the projects. The second part describes the relation between theory and conclusions. Moreover, limitations and directions for further research are shown.

In line with several other studies, this research concludes that innovation is a multi-functional process. Success cannot be explained by a single factor or several factors alone. Therefore this research divides 9 success factors in important and less important factors. First, important factors are discussed.

For projects financed by LTO Noord Fondsen, **communication** is an important success factor. LTO Noord Fondsen is able to see that successful projects have more understanding and express more commitment to the project, when assessing the applications of the projects. Concluding from this, the communication skills of team members and the open communication when problems occur need attention when assessing applications of new projects. Another important success factor is having a **cross-functional team**. LTO Noord Fondsen discovered a stronger responsibility of project leaders from successful projects, when assessing the applications of the projects. Therefore the same goal, strict rules for working together and authority of the project leader need extra attention while assessing applications of new projects. **Cooperation** is also important, but cooperation with competitors is the most unattractive way of cooperation for successful and unsuccessful projects. LTO Noord Fondsen discovered that successful projects show more cooperation with Universities and research institutes. Cooperation with competitors, suppliers and customers need more attention when assessing applications of new projects. For the important factor **Product superiority**, customer's loyalty, the newness, the quality and relevance of the innovation are the underlying variables. While LTO Noord Fondsen assess projects for funding, they discovered that successful projects show a higher quality of the innovation. The other three variables need more attention when assessing applications of new projects. **Sustainability** shows to be important for successful projects. LTO Noord Fondsen has to pay more attention on the effect of the innovation on sustainability.

The following success factors are not that important for success. **Protocol** is not extreme important but need attention because it shows that a clear view on the innovation and the future of the innovation is important. LTO Noord Fondsen needs to pay more attention on how projects do have a clear view on the future of the innovation, when assessing the applications of new projects for funding. **Market oriented** shows no high correlation with successful projects except the high potential need of the innovation. **Proficiency of technological activities** is not important but LTO Noord Fondsen need to pay more attention on the planning of the R&D process, when assessing the applications of new projects. More **familiarity** with the innovation does not lead to success but LTO Noord Fondsen discovered that successful projects have innovations that are closer to the main business area of the firm.

### **Conclusions in relation to the theory**

Product superiority and market need are discovered as important success factors for general and agrifood success factor studies. Where general success factors studies concluded that marketing, R&D and understanding of user needs (Rothwell, 1972; Maidque & Zirger, 1984) are important, agrifood studies focus on team communication (Fortuin et al., 2007), cooperation and environment (Pannekoek et al., 2005). The important success factors for agrifood projects financed by LTO Noord Fondsen are characterized by; cooperation, communication, cross-functional team, product superiority and sustainability. The extreme focus on communication, cooperation and cross-functional team is partly explicable by the agrifood project but it also depends on the selection/success criteria used by LTO Noord Fondsen.

### **Limitations and discussion**

This research is concerned with some important facts to take into account.

- The success factors are not specified for product or process innovations. This results in testing success factors on a broad variety of projects and can lead to misconception of conclusions.
- Success factors are only discussed with two innovation experts.
- Projects didn't start on the same date what makes it possible that projects leaders would have answered different when the project is further in the process.
- The surveys are not objective, because they are based on the opinions of projects leaders, whom are more inclined to give positive answers.
- Not every project within the successful group or unsuccessful group is even successful or unsuccessful.
- Project leaders will be more inclined to fill out the survey a little too positively instead of negatively.
- To increase the reliability of the research, a bigger sample than 25 is desirable
- LTO Noord Fondsen filled in the surveys afterwards, about how every project scored on the success factors before the project actually started. This could lead to a misconception

Taking the limitations into account, this research translated a theoretical view on success factors into useful information for the assessment of new projects of LTO Noord Fondsen. For a better statistical reliability, a bigger sample of surveys is needed.

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# Appendices

## Appendix 1: Project descriptions

LTO Noord Fondsen doesn't want to present the different projects in this research by name and specific content. To give a representative view of projects used in this research, goals of different projects are presented.

- Create a more sustainable potato seed sector, and realise more revenues and better working methods.
- Create a digital place where supply of authentic products and demand find each other.
- Realize a new dairy brand in which nature organisations, farmers and retailers are working together.
- Build a manure digester for producing energy.
- Improve corn production by using a different production method.
- Producing algae for biofuel, feed, animal feed and pharmaceutical purposes.



# Enquête

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## Intro

Als master student Management Economics and Consumer studies aan de Wageningen Universiteit, ben ik momenteel bezig met het schrijven van mijn afstudeerscriptie. Mijn scriptie schrijf ik voor LTO Noord Fondsen en mijn doel is om meer inzicht te krijgen in de factoren die van invloed zijn voor het functioneren van een innovatief project. Om niet alleen van de literatuur uit te gaan wil ik een aantal factoren gaan testen bij projecten van LTO Noord Fondsen.

Het onderzoek bestaat uit stellingen die ingaan op verschillende factoren die van invloed kunnen zijn op het functioneren van uw project. Deze stellingen kunnen beantwoord worden met een schaal van 1 t/m 5. De enquête zal ongeveer 20 minuten van uw tijd in beslag nemen.

Dit onderzoek kan alleen waardevol worden als uw antwoorden op de waarheid berusten. Daarom wil ik u melden dat er met uw gegevens strikt vertrouwelijk wordt omgegaan. Ik vraag u dan ook om de antwoorden op te sturen naar de Universiteit Wageningen middels de envelop die is bijgevoegd. Uitkomsten van het onderzoek zullen alleen geaggregeerd inzichtelijk worden voor LTO Noord Fondsen, zij zullen dus geen individuele scores kunnen herleiden.

De envelop die is bijgevoegd kan zonder postzegel op de post worden gedaan. Ik zal er erg mee geholpen zijn als u de enquête voor 19 augustus 2013 opstuurt naar Wageningen.

Hartelijk dank voor uw deelname!

Koen Kromhof

De stellingen zullen ingaan op factoren die van invloed kunnen zijn op het functioneren van het project. Bij elke stelling wordt er gevraagd in situatie a en b te antwoorden. Hieronder wordt er uitgelegd wat met a en b bedoeld wordt:

**a:** Hierbij gaat het om het moment dat u, uw projectvoorstel heeft voorgelegd aan mogelijke financiers (bijv. LTO Noord Fondsen). U wordt dus gevraagd om bij a antwoord te geven op een stelling met de informatie die u toen kenbaar heeft gemaakt aan mogelijke financiers.

**b:** bij b wordt gevraagd hoe u nu tegen de situatie aankijkt.

Antwoorden kunnen gegeven worden met een schaal van 1 t/m 5 waarbij 1 aangeeft dat u het helemaal niet eens bent met de stelling en 5 aangeeft dat u het volledig eens bent met de stelling. U kunt het juiste antwoord omcirkelen.

Het is erg van belang dat u bij elke vraag nagaat hoe deze situatie was tijdens de financieringsaanvraag en hoe u nu naar het project kijkt. Het is bijvoorbeeld heel aannemelijk dat u bij het aanvragen van de financiering dacht dat het idee achter uw innovatie totaal vernieuwend zou zijn en dus antwoordmogelijkheid a scoort met een 5 terwijl tijdens het project is gebleken dat het idee toch niet zo vernieuwend is en antwoordmogelijkheid b scoort met een 3.

Mocht er een vraag niet van toepassing zijn op uw project, dan kunt u deze vraag onbeantwoord laten.

### Product superioriteit:

		<i>helemaal niet mee eens</i>				<i>volledig mee eens</i>
Het idee achter uw innovatie is totaal nieuw	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Uw innovatie is van hogere kwaliteit	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Uw innovatie is erg goed beschermd tegen namaak	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Uw innovatie is erg relevant voor de gebruiker	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Uw innovatie zorgt voor veel vervolg innovaties in de toekomst	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Uw innovatie zal de klantenbinding erg versterken	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5

### Markt georiënteerd:

		<i>helemaal niet mee eens</i>			<i>volledig mee eens</i>
Uw innovatie is totaal nieuw op de markt	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Uw innovatie is hoog nodig	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Het idee van uw innovatie komt vanuit de markt	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Uw innovatie heeft een gedegen marktonderzoek ondergaan	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Uw innovatie heeft een gedegen marktproef ondergaan	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Voor bekendwording van uw product maakt u gebruik van marketing	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5

### Cross-functional team

		<i>helemaal niet mee eens</i>			<i>volledig mee eens</i>
Het projectteam bestaat uit mensen met veel verschillende vakgebieden	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
In het projectteam heeft iedereen hetzelfde gezamenlijke doel	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Het projectteam heeft strenge onderlinge afspraken voor de samenwerking	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
De projectleider is een senior in het vak (meer dan 20 jaar relevante ervaring)	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
De projectleider toont grote verantwoordelijkheid	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
De projectleider heeft veel gezag	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5

## Samenwerking

		<i>helemaal niet mee eens</i>			<i>volledig mee eens</i>
U werkt samen met concurrenten	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
U werkt samen met toeleveranciers	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
U werkt samen met klanten	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
U werkt samen met een Universiteit	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
U werkt samen met een onderzoekscentrum	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
U stelt een samenwerkingscontract op bij eventuele samenwerking	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5

## Communicatie

		<i>helemaal niet mee eens</i>			<i>volledig mee eens</i>
Uw projectteam begrijpt potentiële problemen goed	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Uw projectteam beschikt over erg goede communicatie vaardigheden	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Bij problemen wordt open gecommuniceerd	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Het team toont verbondenheid met het project	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5

## Protocol

		<i>helemaal niet mee eens</i>			<i>volledig mee eens</i>
Gebruikers eisen worden goed begrepen	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Het projectteam heeft een helder beeld van het innovatie project (inhoud, doelen etc.)	a <i>vooraf</i>	1	2	3	4 5
	b <i>nu</i>	1	2	3	4 5
Het projectteam heeft een helder beeld	a <i>vooraf</i>	1	2	3	4 5

van de voordelen van het innovatie project	b <i>nu</i>	1	2	3	4	5
Het projectteam heeft een helder beeld over de toekomst van het innovatie project	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Het project beschikt over een goed verdienmodel	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5

### Technische activiteiten

		<i>belemaal niet</i>			<i>volledig</i>	
		<i>mee eens</i>			<i>mee eens</i>	
Het ontwikkeling traject van de innovatie is erg goed uitgewerkt	<i>a vooraf</i>	1	2	3	4	5
	<i>b nu</i>	1	2	3	4	5
Het ontwikkeling traject is erg goed gepland	<i>a vooraf</i>	1	2	3	4	5
	<i>b nu</i>	1	2	3	4	5

### Bekendheid

		<i>beleemaal niet</i>			<i>volledig</i>	
		<i>mee eens</i>			<i>mee eens</i>	
Het projectteam is erg goed bekend met de technologie achter de innovatie	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Het innovatieproject staat volledig in lijn met de kernactiviteiten van het bedrijf/projectteam	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
De innovatie is technisch gezien erg complex	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5

### Duurzaam

		<i>belemaal niet</i>			<i>volledig</i>	
		<i>mee eens</i>			<i>mee eens</i>	
Het innovatieproject heeft een erg positieve uitwerking op de natuur	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5
Het innovatieproject draagt enorm bij aan de verduurzaming	a <i>vooraf</i>	1	2	3	4	5
	b <i>nu</i>	1	2	3	4	5

## Appendix 3: Kruskal Wallis test Project leaders: ‘now’

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Pro 1- Het idee achter uw innovatie is totaal nieuw is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,050	Reject the null hypothesis.
2	The distribution of Pro 2- Uw innovatie is van hogere kwaliteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,218	Retain the null hypothesis.
3	The distribution of Pro 3- Uw innovatie is erg goed beschermd tegen namaak is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,908	Retain the null hypothesis.
4	The distribution of Pro 4- Uw innovatie is erg relevant voor de gebruiker is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,219	Retain the null hypothesis.
5	The distribution of Pro 5- Uw innovatie zorgt voor veel vervolg innovaties in de toekomst is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,282	Retain the null hypothesis.
6	The distribution of Pro 6- Uw innovatie zal de klanten binding versterken is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,033	Reject the null hypothesis.
7	The distribution of Mar 1- Uw innovatie is totaal nieuw op de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,671	Retain the null hypothesis.
8	The distribution of Mar 2- Uw innovatie is hoog nodig is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,007	Reject the null hypothesis.
9	The distribution of Mar 3- Het idee achter uw innovatie komt vanuit de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,542	Retain the null hypothesis.
10	The distribution of Mar 4- Uw innovatie heeft een gedegen marktonderzoek ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,932	Retain the null hypothesis.
11	The distribution of Mar 5- Uw innovatie heeft een gedegen marktproef ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,955	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
12	The distribution of Mar 6- Voor bekendwording van uw product maakt u gebruik van marketing is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,820	Retain the null hypothesis.
13	The distribution of Cro 1- Het projectteam bestaat uit mensen met veel verschillende vakgebieden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,398	Retain the null hypothesis.
14	The distribution of Cro 2- In het projectteam heeft iedereen hetzelfde gezamenlijke doel is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,051	Reject the null hypothesis.
15	The distribution of Cro 3- Het onderlinge afspraken voor samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,028	Reject the null hypothesis.
16	The distribution of Cro 4- De projectleider is een senior in het vak (meer dan 20 jaar relevante ervaring) is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,930	Retain the null hypothesis.
17	The distribution of Cro 5- De projectleider toont grote verantwoordelijkheid is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,008	Reject the null hypothesis.
18	The distribution of Cro 6- De projectleider heeft veel gezegd is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,011	Reject the null hypothesis.
19	The distribution of Sam 1- U werkt samen met concurrenten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,068	Reject the null hypothesis.
20	The distribution of Sam 2- U werkt samen met toeleveranciers is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,115	Retain the null hypothesis.
21	The distribution of Sam 3- U werkt samen met klanten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,088	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
22	The distribution of Sam 4- Uw werkt samen met een Universiteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,044	Reject the null hypothesis.
23	The distribution of Sam 5- Uw werkt samen met een onderzoekscentrum is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,105	Retain the null hypothesis.
24	The distribution of Sam 6- U stelt een samenwerkingscontract op bij eventuele samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,379	Retain the null hypothesis.
25	The distribution of Com 1- Het projectteam begrijpt potentiële problemen goed is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,227	Retain the null hypothesis.
26	The distribution of Com 2- Uw projectteam beschikt over erg goede communicatie vaardigheden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,140	Retain the null hypothesis.
27	The distribution of Com 3- Bij problemen wordt open gecommuniceerd is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,049	Reject the null hypothesis.
28	The distribution of Com 4- Het team toont verbondenheid met het project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,015	Reject the null hypothesis.
29	The distribution of Ptc 1- Gebruikers eisen worden goed begrepen is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	1,000	Retain the null hypothesis.
30	The distribution of Ptc 2- Het projectteam heeft een helder beeld van het innovatie project(inhoud, doelen etc) is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,078	Reject the null hypothesis.
31	The distribution of Ptc 3- Het projectteam heeft een helder beeld van de voordelen van het innovatie project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,701	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
32	The distribution of Ptc 4- Het projectteam heeft een helder beeld over de toekomst van het innovatie project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,006	Reject the null hypothesis.
33	The distribution of Ptc 5- Het projectteam beschikt over een goed verdienmodel is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,203	Retain the null hypothesis.
34	The distribution of Tec 1- Het ontwikkelingstraject van de innovatie is erg goed uitgewerkt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,353	Retain the null hypothesis.
35	The distribution of Tec 2- Het ontwikkelingstraject is erg goed gepland is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,055	Reject the null hypothesis.
36	The distribution of Bek 1- Het projectteam is erg goed bekend met de technologie achter de innovatie is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,767	Retain the null hypothesis.
37	The distribution of Bek 2- Het innovatieproject staat volledig in lijn met de kernactiviteiten van het bedrijf/projectteam is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,479	Retain the null hypothesis.
38	The distribution of Bek 3- De innovatie is technisch gezien erg complex is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,209	Retain the null hypothesis.
39	The distribution of Du 1- het innovatieproject heeft een erg positieve uitwerking op de natuur is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,066	Reject the null hypothesis.
40	The distribution of Du 2- Het innovatieproject draagt enorm bij aan de verduurzaming is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,007	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

## Appendix 4: Kruskal Wallis test Project leaders: ‘now’ (between 15 successful and 6 most unsuccessful projects)

### Cooperation

Hypothesis Test Summary			
	Null Hypothesis	Test	Sig. Decision
1	The distribution of Sam 1- U wekt samen met concurrenten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,046 Reject the null hypothesis.
2	The distribution of Sam 2- U wekt samen met toeleveranciers is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,089 Reject the null hypothesis.
3	The distribution of Sam 3- U wekt samen met klanten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,072 Reject the null hypothesis.
4	The distribution of Sam 4- U wekt samen met een Universiteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,028 Reject the null hypothesis.
5	The distribution of Sam 5- U wekt samen met een onderzoekscentrum is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,037 Reject the null hypothesis.
6	The distribution of Sam 6- U stelt een samenwerkingscontract op bij eventuele samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,282 Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

### Communication

Hypothesis Test Summary			
	Null Hypothesis	Test	Sig. Decision
1	The distribution of Com 1- Het projectteam begrijpt potentiële problemen goed is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,037 Reject the null hypothesis.
2	The distribution of Com 2- Uw projectteam beschikt over erg goede communicatie vaardigheden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,023 Reject the null hypothesis.
3	The distribution of Com 3- Bij problemen wordt open gecommuniceerd is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,003 Reject the null hypothesis.
4	The distribution of Com 4- Het team toont verbondenheid met het project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,002 Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.



## Appendix 5: Factor analysis

Product superiority sig. 0,06

**Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Pro 5- Uw innovatie zorgt voor veel vervolg innovaties in de toekomst	,859	
Pro 3- Uw innovatie is erg goed beschermd tegen namaak	-,814	
Pro 2- Uw innovatie is van hogere kwaliteit	,475	,447
Pro 4- Uw innovatie is erg relevant voor de gebruiker		,729
Pro 1- Het idee achter uw innovatie is totaal nieuw		,704
Pro 6- Uw innovatie zal de klanten binding erg versterken		,575

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Cross-functional team sig. 0,001

**Rotated Component Matrix<sup>a</sup>**

	Component		
	1	2	3
Cro 3- Het projectteam heeft strenge onderlinge afspraken voor samenwerking	,923		
Cro 2- In het projectteam heeft iedereen hetzelfde gezamenlijke doel	,875		
Cro 1- Het projectteam bestaat uit mensen met veel verschillende vakgebieden		,756	
Cro 5- De projectleider toont grote verantwoordelijkheid		,749	
Cro 6- De projectleider heeft veel gezag		,661	
Cro 4- De projectleider is een senior in het vak (meer dan 20 jaar relevante ervaring)			,969

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

**Cooperation sig. 0.0****Rotated Component Matrix<sup>a</sup>**

	Component	
	1	2
Sam 3- U werkt samen met klanten	,883	
Sam 2- U werkt samen met toeleveranciers	,809	
Sam 1- U werkt samen met concurrenten	,624	
Sam 6- U stelt een samenwerkingscontract op bij eventuele samenwerking		
Sam 4- U werkt samen met een Universiteit		,972
Sam 5- U werkt samen met een onderzoekscentrum		,956

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

**Communication sig: 0,0**

Because this variable consist of 1 component, a rotated component matrix is not possible. Therefore, a component matrix:

**Component Matrix<sup>a</sup>**

	Component
	1
Com 3- Bij problemen wordt open gecommuniceerd	,903
Com 1- Het projectteam begrijpt potentiële problemen goed	,855
Com 4- Het team toont verbondenheid met het project	,830
Com 2- Uw projectteam beschikt over erg goede communicatie vaardigheden	,735

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

**Protocol sig: 0,0**

Because this variable consist of 1 component, a rotated component matrix is not possible. Therefore, a component matrix:

**Component Matrix<sup>a</sup>**

	Component
	1
Ptc 1- Gebruikers eisen worden goed begrepen	
Ptc 2- Het projectteam heeft een helder beeld van het innovatie project(inhoud, doelen etc)	,928

Ptc 3- Het projectteam heeft een helder beeld van de voordelen van het innovatie project	,897
Ptc 4 - Het projectteam heeft een helder beeld over de toekomst van het innovatie project	,626
Ptc 5 - Het projectteam beschikt over een goed verdienmodel	,745

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

### Sustainable sig: 0,0

Because this variable consist of 1 component, a rotated component matrix is not possible. Therefore, a component matrix:

Component Matrix <sup>a</sup>	
	Component
	1
Du 2 - Het innovatieproject draagt enorm bij aan de verduurzaming	,946
Du 1- het innovatieproject heeft een erg positieve uitwerking op de natuur	,946

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

## Appendix 6: Kruskal Wallis test project leaders: ‘before’

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Pro 1- Het idee/achter uw innovatie is totaal nieuw is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,033	Reject the null hypothesis.
2	The distribution of Pro 2- Uw innovatie is van hogere kwaliteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,097	Reject the null hypothesis.
3	The distribution of Pro 3- Uw innovatie is erg goed beschermd tegen namaak is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,729	Retain the null hypothesis.
4	The distribution of Pro 4- Uw innovatie is erg relevant voor de gebruiker is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,145	Retain the null hypothesis.
5	The distribution of Pro 5- Uw innovatie zorgt voor veel vervolg innovaties in de toekomst is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,123	Retain the null hypothesis.
6	The distribution of Pro 6- Uw innovatie zal de klanten binding versterken is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,311	Retain the null hypothesis.
7	The distribution of Mar 1- Uw innovatie is totaal nieuw op de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,834	Retain the null hypothesis.
8	The distribution of Mar 2- Uw innovatie is hoog nodig is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,013	Reject the null hypothesis.
9	The distribution of Mar 3- Het idee/achter uw innovatie komt vanuit de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,439	Retain the null hypothesis.
10	The distribution of Mar 4- Uw innovatie heeft een gedegen marktonderzoek ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,406	Retain the null hypothesis.
11	The distribution of Mar 5- Uw innovatie heeft een gedegen marktproof ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,932	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
12	The distribution of Mar 6- Voor bekendwording van uw product maakt u gebruik van marketing is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,777	Retain the null hypothesis.
13	The distribution of Cro 1- Het projectteam bestaat uit mensen met veel verschillende vakgebieden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,771	Retain the null hypothesis.
14	The distribution of Cro 2- In het projectteam heeft iedereen hetzelfde gezamenlijke doel is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,745	Retain the null hypothesis.
15	The distribution of Cro 3- Het projectteam heeft strenge onderlinge afspraken voor samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,334	Retain the null hypothesis.
16	The distribution of Cro 4- De projectleider is een senior in het vak (meer dan 20 jaar relevante ervaring) is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,487	Retain the null hypothesis.
17	The distribution of Cro 5- De projectleider toont grote verantwoordelijkheid is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,379	Retain the null hypothesis.
18	The distribution of Cro 6- De projectleider heeft veel gezag is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,045	Reject the null hypothesis.
19	The distribution of Sam 1- U werkt samen met concurrenten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,080	Reject the null hypothesis.
20	The distribution of Sam 2- U werkt samen met toeleveranciers is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,270	Retain the null hypothesis.
21	The distribution of Sam 3- U werkt samen met klanten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,681	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
22	The distribution of Sam 4 - Uw werkt samen met een Universiteit is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,399	Retain the null hypothesis.
23	The distribution of Sam 5 - Uw werkt samen met een onderzoekscentrum is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,954	Retain the null hypothesis.
24	The distribution of Sam 6 - U stelt een samenwerkingscontract op bij eventuele samenwerking is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,428	Retain the null hypothesis.
25	The distribution of Com 1 - Het projectteam begrijpt potentiële problemen goed is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,952	Retain the null hypothesis.
26	The distribution of Com 2 - Uw projectteam beschikt over erg goede communicatie vaardigheden is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,642	Retain the null hypothesis.
27	The distribution of Com 3 - Bij problemen wordt open gecommuniceerd is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,513	Retain the null hypothesis.
28	The distribution of Com 4 - Het team toont verbondenheid met het project is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,552	Retain the null hypothesis.
29	The distribution of Pto 1 - Gebruikers eisen worden goed begrepen is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,862	Retain the null hypothesis.
30	The distribution of Pto 2 - Het projectteam heeft een helder beeld van het innovatie project (inhoud, doelen etc) is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,022	Reject the null hypothesis.
31	The distribution of Pto 3 - Het projectteam heeft een helder beeld van de voordelen van het innovatie project is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,385	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
32	The distribution of Pto 4 - Het projectteam heeft een helder beeld over de toekomst van het innovatie project is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,489	Retain the null hypothesis.
33	The distribution of Pto 5 - Het projectteam beschikt over een goed verdienmodel is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,320	Retain the null hypothesis.
34	The distribution of Tec 1 - Het ontwikkelingstraject van de innovatie is erg goed uitgewerkt is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,552	Retain the null hypothesis.
35	The distribution of Tec 2 - Het ontwikkelingstraject is erg goed gepland is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,568	Retain the null hypothesis.
36	The distribution of Bek 1 - Het projectteam is erg goed bekend met de technologie achter de innovatie is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,433	Retain the null hypothesis.
37	The distribution of Bek 2 - Het innovatieproject staat volledig in lijn met de kernactiviteiten van het bedrijf/projectteam is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,883	Retain the null hypothesis.
38	The distribution of Bek 3 - De innovatie is technisch gezien erg complex is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,359	Retain the null hypothesis.
39	The distribution of Du 1 - het innovatieproject heeft een erg positieve uitwerking op de natuur is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,062	Reject the null hypothesis.
40	The distribution of Du 2 - Het innovatieproject draagt enorm bij aan de verduurzaming is the same across categories of succes.	Independent Samples Kruskal-Wallis Test	,044	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

## Appendix 7: Kruskal Wallis test LTO Noord Fondsen ‘before’

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Pro 1- Het idee achter uw innovatie is totaal nieuw is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,283	Retain the null hypothesis.
2	The distribution of Pro 2- Uw innovatie is van hogere kwaliteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,029	Reject the null hypothesis.
3	The distribution of Pro 3- Uw innovatie is erg goed beschermd tegen namaak is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,137	Retain the null hypothesis.
4	The distribution of Pro 4- Uw innovatie is erg relevant voor de gebruiker is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,302	Retain the null hypothesis.
5	The distribution of Pro 5- Uw innovatie zorgt voor veel vervolg innovaties in de toekomst is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,947	Retain the null hypothesis.
6	The distribution of Pro 6- Uw innovatie zal de klanten binding versterken is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,317	Retain the null hypothesis.
7	The distribution of Mar 1- Uw innovatie is totaal nieuw op de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,259	Retain the null hypothesis.
8	The distribution of Mar 2- Uw innovatie is hoog nodig is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,169	Retain the null hypothesis.
9	The distribution of Mar 3- Het idee achter uw innovatie komt vanuit de markt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,768	Retain the null hypothesis.
10	The distribution of Mar 4- Uw innovatie heeft een gedegen marktonderzoek ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,182	Retain the null hypothesis.
11	The distribution of Mar 5- Uw innovatie heeft een gedegen marktproef ondergaan is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	1,000	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
12	The distribution of Mar 6- Voor bekendwording van uw product maakt u gebruik van marketing is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,138	Retain the null hypothesis.
13	The distribution of Cro 1- Het projectteam bestaat uit mensen met veel verschillende vakgebieden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,476	Retain the null hypothesis.
14	The distribution of Cro 2- In het projectteam heeft iedereen hetzelfde gezamenlijke doel is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,221	Retain the null hypothesis.
15	The distribution of Cro 3- Het projectteam heeft strenge onderlinge afspraken voor samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,259	Retain the null hypothesis.
16	The distribution of Cro 4- De projectleider is een senior in het vak (meer dan 20 jaar relevante ervaring) is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,197	Retain the null hypothesis.
17	The distribution of Cro 5- De projectleider toont grote verantwoordelijkheid is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,069	Reject the null hypothesis.
18	The distribution of Cro 6- De projectleider heeft veel gezag is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,259	Retain the null hypothesis.
19	The distribution of Sam 1- U werkt samen met concurrenten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,500	Retain the null hypothesis.
20	The distribution of Sam 2- U werkt samen met toeleveranciers is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	1,000	Retain the null hypothesis.
21	The distribution of Sam 3- U werkt samen met klanten is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,403	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
22	The distribution of Sam 4 - U werkt samen met een Universiteit is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,022	Reject the null hypothesis.
23	The distribution of Sam 5- U werkt samen met een onderzoekscentrum is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,037	Reject the null hypothesis.
24	The distribution of Sam 6- U stelt een samenwerkingscontract op bij eventuele samenwerking is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,042	Reject the null hypothesis.
25	The distribution of Com 1- Het projectteam begrijpt potentiële problemen goed is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,016	Reject the null hypothesis.
26	The distribution of Com 2- Uw projectteam beschikt over erg goede communicatie vaardigheden is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,128	Retain the null hypothesis.
27	The distribution of Com 3- Bij problemen wordt open gecommuniceerd is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,567	Retain the null hypothesis.
28	The distribution of Com 4- Het team toont verbondenheid met het project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,069	Reject the null hypothesis.
29	The distribution of Pto 1- Gebruikers eisen worden goed begrepen is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,189	Retain the null hypothesis.
30	The distribution of Pto 2- Het projectteam heeft een helder beeld van het innovatie project(inhoud, doelen etc) is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,009	Reject the null hypothesis.
31	The distribution of Pto 3- Het projectteam heeft een helder beeld van de voordelen van het innovatie project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,069	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
32	The distribution of Pto 4 - Het projectteam heeft een helder beeld over de toekomst van het innovatie project is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,150	Retain the null hypothesis.
33	The distribution of Pto 5 - Het projectteam beschikt over een goed verdienmodel is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,519	Retain the null hypothesis.
34	The distribution of Tec 1 - Het ontwikkelingstraject van de innovatie is erg goed uitgewerkt is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,002	Reject the null hypothesis.
35	The distribution of Tec 2 - Het ontwikkelingstraject is erg goed gepland is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,257	Retain the null hypothesis.
36	The distribution of Bek 1 - Het projectteam is erg goed bekend met de technologie achter de innovatie is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,180	Retain the null hypothesis.
37	The distribution of Bek 2 - Het innovatieproject staat volledig in lijn met de kernactiviteiten van het bedrijf/projectteam is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,081	Reject the null hypothesis.
38	The distribution of Bek 3 - De innovatie is technisch gezien erg complex is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,529	Retain the null hypothesis.
39	The distribution of Du 1- het innovatieproject heeft een erg positieve uitwerking op de natuur is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,024	Reject the null hypothesis.
40	The distribution of Du 2 - Het innovatieproject draagt enorm bij aan de verduurzaming is the same across categories of succes.	Independent-Samples Kruskal-Wallis Test	,103	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,10.