Identifying Lead Users Through a Personality Characteristics Survey

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ABSTRACT
A lead user is someone who faces a need before the rest of the population faces this need. Since they are in front of the trend by months or sometimes several years, their need is not yet satisfied by the market which can result in the lead user to satisfy the need himself. Found in the Global Report 2012 by the Global Entrepreneurship Monitor that there is a large group of people in deprived regions who have entrepreneurial and creative skills which are potentially lead users. There is a vast literature on the importance and difficulty of the identification process of lead users. This study aims to answer whether this scale, partially from unpublished work of Marlies Stuiver, used to filter potential lead users from a target population, is valid and reliable. Four experts give their feedback on the different validities, and SPSS is used to statistically test the survey on validity and reliability, with the use of factor analysis, Cronbach's alpha and KR-20 tests. The findings conclude that some adjustments need to be made in order to ensure complete validity and reliability. Questions will need to be moved according to the factor analysis outcome. Furthermore, when the questions are moved accordingly, the reliability is very strong however, a complete construct falls off. This construct will need adjustment for future research and use of this survey.

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1. INTRODUCTION

The lead user construct, as described by von Hippel (1986), will be central in this research. A lead user is someone who faces a need before the rest of the population faces this need. Since they are in front of the trend by months or sometimes several years, their need is not yet satisfied by the market which can result in the lead user to satisfy the need himself (von Hippel, 1986). The Global Entrepreneurship Monitor researches the influence of entrepreneurship on economic growth. The research Global Report 2012 indicates that there is a group of people in socially deprived regions that have entrepreneurial skills and creativity power but lack the resources to develop their idea into products and businesses (Becker, Franco-Garcia & Groen, 2013), there are potential lead users in this large group of people. Although the importance of identifying lead users is great, it is also difficult. A research argues that finding lead users is difficult since lead users are 'rare subjects' in a population (Hippel, Franke, & Prügl, 2008), this makes improving lead user identification important and theoretically relevant.

A relatively recent study focusses on finding lead users, in their business model proposition for product co-creation centers, which is abbreviated as PC3, 'p' standing for 'product' and 'c3' for co-creation center'. (Becker, Franco-Garcia, & Groen, 2013). A PC3 is an environment where participants are given support to develop their idea into a working prototype. It serves as a business pre-incubator for its participants (Becker et al, 2013). A PC3 can be supporting all kinds participants but has its focus on people from deprived regions. Becker et al. (2013) found, through analysing data from the Global Report 2012, that there is a gap in current support of deprived region entrepreneurship. Furthermore, entrepreneurship is an engine in the social and economic development of the deprived regions, which shows practical relevance in further research towards lead users and identification of lead users (Aghion & Howitt, 1998). This in combination with the aim of a PC3, which is to fill the gap that individuals are experiencing concerning resources, capabilities and expertise. So, a PC3 is an (physical) environment where potential entrepreneurs can interact with experts to evolve their initial idea into a prototype and a business plan (Becker et al, 2013). Everybody is welcome to participate in a PC3, however, Becker et al. argue that individuals having lead user characteristics have a higher likelihood to successfully participate in a PC3 process (Becker et el. 2013).

Current research methods for finding lead users, such as (mass) screening, are not efficient enough, take up much time and require a lot of resources (Lühtje 2000). This study aims to answer whether the scale, used to filter potential lead users from a target population, is valid and reliable. The goal of this research will be to test the scale of Marlies Stuiver for validity and reliability with the help of experts and the use of statistical tests. The validity is tested with the help of experts in the field. The scale will be optimized with their help and tested for reliability by doing a sample of 50 respondents. The respondents will be people from socially deprived areas in Enschede, because this is where, possibly, a PC3 is launched and because the University of Twente is located in Enschede. This paper will contribute to the existing literature about lead user identification and will result in an optimized and tested scale.

2. THEORETICAL FRAMEWORK

2.1 Literature Review

Becker et al (2013) found from analysing the Global Report 2012 by the Global Entrepreneurship Monitor that there is a large group of people in deprived regions who have entrepreneurial and creative skills which are potentially lead users. Stated is that there is a much greater entrepreneurial intention in factor-driven economies, the underdeveloped countries, than in innovation-driven countries, the more developed countries. This shows a pattern where people in deprived regions show more intention in entrepreneurship but also are more entrepreneurial, with for example, the highest scores of entrepreneurial activity found in Sub-Saharan Africa and Latin America (Becker et al, 2013; Global Report, 2012). Such entrepreneurship is an engine in the social and economic development, since it requires improvement of existing knowledge and organizations and targets improvements of the local community (Aghion & Howitt, 1998). This creates a huge importance of finding these potential lead users and helping them in their process of developing ideas to businesses and commercialization. However, as mentioned, identification of lead users is not easy. Existing literature about lead users puts forth some key constructs and characteristics which will help in the identification process when bundled.

A lead user, as first described by von Hippel (1986) is a user whose present needs will become general in a marketplace months or years later. Since lead users experience a need months or years before the bulk of the marketplace picks up or experiences this need, the lead user often proceeds to attempt and satisfy this need themselves. They can either do this by enhancing an existing product or by creating a completely new product. Von Hippel (1986) also describes expected benefit as a lead user characteristic. Expected benefit is explained as the benefit obtained by creating a solution for those unmet needs. Since lead users have an unmet need, finding a solution for this need will have a great expected benefit for them. Furthermore, as previously mentioned, lead users are described as 'rare subjects' (von Hippel et al, 2008), this means that individuals with the desired attributes or characteristics become rarer in a population which makes them harder to identify. In order to make it easier and more efficient to find lead users, Lüthje (2004) adds lead user characteristics in his study to the two characteristics of von Hippel (1986): 'ahead of trend' and 'expected benefits'. Lüthje suggests to add product-related knowledge, use experience, involvement and opinion leadership in order to make it easier to identify lead users in the consumer goods market. Product-related knowledge, use experience and involvement are three characteristics that are relevant in the identification of lead users and will be integrated throughout this research. Opinion leadership will not be included in the study since it will not help with the identification of lead users via a survey.

Belz and Baumbeck (2010) further elaborated on the lead user construct and the identification of lead users in a population. A number of empirical studies show empirical evidence of lead users enhancing or developing products. This research is done in a great number of different markets; software, industrial goods, consumer goods and sports equipment. Overviews of all these studies are found in numerous empirical studies (Lüthje & Herstatt, 2004; von Hippel, 2005; Schreier & Prügl, 2008) showing the great interest and importance of lead users in product development. The empirical studies also show the market failing to satisfy the need of the users. These studies show previous lead user identification in many different markets. Several questions from these studies are used in the survey, under the construct of 'market failure', which is tested in this research.

Different resources such as assistance or expertise are brought forward in the literature relevant to lead user identification. There are user-communities where members share information, assistance and innovations freely (Franke & Shah, 2003). There are multiple reasons why users freely share their innovations.

Protection of the innovation can be difficult and expensive (Allen, 1983), or the user expects reputational gains for their innovation from community members (Allen, 1983; Harhoff, Henkel & von Hippel, 2003). Furthermore, their innovation can become standard in the market when further improved, and lastly, users share the innovation hoping and expecting others to further improve their innovation (Allen 1983; von Hippel 2005). Whenever the new innovation is finished, the innovation is shared with everyone in the community, not just with the member who helped in the process (Franke & Shah, 2003). Expertise is another key characteristics of lead users and also shared within communities. Expertise about products or a field of interest is crucial in the development of an idea into a product or service, whether it is personal expertise or acquired expertise from experts. Expertise or knowledge combined with use experience could result in new or improved products. Conclusions and items from these studies are central in the scale development and are used to form questions for the questionnaire under the construct of 'resources'.

A common method of identifying lead users from a target population is via screening with use of surveys and or interviews. Screening is widely used in a number of studies (Urban & Hippel, 1998; Herstatt & Hippel, 1992; Hippel, 2005; Franke & Shah, 2003; Lüthje, 2000, 2004; Lüthje & Herstatt, 2004; Morrison, Roberts & Midgley, 2004; Schreier & Prügl, 2008; Schreier, Oberhauser & Prügl, 2007). A survey which has a standardized and quantitative approach, screening a large group of people hoping to identify the users with the desired attributes. It is often conducted via written questionnaires, telephone interviews or via internet surveys. The survey, for example in the search of lead users, will contain questions about personal characteristics. Subjects scoring high in terms of them having the desired characteristics are selected from the group for further research. Unfortunately screening also has its downsides. Since lead users are rare in a population, this form of identification can be inefficient. The study of Lüthje (2000) shows a screening of over 2000 respondents which only identified 22 lead users. Another downside is the way of evaluating and making of the conducted surveys, which can be misleading, since it comes down to human opinion. This can be countered by testing the survey on a small group of people and evaluating the results on validity, reliability and observations made on how respondents react on the survey. This helps minimizing the human opinion before testing the survey on the greater public. Furthermore, increasing the efficiency of the screening can be done by selecting your respondents and not by random, in this case the deprived regions of Enschede are chosen with multiple reasons which will be explained later.

All these researches and studies combined show different connections about lead user behavior and characteristics. Starting with the definition and explanation of von Hippel (1986) about the lead user and how a lead user is ahead of trend. The lead user is ahead of trend and has a need or problem which is not yet satisfied by what is out on the market. The market is failing to satisfy the needs of people since it does not provide for all problems or needs. These unmet needs are, as already shown previously, then provided for by lead users themselves since they try to solve the problem and develop something for their unmet need (Lüthje & Herstatt, 2004; von Hippel, 2005; Schreier & Prügl, 2008). This has been shown in many different segments throughout the market. The development of these novel products or services to satisfy the unmet needs of lead users was only possible because the lead users had experience, assistance and expertise. As shown in the overviews of all these researches, the lead users didn't always do it on their own (Lüthje & Herstatt, 2004; von Hippel, 2005; Schreier & Prügl, 2008). The experience could be first-hand or second-hand, they could have had the experience but lacked knowledge for which they needed assistance.

2.2 Scale Constructs

The study of Lüthje (2000) as previously mentioned shows how inefficient the screening method can be. This makes choosing the right constructs and variables very important. This study will use three main constructs brought forward in the literature as explained above. The constructs are operationalized with items, questions. Market failure, lead user characteristics and resources will be the three main constructs of the survey, drawn from the literature, each consisting of two sub-constructs. Product-related knowledge, use experience and involvement are three characteristics that will be integrated throughout the survey, this because they are not constructs on their own and could fall under multiple constructs. The constructs that will be measured in this survey look as follows:

Table 1. Operationalization of the Survey

Construct	Definition	Operationalization	Source
Market failure	The market does not provide for the needs of everyone which leave certain needs unmet.	The sub-constructs are 'market failing to satisfy' and 'opportunity recognition'. This construct will contain questions about unmet needs, improvement of product or service, product or service development and recognition of the problem or need.	Franke & Shah (2003); Morrison et al. (2000); De Jong (2009); Pongtanalert & Ogawa (2015); Lüthje, Herstatt and von Hippel (2006)
Lead user characteristics	Lead user characteristics as first described by von Hippel, which are: ahead of trend and expected benefit.	The sub-constructs are 'ahead of trend' and 'expected benefit'. This construct will contain questions about people being up-to-date about new products or services and interested in buying new products or services soon after release. Expected benefit will be measured with questions about the impact of the unmet need, how dissatisfied people are with current offer or products or services.	Lillien (2002); Frank & Shah (2003); Morrison et al (2000); Belz (2010)

Resources	The resources that will be measured in this construct will be assistance with the development of the product or services and expertise.	The sub-constructs are 'assistance' and 'expertise'. This construct will contain questions about given or received support. Furthermore, questions about expertise, knowledge about the best materials or technological expertise.	Franke & Shah (2003); Lettl (2007); Lillien (2002); Lüthje (2002); Lüthje, Herstatt and von Hippel (2006)

2.2.1 Market Failure

Incorporating the construct market failure and opportunity recognition into this research will help to identify lead users from a target population. Individuals complaining about the market or government failing to supply the population with the needed products or services have the insight of what is missing and not offered on the market. This can function as an indicator for a lead user characteristic. There can be multiple different reasons why the market isn't supplying this product or service, for example lack of knowledge, experience or resources. Individuals can either first-hand experience the need for this missing product or service, or they can hear of this need from people in their social or professional network (Franke & Shah, 2003). Another problem with failure by the market is that the opportunity is simply not recognized to jump into this gap and put something on the market (Lüthje et al, 2006). However, this will be very hard to measure under lead users who have not yet undertaken action, under entrepreneurs for example, this would be easier to measure. Individuals who recognize the opportunity can have ideas and try to exploit the gap in the market with their new product or by improving existing ones. Individuals experiencing market failure or insights show desired characteristics of lead users.

2.2.2 Lead User Characteristics

Lead user characteristics is another important construct to incorporate in this study. Since the goal of this questionnaire will be to identify lead users from a target population, one must incorporate lead user characteristics related questions in the survey. The two main lead user characteristics are, as described before; ahead of trend and expected benefit (von Hippel, 1986). The other three lead user characteristics that were described before, product-related knowledge, use experience and involvement will be incorporated throughout the survey. Product knowledge and use experience are, for example, both relevant in the questions concerning opportunity recognition and market failure. Use experience is furthermore questioned in the expertise variable. Involvement is integrated in both the ahead of trend and assistance variables. Ahead of trend is important to incorporate since it can help identify, for example, by showing what kind of buyer someone is which shows something about his or her character or whether there are unmet needs (Belz & Baumback, 2010). Furthermore people being ahead of trend have needs others have not yet experienced, this unmet need can occur months or even years before others experience this (von Hippel, 1986). It could show whether they think it is important to be amongst the first to buy a novel product, this shows us whether they think it is important to be up to date with new products in their field of interest or professional field. Another characteristic that will help in the identification process is the expected benefit people will experience. How dissatisfied someone is with the current products or services or even the product or service completely missing will influence someone to undertake action. He or she can decide to develop the product or service themselves when they have the knowledge and resources, and when they think the expected benefit is worth it.

2.2.3 Resources

Assistance and expertise can also be good indicators to help identify people as lead users. Having expertise and use experience in a field of interest is important for a lead user. Lead users often develop novel products or improve existing ones with their own experience and expertise (Lüthje & Herstatt, 2004; von Hippel, 2005; Schreier & Prügl, 2008). Without expertise and experience lead user will not be able to think of new ideas to create or improve products or services. They will also not be able to spot the problem, find a solution and recognize the opportunity since they simply don't have the knowledge and know-how. However, lead users don't and aren't always doing it all by themselves. Lead users tend to exchange information about new ideas on products and services (Pongtanalart & Ogawa, 2015). Lead users seek advice and thoughts on their idea from members in the community. Found is that 9 out of the 40 of the most active members in the studied community possess more lead user attributes or characteristics (Belz & Baumback, 2010). Lead user can furthermore be active in marketing or production research or test groups for companies and factories. ''Marketing researchers face serious difficulties if they attempt to determine new product needs falling outside of the real-world experience of the users they analyse'' (von Hippel, 1986 p.796). Von Hippel describes it as a use for lead users but could also be an indicator of lead user activities and characteristics.

3. METHODOLOGY

3.1 Method

The relationship of the different constructs is shown below in Figure 1. The model should be interpret as when people show characteristics on the left side of the model this could mean that they are a lead user. People having more than one characteristic connecting them with 'potential lead user', the higher the likelihood of them in fact being a lead user. People showing a variable as shown below is a sign of someone possibly possessing more and in fact being a lead user. Note that people possessing one variable are not lead users. People showing a combination of variables or constructs are considered potential lead users. Each of the three main constructs consist of two sub-constructs as explained in the previous section.

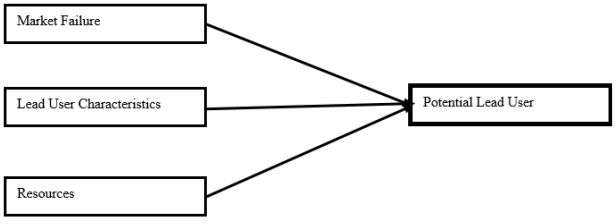

Figure 1. Lead User Identification Model

3.2 Operationalization and Scale Development

Development of the scale and questionnaire are partially already done in unpublished work from Marlies Stuiver who is

researching PC3 possibilities. Parts of the much greater questionnaire Marlies Stuiver made will be used in this study. As earlier stated the main constructs; market failure, lead user characteristics and resources each have sub-constructs with items (questions) relevant for these constructs that will make the variables and the desired characteristics measureable. The sub-constructs are market failure, opportunity recognition, ahead of trend, expected benefit, assistance and expertise. The items relevant to each construct are extracted from many different researches as explained in Table 1. There are some adjustments made to the survey of Marlies Stuiver to use it for lead user identification which is what this research studies.

In order to say something about the validity of the survey several experts were contacted and were asked to review the survey and give their feedback. Four experts from the academic staff of the NIKOS department from the University of Twente reviewed the survey and gave comprehensive feedback. The process is done in two ways, the first is an interview where the expert was given the survey and then asked to review it with some questions in mind. The questions were concerned with the constructs; items; answer possibilities; and validity. The survey was also sent via mail to a few experts with a small introduction and the questions, to use to evaluate the survey and give feedback, attached. After all feedback is collected, adjustments concerning choice of words and question formulation are made, also a couple of questions were added to the survey.

The first expert is Jaap van Tilburg, who is an expert on the field of innovation, entrepreneurship and spin-off business start-ups, with a lot of publications and experience in this field which makes him an useful expert for this research. Martin Stienstra, is a professor at the university, lecturing about innovative entrepreneurship and innovation. This makes Martin Stienstra a useful addition to the team of experts evaluating the questionnaire. Tijs van den Broek is the third member of the expert team with his area of expertise being social movement theory and social entrepreneurship and extensive researcher. Frans Jonkman is the final expert of the team, with expertise in the field of creating successful innovations and working with surveys.

3.3 Target Group

The target group of this research will be the people living in socially deprived regions of Enschede. In the region of Twente, Enschede is a municipality which is, relatively to other municipalities in Twente, socially deprived. The unemployment rate, for example, is highest in this area of the Netherlands when the 50 biggest cities were compared (RTL Nieuws, 2016). Other research show an unemployment rate of 8,5% in Enschede (Kennispunt Twente, 2016). Within the municipality of Enschede, districts as Dolphia, Wesselerbrink and Pathmos are most socially deprived and therefore focus of this study.

3.4 Data Collection

As earlier stated the data will be collected with the use of a survey. This survey is held in the districts of Dolphia, Wesselerbrink and Pathmos, where 50 surveys were collected in total. The survey will be held by either going door to door or near a mall, and handing the respondents a printed version of the survey. An explanation about the survey, and that it will be used in a final thesis project for the university of Twente was given prior to the respondents filling in the survey. This form of survey allows for respondents to stop halfway, which could be the case for different reasons, although this is discouraged. The surveys from respondents stopping halfway will still be useful for data analysis. This because respondents fill in the data and it is collected as they write.

3.5 Data Analysis

The survey will be analysed in terms of validity and reliability. Validity is the extent to which measurement tools measure what it is supposed to measure, the constructs and the goal of the survey. The face, construct and content validity will be measured using the data and the interviews with the experts (Babbie, 2001). The face validity is a measure of how representative a research project is and whether it appears to be a good at face value, which means that by just looking at it does it seem to measure what it says it should be measuring. The construct validity defines how good a survey measures up to its claims, to what it claims to measure. It says something about the appropriateness of inferences made on the basis of measurements, which could be statistical tests. The content validity is an estimation of how much an item represents the construct it falls under. In order to do so, the data from the paper survey will be put into a database in a program called SPSS. SPSS is predictive analytics software and often used as the tool to analyse data in studies. With the database in SPSS the data can be subject to a wide variety of statistical analysis. Factor analysis, Cronbach's alpha and KR-20 tests will be done to help answer the question whether the survey is reliable. In other words, do the items accurately measure what it is supposed to measure; the construct it falls under. The Cronbach's alpha tests will be done on ordinal items. Where a Kudar-Richardson-20 (KR20) is used on dichotomous questions, which are questions with only two answer possibilities, in this questionnaire that are the yes or no questions.

4. RESULTS

4.1 Face Validity

The face validity, measures how representative the survey is and whether it appears to be a good survey, which is a subjective measurement of validity, it is measured from two perspectives. The perspective of experts reviewing the survey, and the respondents of the survey. To start with the experts' view, the four experts agree upon the survey to be good 'at face value'. Of course, remarks and feedback were given, but not disturbing their view on the face value of the survey to be well which can be read in the first table in the appendix. The operationalisation, how a construct is measured, seems good. The measures, the items, make sense and appear to measure what the survey is trying to measure. Furthermore, since the items were derived from earlier studies and bundled under constructs by Marlies Stuiver, the opinion of the four experts was that then they were expected to be good items.

The perspective and opinion of the respondents show a slightly different one than the experts'. During the process of answering the survey, several observations were made. In terms of 'face value' of the survey, it was not clear to all the respondents what the survey was exactly about and therefor didn't always seem logical why some questions were asked, despite the fact that a small explanation was given. Which is not weird in social sciences, and was already pointed out by two experts. Although, the vast majority of the respondents understood the relevance of the constructs and items.

The face validity of the survey seems to be good. The experts and the respondents think that the items used to measure the constructs seem to make sense.

4.2 Construct Validity

The construct validity defines how good the items measures what it says it measures; the construct and the meaning of the construct. It is based on the logical inferences made on the basis of observations, in this study the expert interviews, and measurements, in this study the test scores. A comprehensive explanation of the construct validity in terms of the tests scores will be done later on in this section. Most of the constructs are observed as valid, five out of the six, where no further adjustments need to take place for its construct validity. However, one constructs raises some questions with two of the experts, the construct 'opportunity recognition'. The construct and the items are expressed as vague and are not understood well. This raises the question whether this construct is measuring the right thing. The answer possibilities of the items were slightly changed after these comments, into clearer 5 point likert scales, this was done before the survey was executed in order to try to improve the item and the relation with the construct. The rest of the six constructs were seen as good and valid by the four experts, the logical relationships among the constructs, and with the overall goal of the survey were clear. The main reason for this overall opinion of the experts is the fact that the questions and constructs are from earlier research and are bundled under returning constructs in the literature, starting with the early work of von Hippel (1986) about lead users. The finding and bundling of these questions were done by Marlies Stuiver, this helped the experts determining whether or not they thought the constructs were valid. Since there is no standard study, these similar but more specific studies and the work of Marlies Stuiver are the bases of the opinion of experts on the construct validity of this survey.

4.3 Content Validity

The content validity refers to how much a measurement covers the range of meanings which are included within a construct (Babbie, 2001). Questioned in this type of validity is whether all the different constructs and the goal of the survey is measured accurately and completely. The four experts are in agreement that the goal of the survey is supported by a complete range of constructs, and that these constructs measure the goal as earlier stated, only the construct of 'opportunity recognition' raises questions again in terms of content validity. Three experts do have some additional questions they would like to see added to different constructs to increase the content validity, in other words, to increase the completeness of the constructs in their eyes. The items that are added are; item three, six, seven and ten in 'market failure', which can be found in the questionnaire in the appendix as questions 6, 8 and 9. Furthermore, items two and three in 'assistance' were added, which can be found in the questionnaire in the appendix as questions 29 and 30. These questions were added in order to further increase the content validity of the construct. The consequences these additions had on the reliability of the constructs are explained in the next subsection.

Additionally, a few remarks are made, by two experts, concerning answer possibilities that should be adjusted to improve the completeness of the item. This adjustment of answer possibility was done for the items in the constructs; 'expected benefit', 'assistance' and 'expertise'. The answer possibilities were seen as incomplete and were therefor adjusted to make sure the range was complete. Also, after being pointed out by an expert, some items were given a likert scale instead of a yes or no answer possibility to improve the range and to match the item with the other items in the construct from the same study it was taken from. Concluding, the construct validity of the survey looks good, only minor adjustments and additions were done after listening to the remarks of the experts.

4.4 SPSS

4.4.1 Factor Analysis

Trying to measure something that can't be directly measured is something that is done in social sciences, this research is an example of this. Whether or not someone is a lead user can't be measured directly. The different facets that can identify lead users are measured with constructs and variables. The factor analysis is an example of such a measuring technique. The factor analyses has three main uses: it is a technique used to identify groups or clusters of variables; questionnaire construction to measure and underlying variable; and to reduce a dataset to a more manageable size (Field, 2000). The questionnaire is structured with the six sub-constructs, five of which can be measured with the test. The items are deliberately placed under constructs with the use of literature. One construct that can't be included in this analysis is the 'market failure' construct since it consists of items that can't be analysed, since these are dichotomous or yes/no questions. The factor analysis measures which questions correlate with each other and places them in a component or factor. Expected is that if the questionnaire is perfectly structured that the clustered items, a component, correspond with the way that the questionnaire is structured in terms of constructs. The test will tell whether the item that is stated under a certain construct is actually measuring the unobserved factor or construct it falls under. Also, although the items are measuring different aspects, they are measuring the same thing and could show intercorrelation between the

Table 2. Rotated Component Matrix

	Component				
	1	2	3	4	5
Q20	**,859**	,140	,096	-,035	-,099
Q21	**,813**	,248	,255	,140	,032
Q17	**,781**	,242	,258	,173	-,163
Q18	**,730**	,341	**,409**	,328	-,098
Q19	**,727**	,332	**,411**	,336	-,105
Q16	**,722**	,344	**,413**	,327	-,090
Q22	**,582**	,162	,313	**,516**	-,137
Q34	,232	**,918**	,163	,156	,001
Q35	,232	**,917**	,162	,163	,005
Q32	,290	**,844**	,194	,307	-,088
Q33	,292	**,843**	,191	,311	-,092
Q13	,299	,185	**,921**	,137	-,052
Q15	,304	,190	**,919**	,129	-,052
Q14	,307	,190	**,916**	,136	-,060
Q30	,155	,093	,107	**,742**	,359
Q36	,017	**,412**	,079	**,679**	-,239
Q28	,333	**,488**	,190	**,670**	,063
Q27	,338	**,489**	,189	**,663**	,050
Q11	-,121	-,009	-,063	-,010	**,966**
Q12	-,135	-,075	-,071	,091	**,944**

constructs, however too much intercorrelation is not a good sign, then the question might be too broad. The intercorrelation is too much when a single item is scoring above 0,7 in two factors.

The table above shows the scores of the factor analysis, scores that are in bold are the scores that are above the threshold of 0,4 which is the minimum score to show correlation (Field, 2000). High scores mean high correlation between questions in the component. The questions corresponding with the numbers in table 2 can be found in the second table in the appendix. Clusters of questions put together in a component is what the factor analysis calculates. Without correlation this can´t be done, that is why there is a threshold for this score set at 0,4 for this correlation, scoring below this threshold means that the questions are too independent from each other. Note that the questionnaire consists of six constructs and the table is only showing five of them, this is because of the items of construct 'market failure', where none of the items are items that can be included in this analysis because of its answer possibilities, since the factor analysis does not include dichotomous questions.

The table shows five components and the twenty ordinal questions. Several questions have scored above the threshold in two components. Meaning the questions correlate with other questions in multiple components. The component in which the question scores highest is the component the question should fall under. It is possible that this component in a different component that what was expected. The reliability will be measured using the constructs as structured in the questionnaire, and by using the components taken from the factor analysis. There are a few scores that are surprising in the factor analysis. Table 3 shows the items sorted by construct as they were structured in the questionnaire and the items sorted per component as how they scored in the factor analysis.

Table 3. Component and Construct Comparison

Component and construct	Questions per construct	Factor analysis outcome
#1 Expected benefit	20 21 22 27	16 17 18 19 20 21 22
#2 Expertise	32 33 34 35 36	32 33 34 35
#3 Ahead of trend	13 14 15 16 17 18 19	13 14 15
#4 Assistance	28 30	27 28 30 36
#5Opportunity recognition	11 12	11 12

Several questions show abnormalities, the items score higher in a different component than was expected in the survey structuring. Questions 16, 17, 18 and 19 were expected to fall under the third component yet score a higher correlation in the first component. They do however also score above the threshold of 0,4 in the third component, except question 17 scoring below the threshold. Questions 17 shows no significant correlation with the questions in the construct it falls under which means that either the questions is placed wrong of the question itself is not good. After reviewing the questions concluded is that it should be removed since the question should fall under the expected construct. On the same note, question 36 scores higher correlation with the 'assistance' construct questions instead of with the questions from the 'expertise' construct as was expected. The item, concerning whether someone is seen as an expert in his field is expected to fall under expertise but could also fall under assistance, since people could assist others when seen as expert in some field. This question will not be removed from the survey, because it could fall under both constructs. Questions 22 scores high, or at least above the threshold in both 'expected benefit' and 'assistance', scoring highest in the expected component, and thus will need no further explanation. Questions 28 scores high in both 'expertise' and 'assistance', where expected was that the item would fall under 'assistance' which is also where it scored highest. The correlation in both these components is not abnormal since the question concerns whether or not someone join in conversations about new products or services. Question 27, however, is abnormal because of its correlation with two components above the threshold, neither of which being the expected component. The item concerned the felt frustration by respondents because of thoughtfulness of certain aspects of a product or service. Expected was to see correlation with questions from the 'expected benefit' construct, high frustration could mean great benefit if a solution is found, this however was a score of just ,338. Scoring higher correlation with questions from the 'assistance' and 'expertise' construct, both resource based constructs. The questions could also fall under 'expertise' or 'assistance' and should therefore be moved.

The test also confirmed that a lot of questions are in fact clustered the right way under a certain component. Fourteen out of the twenty questions that were showing correlation were clustered in a group as they were expected to be. Furthermore, four of the items are placed different than they were expected to be. Two questions, 17 and 27 score unacceptable with the expectation. The questionnaire was structured in quite an acceptable manner with a lot of questions being clustered in components as they were expected to in the structuring of the questionnaire. Nevertheless, the test shows the items do not perfectly cluster and the questionnaire will need adjustment to increase the validity and better the structure of the questionnaire. The test will show perfectly clustered components if the questionnaire is adjusted and if done correctly. Adjustments will need to be made in order to use this questionnaire in further research, as it is now the questionnaire does not show complete validity. However, they are not major or insuperable, the test shows that the questionnaire is on the right track.

4.4.2 Reliability Tests Prior to Factor Analysis

The survey contains both ordinal and dichotomous questions, these questions have to be analysed differently in SPSS. The constructs are separately analysed and within the construct the ordinal and dichotomous questions are analysed separately, with the use of Cronbach's Alpha and the KR-20 tests. Results from SPSS are shown in Table 4 below, these are the results without interference from the factor analysis. Seen is that in overall the analysis is showing good scores. The Cronbach's Alpha's are calculated for the items which are answered with the 5-point likert scales. KR-20 is another tests to calculate a Cronbach's Alpha, however this test is for the items answered with yes or no. The minimum score of Cronbach's Alpha is 0,7 for a scale to be considered valid. Some constructs have both ordinal and dichotomous questions and will therefor show a Cronbach's Alpha and a KR-20 score.

Table 4. SPSS Reliability Scores

Scale	**Cronbach's Alpha**	**KR-20**
Market failure	-	0.081
Opportunity recognition	0,960	-
Ahead of trend	0,953	-
Expected benefit	0,827	0,909

Assistance	0,674	0,936
expertise	0,926	-

In short, the table with the SPSS scores shows a few things, the 'market failure' construct has a problematic KR-20 score. The 'assistance' construct scores just under the minimum of 0,7 with the Cronbach's Alpha test, however, scores very good with the remaining questions measured with the KR-20. The rest of the constructs show good scores and thus show reliability. A comprehensive analysis of the scores will be done per construct. Items that were not useable because of the answer possibilities, were left out of the analysis since no results in terms of reliability can be drawn from them.

Reliability Statistics 'Market failure'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,081	,561	6

What is seen here is an outcome generated by SPSS, showing the Cronbach's Alpha score and the number of items of the construct. It shows a terrible Cronbach's Alpha score of 0,081, which is not even close to the threshold of 0,7. To find the explanation for this bad score the inter-item correlation matrix and then item-total statistics are analysed. The inter-item correlation matrix show low correlation scores between the items, the scores aren't higher than 0,4 which is low. If an item would be deleted from the construct a new Cronbach's Alpha score is calculated and this is showed in the item-total statistics table in SPSS. This table shows that there could be an increase in Cronbach's Alpha score if item three of the construct is deleted, which is question six of the questionnaire, the new score will then be 0,596 which is closer to the threshold but still not good enough. If other items were to be deleted the score would drop or would increase with 0,001 to 0,003 which is negligible. When, additionally to the third item being removed, another item is removed which is holding down the Cronbach's Alpha score the score will go up to 0,623, still not high enough to get past the threshold of 0,7. This means that this scale is not reliable the way it is setup right now, this will need to be changed if this construct is to be used, starting with the removal of questions six. This question was suggested to be added by one of the experts. Also, a question should be added to increase the score and reliability of the construct.

Reliability Statistics 'Opportunity recognition'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,960	,960	2

This construct shows a very good Cronbach's Alpha of 0,96, which is a lot higher than the minimum of 0,7. However, a lot of data is missing in this construct because the questions were simply not answered. The questions were experienced as difficult and not filled in, or did not apply on the respondent. Furthermore, the construct only consisted of two items, which was addressed by the experts as a weak point. Nevertheless, the statistical analysis measures this construct as reliable, although it has its weak points.

Reliability Statistics 'Ahead of trend'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,953	,961	7

The 'ahead of trend' construct scores 0,953 with all the items in the scale, this is measured as very reliable. When one of the seven item will be removed from the study the Cronbach's alpha will decrease, only if the fifth item is removed the Cronbach's Alpha is increased by 0.005 which is negligible. So, we can say that this scale is very reliable scoring where no further adjustments need to be made in terms of reliability.

Reliability Statistics 'Expected benefit'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,827	,835	4

Taking the four items that can be used to measure the Cronbach's Alpha in this scale the Cronbach's Alpha is 0,827. Which is an acceptable score above the threshold. Removing items from this test will not cause the reliability to increase, on the contrary, it will cause it to decrease. No further adjustments will need to be made.

Reliability Statistics 'Expected benefit'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,909	,909	4

The score of the KR-20 tests, only including the yes or no questions in this test is 0,909. This is an acceptable score well above the threshold and to be called a reliable construct. The score could increase to 0,953 if item 4 of the construct is removed, however, there is no reason to do this because the score is good. The construct as a whole scores well above the threshold and is measured to be reliable.

Reliability Statistics 'Assistance'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,674	,714	2

The score falls just under the threshold of 0,7 with a score of 0,674. Note that the test consists of just two items where more items will, in general, result in a higher Cronbach's Alpha score. This result on its own is not good enough to conclude that this

construct is reliable, more items will need to be added to ensure the reliability.

Reliability Statistics 'Assistance'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,936	,938	2

The KR-20 gives a much greater score, a score of 0,936 which is well over the threshold and shows reliability. However, this test also consists of just two items where more items will give a better view although it is a good score. When both tests of the construct are combined, one could conclude that the 'assistance' construct as a whole can be called reliable.

Reliability Statistics 'Expertise'

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,926	,943	5

Another good Cronbach's Alpha score way above the minimum with 0,926 with five items in this construct. This could even increase to 0,978 if the last item if removed. However, there is no reason to remove an item because of the acceptable score.

Concluding the analysis of the reliability of the questionnaire one could say that in general the constructs are reliable. Four of the six constructs show scores well above the threshold. One construct which is tested with both Cronbach's Alpha and the KR-20 score scores just under and well over the threshold respectively, combining both tests will give a reliable construct. Nevertheless, one construct fails to score an acceptable Cronbach's Alpha and will need some serious adjustment, where deleting one question as explained will help significantly, however, that will be only the beginning and not the complete solution. In general the constructs score good and above the threshold of 0,7, therefore one could say that these constructs are reliable and precisely measure the construct.

4.4.3 Reliability Tests After Factor Analysis

What is shown below are the reliability scores conducted over the components as they were structured by SPSS in the factor analysis. The construct 'market failure' isn't included in these tests since the questions of this construct could not be included in the factor analysis and therefore are not structured in one of the components. For the components only the Cronbach's Alpha test is conducted since all the questions have a likert scale.

Table 5. SPSS Reliability Scores

Component	**Cronbach's Alpha**	**Number of Items**
#1 Expected benefit	0,948	7
#2 Expertise	0,978	4
#3 Ahead of trend	1,000	3
#4 Assistance	0,895	4
#5Opportunity recognition	0,960	2

The components which were formed in the factor analysis all score well over the threshold of 0,7 which shows very good reliability. Since there are questions moved around from the construct as structured in the questionnaire and the components, some components will need different names to keep them relevant. Furthermore, since the dichotomous questions can't be used there are less items in these Cronbach's Alpha tests.

Table 6. Component Structuring

Component	**Consists of (#) questions from construct**
#1 Expected benefit	Expected benefit (3) + Ahead of trend (4)
#2 Expertise	Expertise(4)
#3 Ahead of trend	Ahead of trend (3)
#4 Assistance	Expected benefit (1) + Assistance (2) + Expertise (1)
#5 Opportunity recognition	Opportunity recognition (2)

There are three components where either nothing changed or questions were moved out of the construct and therefore need no change in the name of the construct, this concerns the constructs; 'expertise', 'ahead of trend' and 'opportunity recognition'. The first component consists of 'expected benefit' and 'ahead of trend' items. After reviewing the relevant questions, a new name for this construct has to be something with being informed about new products or services and dissatisfaction of the current supply. Which could be 'dissatisfaction through pioneering'. Furthermore, component four consists of questions from the 'expected benefit', 'assistance' and 'expertise' construct. After reviewing the relevant questions, a new name for this construct will need to involve frustration with simplicity, participating in conversations about new products, receiving assistance and being seen as an expert. This component consists of a few different facets not really showing one absolute key point of overall relevance, which makes it difficult to label. If the questionnaire is restructured as explained then the questionnaire will be both valid and reliable as the scores show. Also, the questionnaire will consist of less questions and will still be as good, and even better concerning validity and reliability.

5. CONCLUSION

5.1 Conclusion

Concluding the research on the questionnaire concerning lead user identification in terms of validity and reliability. The validity of the questionnaire is measured in two ways; the factor analysis and with the help of the four experts. The face, construct and content validity are agreed upon to be good by the four experts who reviewed the questionnaire and gave their feedback. Of course, the questionnaire was not perfect and the experts gave remarks and adjustment advice, most remarks concerned: the weakness of the opportunity recognition construct, adjustment of answer possibilities and adding questions. These were not major adjustments and therefore, the questionnaire is seen as valid by the experts. The opinion about the questionnaire was strengthened by the fact that the items came from literature and were bundled and structure by Marlies Stuiver precisely and deliberately.

The factor analysis did however shed a critical light on the questionnaire. The analysis showed the constructs that need

adjustment as explained in the results, these however are not major or insuperable. The questionnaire will need adjustment concerning the placement of the questions, some will need to be slightly adjusted and placed under a different construct. An example of this is question 27, scoring higher in two other components than it in the one it was on forehand placed, this means it will need major adjustment or completely deleted.

The reliability of the questionnaire, prior to changed made after the factor analysis, is measured per construct with the use of the Cronbach's Alpha and KR-20 test. The tests concluded that five of the six constructs showed acceptable scores. The only construct that was concerned to be not reliable was the 'market failure' construct. A single item was the major reason of the bad score of the construct. The start of the improvement of this construct will be to delete the third item of the construct, increasing the score of 0,081 to 0,596. More questions will need to be added to improve the reliability of this construct and to increase its reliability beyond the threshold. Furthermore, as explained in the results section it is advised to drop several questions from the constructs to increase reliability, where also question will need to be added to give a better view concerning the reliability.

The reliability of the constructs if they were changed in the way the factor analysis prescribes, then the reliability will be good at all constructs. Scoring well over the threshold and also shortening the questionnaire. No further changes will need to be made when structuring the questionnaire in this way with the included question. The questions that were not included also were a complete construct, 'marker failure', and since this is the construct that is also not scoring good prior to the changes made, this is a major issue and will need major adjustment in terms of the question being deleted and new questions that will need to be added.

During the survey process several observations were made concerning the questionnaire. A very clear observation that was made is that people in the selected deprived regions were not eager to participate. The majority of the people who in fact participated in the research were unwilling to give personal information such as postal code and address. Furthermore, the questionnaire was found too long, which is tackled by restructuring the questionnaire as the factor analysis shows, and also, some questions too difficult to understand. The two questions in the opportunity recognition were not understood where extra explanation was needed or left open, the construct however shows to be valid and reliable in the tests. The goal of the questionnaire was also not always clear under the participants, it was too difficult to understand what it was for. This even after the short explanation that was given at the start of the questionnaire, which resulted in less motivation to complete the whole survey since they did not see the point of it.

5.2 Future research

Future research in and adjustment of the questionnaire will need to be done in order to use this questionnaire to filter out lead users from a target population, starting with the remarks made in the previous section. As it is now this can be done, however, the validity and reliability is not completely guaranteed. The adjustment of the questionnaire will lead to a repetition of the analysis as done in this study to get closer to the goal of formulating a valid and reliable questionnaire that filters out lead users from a population. The questionnaire should decrease the amount of personal information that is asked of the respondents since they seemed hesitant to fill it in and continue the survey, it worked deterrent. Another issue was the length of the survey which did not work appealing, however, several questions per construct are needed for validity and reliability measurement, this works contradictory. Furthermore, the answer possibilities need adjustment in order to include the questions in the statistical tests. The questions will need to be able to be answered with, for example, a likert scale or with yes or no, the possibilities should be the same in order for good analysis. Also, of course, more respondents would give a better analysis of the questionnaire and these adjustments will make it better to collect respondents.

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8. APPENDIX

The appendix contains respectively; the experts' feedback, the factor analysis with relevant questions and the questionnaire.

	Tijs van den Broek	Jaap van Tilburg	Martin Stienstra	Frans Jonkman
Face validity	The survey is looking good 'at face value'.	The survey looks alright 'at face value'.	Good survey 'at face value'.	The 'face value' of the survey seems good.
Construct validity	Questions raised at the construct 'opportunity recognition'. Rewrite the answer possibilities	-	When the literature bring forward these constructs and previous research used these question taken by Marlies Stuiver then I suppose the items and constructs are good.	Constructs look good to measure what they are supposed to measure, however questions raised with the 'opportunity recognition', may need adjustment in answer possibilities
Content validity	The opportunity recognition scale is not complete and will raise questions Remarks made on the answer possibilities in the scales 'expected benefit' and 'assistance' to capture it's complete meaning	Suggested is to add some questions. Five questions of which one made it to the final survey. The added question is item ten in construct 'market failure'.	Marlies Stuiver did a good job covering the range of the construct, questions taken from earlier studies are supposed to be valid and show a rage of meanings	A few questions should be added to complete the constructs. Construct 'Market failure' two added questions, six and 7. Construct 'assistance' two added questions, two and three. This in order to capture the complete meaning Construct 'expertise', at one item the answer possibilities should be adjusted, item seven

	Component				
	1	2	3	4	5
Q20 Ik heb behoeften welke niet worden voorzien door bestaande producten of diensten	**,859**	,140	,096	-,035	-,099
Q20 De bestaande producten of diensten zijn voldoende om in mijn behoefte te voorzien	**,813**	,248	,255	,140	,032
Q17 Ik zie mezelf als pionier in mijn interessegebied	**,781**	,242	,258	,173	-,163
Q18 Ik ben constant op zoek naar verbeterde producten en diensten om in mijn behoeften te voorzien	**,730**	,341	**,409**	,328	-,098
Q19 Ik ben graag op de hoogte van nieuwe ontwikkelingen van producten of diensten in mijn interessegebied	**,727**	,332	**,411**	,336	-,105
Q16 Ik zie mezelf als iemand die voor de trend uitloopt in mijn interessegebied	**,722**	,344	**,413**	,327	-,090
Q22 Ik ben ontevreden over bestaande producten of diensten	**,582**	,162	,313	**,516**	-,137
Q34 Had u genoeg technische kennis voor het ontwikkelen of verbeteren van producten of diensten?	,232	**,918**	,163	,156	,001
Q35 Had u genoeg kennis over de benodigde materialen voor de ontwikkeling of verbetering van het product of de dienst?	,232	**,917**	,162	,163	,005
Q32 Ik kan zelf producten of diensten ontwikkelen of verbeteren	,290	**,844**	,194	,307	-,088
Q33 Ik vind het leuk om zelf producten of diensten te ontwikkelen of verbeteren omdat ik handig ben	,292	**,843**	,191	,311	-,092
Q13 Ik ben eerder op de hoogte van nieuwe toepassingen van producten of diensten dan anderen dat zijn	,299	,185	**,921**	,137	-,052
Q15 Ik vind het leuk de nieuwste dingen te kopen in mijn interessegebied voordat het overgrote deel van de populatie dat doet	,304	,190	**,919**	,129	-,052
Q14 Over het algemeen ben ik de eerste in mijn omgeving die een nieuw product of de nieuwe dienst aanschaft	,307	,190	**,916**	,136	-,060
Q30 Heeft u hulp gehad van andere met het ontwikkelen van uw idee?	,155	,093	,107	**,742**	,359
Q37Mensen zien mijn als een expert op het gebied van ….	,017	**,412**	,079	**,679**	-,239
Q28 Neemt u wel eens deel aan een gemeenschap of gesprekken waar nieuwe producten of diensten of aanpassingen hierop ter sprake komt?	,333	**,488**	,190	**,670**	,063
Q27 Ik raakte geïrriteerd door het ontbreken van doordachtheid in bepaalde aspecten van producten of diensten die ik nodig heb	,338	**,489**	,189	**,663**	,050
Q11 Hoe herkende u het probleem of de behoefte op de markt welke werd opgelost door uw idee?	-,121	-,009	-,063	-,010	**,966**
Q12 Hoe snel herkende u het probleem of de behoefte op de markt?	-,135	-,075	-,071	,091	**,944**

Onderwerp	**Vraag**	**Antwoordmogelijkheden**
Q1	Geslacht	Man Vrouw
Q2	Leeftijd	<20 20-29 30-39 40-49 50-59 60-69 70+
Q3	Hoogst genoten opleiding	Geen Basisonderwijs LBO/VMBO MAVO MBO HAVO VWO HBO WO Weet niet/ wil ik niet zeggen
	Adres	
	Postcode	
Markt falen:		
Markt voorziet niet in behoefte Q4	Heeft u ooit ideeën gehad voor nieuwe producten of diensten die niet werden aangeboden door de markt? Zo ja, graag een korte beschrijving	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
Q5	Heeft u ooit verbeteringen aangebracht op producten of diensten die al werden aangeboden op de markt? Zo ja, graag een korte beschrijving	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
Q6	Heeft u wel eens een product of dienst gebruikt waar het product of de dienst niet voor gemaakt is?	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
Q7	Heeft u ooit een product of dienst ontwikkeld?	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
	Indien u 'nee' op de vorige vraag heeft geantwoord kunt u deze vraag overslaan. Wat heeft u gemotiveerd om het idee verder te ontwikkelen? U mag meerdere antwoorden aanvinken	o Persoonlijke behoefte o Vond het leuk om te doen o Wilde leren/vaardigheden ontwikkelen o Wilde iemand helpen met mijn product/dienst o Wilde mijn reputatie/respect vergroten o Het zelf ontwikkelen van het product was goedkoper dan het te kopen o Het bestaande op de markt vervulde mijn behoefte niet
Q8	Bent u wel eens tegen een probleem aangelopen waarvoor geen oplossing voor handen was?	Ja Geen idee Nee Zeg ik liever niet

		Korte beschrijving:
Q9	Heeft u wel eens uitgebreid gezocht naar een oplossing voor een probleem?	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
Q10	Heeft u momenteel een idee voor een nieuw product of dienst?	Ja Geen idee Nee Zeg ik liever niet Korte beschrijving:
Herkenning van kans Q11	Hoe herkende u het probleem of de behoefte op de markt welke werd opgelost door uw idee?	Eigen - ervaring - van anderen 0 0 0 0 0
Q12	Hoe snel herkende u het probleem of de behoefte op de markt?	Eenmalig - ervaring - Herhaaldelijke 0 0 0 0 0
Lead user karakteristieken:		
Voorlopen op de trend van de markt Q13	Ik ben eerder op de hoogte van nieuwe toepassingen van producten of diensten dan anderen dat zijn	Altijd Zelden Meestal wel Nooit Soms
Q14	Over het algemeen ben ik de eerste in mijn omgeving die een nieuw product of de nieuwe dienst aanschaft	Altijd Zelden Meestal wel Nooit Soms
Q15	Ik vind het leuk de nieuwste dingen te kopen in mijn interessegebied voordat het overgrote deel van de populatie dat doet	Altijd Zelden Meestal wel Nooit Soms
Q16	Ik zie mezelf als iemand die voor de trend uitloopt in mijn interessegebied	Eens Oneens 0 0 0 0 0
Q17	Ik zie mezelf als pionier in mijn interessegebied	Eens Oneens 0 0 0 0 0
Q18	Ik ben constant op zoek naar verbeterde producten en diensten om in mijn behoeften te voorzien	Eens Oneens 0 0 0 0 0
Q19	Ik ben graag op de hoogte van nieuwe ontwikkelingen van producten of diensten in mijn interessegebied	Eens Oneens 0 0 0 0 0
Verwachtte baat wanneer het product/dienst er wel zou zijn Q20	Ik heb behoeften welke niet worden voorzien door bestaande producten of diensten	Eens Oneens 0 0 0 0 0

Q21	De bestaande producten of diensten zijn voldoende om in mijn behoefte te voorzien	Eens 0 0 0 0 Oneens 0
Q22	Ik ben ontevreden over bestaande producten of diensten	Eens 0 0 0 0 Oneens 0
Q23	Mijn onvoorziene behoeften leiden mij ertoe om bestaande producten of diensten te verbeteren	Ja Nee
Q24	Als het product of de dienst verkrijgbaar zou zijn, zou ik het niet zelf ontwikkelen	Ja Nee
Q25	Mijn onvoorziene behoefte heb ik voorzien door zelf aanpassingen te doen aan producten of diensten	Ja Nee
Q26	Ik ervaarde problemen welke niet werden opgelost door bestaande producten of diensten	Ja Nee
Q27	Ik raakte geïrriteerd door het ontbreken van doordachtheid in bepaalde aspecten van producten of diensten die ik nodig heb	Eens 0 0 0 0 Oneens 0
Middelen:		
Gekregen of geboden hulp met betrekking tot de ontwikkeling van het product/dienst Q28	Neemt u wel eens deel aan een gemeenschap of gesprekken waar nieuwe producten of diensten of aanpassingen hierop ter sprake komt?	Altijd Zelden Meestal wel Nooit Soms
Q29	Heeft u wel eens meegedaan aan een prijsvraag of ontwerpwedstrijd uitgezet door een onderneming?	Ja Nee
	Indien u ja heeft geantwoord op de vorige vraag, heeft u deze wedstrijd wel eens gewonnen?	Ja Nee
Q30	Heeft u hulp gehad van andere met het ontwikkelen van uw idee?	Altijd Zelden Meestal wel Nooit Soms
	Zo ja, wat voor hulp of ondersteuning heeft u gekregen bij de ontwikkeling van uw idee?	○ Praten met anderen over het te oplossen probleem hielp me ○ Anderen gaven me vakkundig advies en suggesties voor verbeteringen ○ Anderen hielpen me met advies over technische details ○ Anderen hielpen me met testen en het geven van feedback ○ De bevestiging en aanmoediging van anderen hielp me ○ Anderen brachten me in contact met mensen die me zouden kunnen helpen

		o Anderen hielpen me met het toewijzen van middelen, bijvoorbeeld geld o Toegang tot interdisciplinaire kennis hielp me
	Zo ja, van wie kreeg u hulp/ondersteuning? U mag meerdere antwoorden aanvinken	o Onbekenden o Experts o Mensen uit mijn professionele netwerk o Mensen uit mijn persoonlijke netwerk
Q31	Heeft u zelf ooit meegeholpen aan de ontwikkeling van een nieuw product of nieuwe dienst?	Ja Nee Zeg ik liever niet Geen idee
	Zo ja, wat voor soort hulp heeft u geboden? U mag meerdere antwoorden aanvinken	o Praten over het idee en het op te lossen probleem o Vakkundig advies geven en suggesties geven over verbeteringen o Advies over technische details o Testen van het nieuwe product of de dienst en feedback geven o Het in contact brengen van de juiste mensen door eigen netwerk
Kennis over het product/dienst Q32	Ik kan zelf producten of diensten ontwikkelen of verbeteren	Eens Oneens 0 0 0 0 0
Q33	Ik vind het leuk om zelf producten of diensten te ontwikkelen of verbeteren omdat ik handig ben	Eens Oneens 0 0 0 0 0
Q34	Had u genoeg technische kennis voor het ontwikkelen of verbeteren van producten of diensten?	Voldoende kennis Onvoldoende kennis 0 0 0 0 0
Q35	Had u genoeg kennis over de benodigde materialen voor de ontwikkeling of verbetering van het product of de dienst?	Voldoende kennis Onvoldoende kennis 0 0 0 0 0
	Zo ja, waar verkreeg u deze kennis? U mag meerdere antwoorden aanvinken	o Door het gebruik van vergelijkbare producten/diensten o Op uw werk o Genoten opleiding o Door aanvullende trainingen
Q36	Mensen zien mijn als een expert op het gebied van ….	Eens Oneens 0 0 0 0 0
	Indien mensen u zien als expert op een bepaald gebied, hoe komt het dat mensen u zo zien? U mag meerdere antwoorden aanvinken	o Door eigen ervaring o Door kennis van materiaal o Door technische kennis o Door uw werkzaamheden o Door uw opleiding