

Market segmentation of diabetes type 1 patients as potential consumers of the Artificial Pancreas

Author: Alica Wilhelm
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands

ABSTRACT

There is a vast literature on market segmentation and segmentation variables which act as a necessarily tool for forming various homogenous clusters out of a vast heterogeneous group of customers. However, the current works provide no evidence of the impact of subjective norm on market segmentation processes even though the considerably effect of social influences on people's decision making processes is discussed heavily. This study focuses on 414 diabetes type 1 patients to which a new technology innovation for treating diabetes diseases, known as the artificial pancreas, is being presented. The aim of this paper is to identify into which customer segments these patients can be distinguished in. Furthermore, it tends to investigate whether the variable subjective norm has a significant impact on patients' intention to make use of the artificial pancreas in comparison to traditional segmentation criteria being used in this research. Therefor, various researches and different theories like the revised version of the Technology Acceptance Model (TAM2) or Theory of Reasoned Action (TRA) were adapted to adequately perform a cluster analysis. The findings reveal that two different clusters emerged and that the variable subjective norm turned out to be the most important item as it has the biggest impact on the research's cluster analysis. The fact that customers differentiate themselves from the degree to which they one the one hand take various social groups' advice into account and on the other hand value the opinion of some groups' more than the one of others can be utilized by companies when establishing and formulating marketing strategies regarding the publication of the artificial pancreas. Moreover, the information can serve as a valuable marketing tool for companies and marketers operating in the healthcare or any other sector.

Supervisors:
Dr. A.M. von Raesfeld Meijer
PhD(c) T. Oukes

Keywords

Diabetes, Artificial Pancreas, Patients, Market segmentation, Marketing, Cluster Analysis, Subjective Norm, Social Influence

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

5th IBA Bachelor Thesis Conference, July 2nd, 2015, Enschede, The Netherlands.
Copyright 2015, University of Twente, The Faculty of Behavioural, Management and Social sciences.

1. INTRODUCTION

Years ago, diabetes mellitus was considered as a disease of which merely a minority of the world's population was affected by (Zimmet, Alberti & Shaw, 2001). Nevertheless, nowadays diabetes is classified as one of the main risks to public health and the number of people being affected increases steadily (Wild, Roglic, Green, Sicree & King, 2004; Zimmet, Alberti & Shaw, 2001). Accordingly, it is expected that diabetes and its treatment options will offer an attractive and growing market for companies operating in the healthcare sector (Hauber & Gale, 2006). There are diverse forms of Diabetes mellitus but most people are either afflicted with diabetes type 1 or type 2 (Musselman, Betan, Larsen & Phillips, 2003). This research is concerned with type 1 diabetes, which is an autoimmune disease causing major implications for patients. The endogenous immune system works counterproductively against the insulin-producing cells, which usually control the blood sugar level and ultimately destroys them (Diabetes Atlas, 2013). Therefore, affected people have to regulate their blood sugar level via external sources. Throughout the years, many different devices were offered to diabetes patients such as insulin pens and pumps or the continuous glucose monitor (CGM).

In 2016, the Dutch company Inreda Diabetic B.V. is planning to introduce a new closed loop system onto the market - the Artificial Pancreas (AP). The AP can be regarded as an innovative system since it measures and automatically adjusts the level of blood sugar with insulin and glucagon injections, working in a similar way as the human body (Inreda n.d.). Even though, the Artificial Pancreas may be able to improve diabetes patients' quality of living and simplifies their day-to-day life, it cannot be assured that the device will successfully be acknowledged by the society, i.e. policy makers and regulators, medicare, hospitals, vendor companies and patients (Cain & Mittman, 2002).

In the consumer industry, customer needs and satisfaction always have the highest priority in its daily business since the majority of offerings is tailored to meet users' demand (Greengrove, 2002). As the technology improvement and progress within the last decades allows for a „better-targeted design“ (Greengrove, 2002, p. 407), concernment of patient needs within the medical industry could gain in importance too. Various authors (Röthele, 2010; Heisler, Cole, Weir, Kerr & Hayward, 2007; Lutfey & Wishner, 1999; Stewart, 1995; Kravitz, Hays, Sherbourne, DiMatteo, Rogers, Ordway & Greenfield, 1993; Bettman, Johnson & Peyn, 1991) observed that more and more patients do decreasingly rely on the counsel of external parties when it comes to decision-making processes on medical treatments and investigate potential therapies by themselves. Likewise, „Vital Signs“, a report by the Boston Consulting Group on the US market, explores that patients nowadays are more informed and proficient about their physical health than in the years before and that they are becoming progressively concerned about their care and possible supports (Lovich, Silverstein & Lesser, 2001). Therefore, it becomes increasingly crucial for companies competing in the pharmaceutical industry to focus on the end-consumers, i.e. the patients and the fulfilment of their (medical) needs as over the years they evolved into an independent group of decision makers that have a major impact on companies' turnover. As a result, implementing distinct marketing policies directed to the patients becomes a major task for Inreda Diabetic B.V.. As stated by Becker and Lillemark (2005), it becomes easier to distribute new product developments when companies are able to implement marketing practices successfully which can be achieved through satisfying every customer group by targeting specific markets and correspondingly deploying customized

marketing mixes in the most effective way (Vargo & Lusch, 2004; Kotler, 1967; McCarthy, 1960). Customers are heterogeneous among themselves as they differ in their attitudes, their buying patterns, their needs which should be met by companies' offerings and many other ways (Pinnell, 2003). This makes it difficult to target and address the requirements of everyone within the whole big group of customers at the same time. In order to manage this difficulty, it is most advantageous for marketers to cluster their consumers into multiple smaller homogenous segments (Shapiro & Bonoma, 1984). Liu and Ong (2008) as well as Huang, Tzeng and Ong (2007) advise companies to deploy individually tailored marketing strategies to each of their consumer clusters after segmenting their entire market as it will benefit them in terms of higher overall customer satisfaction and assists them in allocating resources more effectively and efficiently. Consequently, companies are capable to generate more profit and save costs simultaneously.

Clustering diabetes patients may result in a relatively high or low number of different segmentation groups which might provide valuable information for Inreda's marketing function as it enables the company to direct their marketing programs more customized and specifically towards every patient group. Accordingly, the goal of this study is to examine into which customer segments diabetes type 1 patients can be clustered, followed by an analysis of each group's characteristics. To fulfil this goal, the following research question is ought to be answered:

Which customer segments of diabetes type 1 patients can be distinguished?

The outcomes can be utilized by Inreda Diabetic B.V. when establishing and formulating their marketing strategies regarding their publication of the Artificial Pancreas. Furthermore, the study provides basic information for other companies as well as marketers operating in the healthcare industry. Groupings will emerge by analysing the patients with regards to the variables age, gender, educational level, patients' current diabetic treatment and social influences. Age, gender and educational level are relatively traditional and basic segmentation criteria (Brennan, Canning, & McDowell, 2011; Blythe, 2009; Day, 1990; Malhotra, 1989; Shapiro and Bonoma, 1984) and are accordingly part of this cluster analysis. Several authors (Germar, Schlemmer, Krug, Voss & Mojzisch, 2013; Wood & Hayes, 2012; Alagöz, Ziefle, Wilkowska & Valdez, 2011; Kulviwat, Bruner & Al-Shuridah, 2009; Cooke & Buckley, 2008; Venkatesh and Davis, 2000) discussed the influence and tendential high impact of people's social surrounding on their decision making processes also in relation to new technology acceptance. But even tough marketers should emphasize on people's networks, as these can function as stimuli for promoting companies' offerings (Cooke & Buckley, 2008), by this point, there is no literature which discusses whether subjective norm can function as a possible criterion for market segmentation processes.

Therefore this research contributes to the existing market segmentation literature in terms of investigating the importance of subjective norm on market segmentation approaches, which is why the following sub-question is introduced:

To what extend can subjective norm be used as a segmentation variable and in how far does it have an influence on the cluster analysis compared to the other criteria being used?

This research paper will continue with a literature review which will serve as a summary of former researchers' theories. Especially the role of market segmentation, the segmenting criteria age, gender and educational level and the influence of subjective norm will be investigated. Thereafter, the study

subject and sample will be introduced, followed by definitions of each of the variables. After the cluster analysis' results will be explained and discussed, a conclusion will be elaborated and limitations of the study and directs for further research will be propounded.

2.LITERATURE REVIEW

2.1.Market Segmentation

Focusing on customers right from the beginning of R&D up to the release of innovations for the purpose of increasing customers' likeliness of using the offerings becomes evermore common among businesses as „the key to create value is to coproduce offerings that mobilize customers“ (Vargo & Lusch, 2004; Normann & Ramirez, 1993, p. 69). However, it is relatively taxing for companies to gain an encompassing insight of the extent to which their contributions create value (Macdonald, Wilson, Martinez & Toossi, 2010). Glynn and Lehtinen (1995) indicate that businesses should, due to diverging customer groups, especially focus on close relationships with them in order to get to know their preferences and a notion of what they esteem. Greengrove (2002) strongly linked the need to demonstrate value in distinct customer populations to market segmentation, which is described as a method of dividing a large heterogeneous market into smaller meaningful bundles of homogenous customers (Huang et al., 2007; Myers, 1996; Croft, 1994; Weinstein, 1987; Kotler & Gordon, 1983; Smith, 1956). As noted by Tynan and Dayton (1987) market segmentation enables marketers to more precisely predict consumer responses towards a certain marketing stimulus, enabling firms to distribute their resources more accurately, effectively as well as efficiently (Huang et al., 2007). Further, directing tailored offers and strategies towards smaller subgroups increases the probability of a more approachable customer base, since customers' needs and preferences can be satisfied more accurately leading to an overall higher value assessment (Norušis, 2011; Huang et al., 2007; Anderson & Vincze, 2000). Shapiro and Bonoma (1984) explained that (industrial) segmentation can state a supporting tool for companies in terms of analysing the market and the customers, selecting key markets that may deliver the highest benefits and performing marketing management which they described as elaborating and deploying marketing programs and strategies to gain advantages over competitors. Greengrove (2002) goes one step further when declaring that in every industry, market segmentation is the key to a successful brand development.

2.2.Choice of Variables linked to Market Segmentation Literature

Segmenting a market requires the application of variables which support the classification of distinct subgroups (Brennan, Canning, & McDowell, 2011, p. 147). There are various criteria which companies can use for segmenting their market but usually they all follow the same procedure of analysing the criteria. Shapiro and Bonoma (1984) determine five segmentation criteria: demographics, operating variables, customer purchasing approaches, situational factors and personal characteristics of the buyers, which they arrange in a „nested hierarchy“, described as „a set of boxes that fit one into the other“ (p. 3). The idea is that firms shall move from the more general, easily observable criteria, like demographics to the more specific ones since information of the outer-nest criteria are more available and obvious, meaning that firms do not have to invest in analysis of the data whereas the inner-nest variables deliver more useful information. Based on their knowledge and capital, companies have to decide, at which nest

they should start their market segmentation respectively where to end. In 1978, Choffray and Lilien introduced a similar concept and referred to it as macro-segmentation (larger-scale analysis) and micro-segmentation (finer-level analysis). Conversely, Day (1990) separated segmentation variables in only two main categories whereof one is called identifiers. These are the more traditional variables such as demographics, operations, product requirements or purchasing situations relating to potential customer market segments which can be listed without carrying out extensive research. Day (1990) identified response profile characteristics as second group of segmentation variables which are exclusive for any product or service and based on attributes towards these specific products or corresponding brands. In addition, these variables need further research investigation and are more difficult in terms of measurability and accessibility than identifiers (Malhotra, 1989). Possible criteria for response profiles are customer variables, applications of the product or service or vendor product attributes (Kotler, 2003; Day, 1990; Rao & Wang, 1995; Malhotra, 1989). Even though response profiles are harder to operate with, they will most likely generate more customer responsiveness since companies' marketing strategies can be tailored to the specific needs and wants of the segment being identified (Malhotra, 1989).

The above summary of segmentation literature is mainly focusing on industrial, i.e. business-to-business-, market segmentation whereas this study directs at exploring diabetes patients as potential end consumers of the Artificial pancreas and thus, concentrates on consumer market segmentation. However, the concepts of industrial market segmentation pertain to some extent also to consumer market segmentation. There is high compliance among Shapiro and Bonoma's (1984) inner-nest variable buyer's personal characteristics and Day's (1990) customer variables as part of the response profile. They pursue the same target, namely obtaining information on (potential) end users of a product or service, understanding their characteristics and preferences so that they are able to satisfy their needs better than competitors do (Blythe, 2009, p. 178). This however, is the basic logic behind consumer market segmentation. Similar to Shapiro and Bonoma's (1984) hierarchy of variable levels, Blythe (2009) distinguished between four stages of segmentation: behavioural, geographic, psychographic and demographic segmentation. Demographic segmentation as the most general variable considers consumer attributes like gender, age, education and nationality. Besides, these factors are the most traditional ones which are applied more frequently than other criteria in consumer segmentation since their data is easier to obtain and analyse analogical to Day's (1990) identifiers (Blythe, 2009, p. 185).

The literature makes clear that basic and easily observable criteria like demographic ones are very common in industrial as well as consumer market segmentation and additionally serve as basis for segmentation since their data is easy and relatively keen to get. Because of this, age, gender and educational level are part of the set of segmentation criteria in this study. Next to these, patients' current treatment of diabetes will serve as variable for the cluster analysis. This choice is justified with Day's (1990) so called identifiers, variables that are among others linked to customers, i.e. diabetes patients, purchasing situation.

2.3.Traditional Segmentation Criteria linked to Technology Acceptance Literature

In order to cluster a market, variables have to be chosen on which the segmentation groups shall be similar. This research will focus on the variables age, gender, educational level, the

current treatment of diabetes type 1 patients and the item social influence, i.e. subjective norm. The analysis of the resulting clusters and their characteristics serve as a valuable support for Inreda Diabetic B.V. in serving patients' needs more precisely which may increase their acceptance to use the AP. Companies from every sector but especially companies operating in the healthcare branch which are planning to introduce new innovative offerings onto the market may benefit from segmenting their potential customer base beforehand, as market segmentation acts as a crucial part in innovation and developing processes of medical products and services (MacLennan & MacKenzie, 2000). As noted by Cain and Mittman (2002), innovations diffuse easier and faster among groups with similar characteristics than among groups that differ for instance in their beliefs, meanings and understandings. Therefore, marketing segmentation expounds an assistant tool in the process of launching innovative products or services, precisely because technology novelties often face denial, resistance and lack in acceptance (Alagöz et al. 2011; Taylor & Todd, 1995).

Technology acceptance can be defined as: „the approval, favourable reception and on-going use of newly introduced devices and systems“ (Alagöz et al., 2011, p. 152) or more general in Davis' (1989) words as „potential user's overall attitude towards using a given system“ (p. 24).

Alagöz et al. (2011) who additionally analysed the importance of cultures and health status on acceptance patterns studied the influence of age and gender on user's acceptance. Their study examines new technology acceptance among countries that differ in their degree of development, prevailing society and cultures. The degree of technology approval is influenced by cultural mind-sets among families, the average age in a country, health-care structures (Wilkowska & Ziefle, 2011; Campiniha-Bacote, 2002), as well as culturally sensitive issues like illness and death which is more specified towards medical technologies (Searight & Gafford, 2005; Berger, 1998; Klessig, 1992). However, no difference is found with regards to acceptance patterns among different cultures (Alagöz et al., 2011), wherefore in the cluster analysis the difference in home countries among the customers will not be considered. Alagöz et al. (2011) come to the conclusion that based on their research, women's intention to make use of new devices is higher than men's and that they are in general more open-minded towards innovations even though utilization barriers show no gender effects (Alagöz et al., 2011). However, Wilkowska, Gaul and Ziefle (2010) and Ziefle and Schaar (2011) mitigate this occurrence as they investigate that women's confident mind-set decreases when it concerns body near or invasive technology developments. Furthermore, the acceptance of innovations with regard to women is moderated by age, meaning that the difference between older and younger women was greater than the difference between men, with older women being more liberal towards innovations than younger ones (Alagöz et al., 2011). Nevertheless, after one month of experiencing new technologies, women are more likely to be influenced by subjective norms than men, whereas after three month neither women nor men emphasize it. However, with regard to the decision-making process women do consider input of others on the contrary men do not (Venkatesh & Morris, 2000). Moreover, Venkatesh and Morris (2000) examine that man make their technology acceptance conditional on productivity-related features while women verify their decision on a number of determinants including productivity and usage assessments.

As stated before, this study will also focus on patients' educational level and their current diabetes treatment methods as variables for deploying a cluster analysis. However, at this

time, no literature can be found which investigates whether there is a possible correlation between different levels of education or patients' treatment method and one's intention to use the AP or more general innovative technologies. A reason for this lack may be that consumers' attitude towards certain technology advancements is very personal driven, meaning that people decide based on factors like beliefs, norms and other social influences whether or not they trust and believe in a new device. External determinants like educational level or diabetes patients' current treatment method may not have a big influence on these decision-making processes, as they do not affect the person inherently. Additionally, it is very specific to research if different forms of diabetes treatment methods have an effect on technology acceptance, which is why there may be no investigations about it yet.

2.4. Segmentation Variable Subjective Norm

Technological innovations have become an essential part of the world economy, which is why it has become a major objective for the industry to forecast people's attitude towards those products to assure their acceptance (Kulviwat et al., 2009). Various literatures is concerned with identifying factors that influence users' acceptance towards new technologies (Alagöz et al., 2011; Venkatesh & Davis, 2000; Davis, 1989; Davis, Bagozzi & Warshaw, 1989; Taylor & Todd, 1995a). Criteria like trust as well as perceived usefulness and ease of use of the device are observed as major influencing criteria as explained in the Technology Acceptance Model (TAM) by Davis (1989) and Davis et al. (1989). Perceived usefulness is defined as the degree to which users belief that the product or service benefits them and ease of use is described as the degree to which they perceive the technical innovation would be free of effort.

However, Venkatesh and Davis (2000) developed TAM2, a revised version of the Technology Acceptance Model, since they believe, that users' acceptance is in addition to the two former elements significantly influenced by external determinants, i.e. social influences. Social influence processes are composed of three elements of which one is subjective norm, defined as a „person's perception that most people who are important to him think he should or should not perform the behaviour in question“ (Fishbein & Ajzen 1975, p. 302). This implies that people's social environment is able to influence their behaviour in such a way that they end up adopting technological innovations even though they might not feel confident with it. As second element, Venkatesh and Davis (2000) illustrate voluntariness and compliance with social influence which entails that individuals behave in a certain way, i.e. accepting the use of certain technologies, when they belief that a fellow man wants him/her to do so assumed that this person is in a position to reward or punish the individual based on his/her actions (Venkatesh & Davis, 2000; Warshaw, 1980; French & Raven, 1959; Kelman, 1958). It can be assumed that in the situation of diabetes patients, there are no superiors which have the ability to tell them how to decide on the AP or rather penalize them for wrongdoing. Therefore, this element will not be included in this study. The same applies to the third element „image“ which explained by Kelman (1958) entails that individuals often adjust their behaviour to other people's ideals and beliefs to retain a certain image. Hence people start using a certain technology if they believe it may improve their reputation (Venkatesh & Davis, 2000). Since the AP is a device which is developed for diabetes diseases, patients will focus on its performance, operability and all of its features but not on the image they will have when they use it or not.

The analysis of all three components of social influence revealed a significant impact on people's intention to use in

general but this study will merely focus on subjective norm as an element for the cluster analysis.

Literature points out, that social influence does not only affect people's intention to use a certain product, it also effects their decision making processes and actions in general. Fishbein and Ajzen's (1975) theory of reasoned action (TRA) describes human's behaviour as an objective of someone's intention to engage in the behaviour. They indicate that social networks are concerned with people's perception that referents suppose certain actions should or should not be carried out. Asch (1952) even goes so far as to declare that people's „actions and the beliefs guiding them are either an endorsement of his (her) group, and therefore a bond of social unity, or an expression of a conflict with it“ (p. 577). So, whether conscious or not, individuals influence each other's beliefs, attitudes and judgements (Wood & Hayes, 2012). The desire of being in unity with others, finding a positive self-identity and being part of a wider group of people is part of the human nature (Asch, 1952). It can be concluded, that every behavioural action, buying decisions included, are influenced by others. Hence, the impact of social networks in general is very high. It is therefore of vital concernment for Inreda Diabetic B.V. to understand how their consumers in connection with their social surroundings come to a decision with respect to the AP. For this reason, subjective norm will, even though it is according to the literature relatively unusual, function as segmentation criteria for the cluster analysis.

It is expected that because of its high influence on people's decision making processes in general and also in relation to technological innovations like the AP, subjective norm will be, compared to the remaining criteria, a at least equally if not even more important variable for the cluster analysis and its outcome.

3.METHODOLOGY

3.1.Study Subjects and Sample

The purpose of this article is to ascertain which homogenous segments of diabetes type 1 patients potential users of the Artificial Pancreas can be distinguished. Human beings are heterogeneous themselves with different needs and wants and accordingly so are patients (Pinnell, 2003). Therefore, it becomes challenging for companies to exert proper marketing strategies which satisfy every customer. The same applies to the Dutch company Inreda Diabetic B.V. which will launch the AP for diabetes type 1 patients in the near future. Market segmentation enables firms to create different homogenous clusters of customers and thus, supports firms in arranging appropriate and tailored marketing programs. Therefore, the study's outcome may benefit Inreda's market penetration by delivering valuable information with regards to their customers but may in addition assist other companies operating with diabetes treatments like the AP as well. The cluster analysis which allows for marketing segmentation is based on an online survey which was conducted by the department for Economy and Communication of the University of Twente in cooperation with the Dutch company Inreda Diabetic B.V., AMC Amsterdam, the University of Graz, Profil Research, Full Group and Novo Nordisk. The survey was created with support of LimeSurvey, an advanced online survey system which creates quality online surveys (LimeSurvey Partner Services, n.d.). Inreda Diabetic B.V. and the authors pre- and re-tested the preliminary version of the survey several times in order to remove ambiguity and guarantee validity and also, with the help of native speakers, translated the texts into German and Dutch as these were originally written in English.

Samples were taken from a database with 2100 diabetes patients who voluntarily signed up for participating in Inreda Diabetic B.V.'s research. 595 German, Dutch, Austrian and Belgian diabetes patients were selected to whom an invitation to the 'Patients Acceptance and Readiness for Artificial Pancreas Survey' was transmitted via LimeSurvey's integrated email function. The questionnaire was subdivided into two parts of which the first informed the respondents about the Artificial Pancreas in form of words and images so that all participants could gather basic knowledge about the topic and were able to give information and their opinion towards the AP. The second part was composed of general and specific questions which should be answered individually. After the invitation, a reminder in form of another email was send to the patients who, until then, did not completed the questionnaire to increase the overall rate of return.

Out of the 595 survey invitations a total of 432 complete responses could be registered within the determined timeframe from 2014, June 3rd until 16th which equals a representative response rate of 72.6 %. Baruch and Holtom (2009) investigated a steadily decline in response rates (RR) from 1975 to 2005 where the average RR of surveys was 48.3 % with a standard deviation of 21.6. Therefore, a RR of 72.6 % is considered to be extremely high which decreases the chance of significant nonresponse bias (Babbie, 2010) and increases the credibility as well as statistical power of the data (Baruch & Holtom, 2009; Rogelberg & Stanton, 2007).

Out of the 432 patients, 16 are affected by diabetes type 2, one indicated that he/she is suffering from another form of diabetes, one did not give any information about his/her diabetes type and the remaining 414 (95.8%) are suffering from diabetes type 1. The mean age of the sample was 39.8 ranging from 3 to 85 years with a standard deviation of 16.24. Further, the sample was composed of 231 female (53.5%) and 201 (46.5%) male respondents. This represents the reality's gender allocation of diabetes patients very well as on a global scale there is found little gender difference among numbers of people with diabetes for 2013 (Diabetes Atlas, 2013). The respondents were asked to give information on their current diabetes treatment. By this time, 194 people, 44.9 %, were using an insulin pump followed by 39.6 per cent that were treating their diabetes with an insulin pen. Only 57 (13.3%) persons indicated that they use the Continue Glucose Monitor (CGM).

3.2.Measurements

The survey serves as an important tool for the cluster analysis and the following market segmentation as it enables the operationalization of the variables age, gender, educational level, subjective norm and the current treatment of diabetes type 1 patients, whereas the variable subjective norm consist of more than one item. In Table 1 and 2 (see Appendix 10.1.) all input variables with their corresponding definitions as well as the variables' sources and the original items of the survey are listed. The items, which reveal more information about subjective norm are based on surveys and literature of others. Additionally, subjective norm as an item of a previous study had to be tailored to the current context in order to ensure validity and some items were composed by the authors themselves (see Table 1, Appendix 10.1.). The survey consists of close-ended questions as it allows for collecting various data easily and in a short time-frame, since everything is measurable. Furthermore, closed-ended questions, i.e. quantitative research may reveal patterns and uniformity of the given responses and reduce the possibility of misunderstandings on researcher's as well as respondent's site (Rubin & Babbie, 2011). Patients hat to answer on a seven point Likert scale,

more precisely question related to nominal variables were answered on a rate ranging from one („Strongly disagree“) to seven („Strongly agree“), whereby the option ‚not applicable‘ was added to all questions which were related to subjective norm. Furthermore, respondents had to state their age (0-99 years) and their gender (male or female). They were also asked to give information on their highest educational level with Primary school, Secondary school, High school, Bachelor degree and Master degree as possible options. Then, they should indicate whether they treat their diabetes disease with an Insulin Pen, Insulin Pump or an Insulin pump and CGM (see Table 2, Appendix 10.1.). Patients operating with an Insulin pen have to supply their body with the required amount of insulin several times a day by injecting it under their subcutaneous fatty tissue. The Insulin pump works similar, it differs from the pen in so far that the needed amount of insulin will continuously be delivered through a tube of a small portable device. The CGM, also a small portable device can be regarded as an advancement of the pump. It measures the glucose level in the blood and automatically informs the patients who then can decide whether to insert more insulin through the Insulin pump or not (Inreda n.d.).

3.3.Data Analysis

The cluster analysis of this study is done with the statistics software SPSS by IBM. The responses of all 416 diabetes type 1 patients are exported to the system, whereas these of diabetes type 2 and the two other patients are excluded from the analysis. Moreover, age statements like 4849 and 1977 are indicated as unreliable answers and are also not taken into account. The item subjective norm and its sub-categories partners, family, children, friends, co-workers, physicians, diabetes nurses, patients associations and other diabetes patients consists of two questions each. As the cluster's algorithm is based on measures of distances between the variables a mean for each item is computed. This enables a standardization of the variables and simplifies working with the data. It also ascertains that all variables contribute equally to the distance or similarity between the cases while forming clusters. Since gender, educational level and current diabetes treatment are categorical data but age and subjective norm are continuous ones, the SPSS TwoStep Cluster Analysis is the only procedure that is able to bring a solution based on these two kinds of variables (Norusi, 2011). The outcome of this analysis shows how many clusters based on the categorical and continuous variables will emerge. Furthermore, SPSS gives a detailed overview of the clusters size, the importance as well as the inputs' distribution.

4.RESULTS

Before performing the cluster analysis, SPSS gave the option to base the analysis either on Schwarz's Bayesian (BIC) or Akaike's Information Criterion (AIC). Both of these statistics serve as an supporting tool in comparing models containing different combinations of predictor items (Field, 2009). Since the outcome for both clustering criteria were the same, BIC was used throughout the statistical analysis. As can be seen in Figure 1 and 2, out of the variables input, two distinct clusters were formed. The largest cluster (Cluster 2) has a size of 87 patients compared to Cluster 1 which is composed of 74 people. This equals a ratio of 1.18 or 54 % versus 46 %. In the survey, respondents had to rate their perceived social influence on a 1 to 7 Likert scale. Nevertheless, the patients were also able to choose eight as an answer option which stands for „not applicable“. As the option does not give any valuable information towards the variables but bias the mean scales, all answers rated with an eight were disregarded in this cluster analysis. This also explains, why both clusters in total are

composed of only 161 patients, although 416 responses were considered.

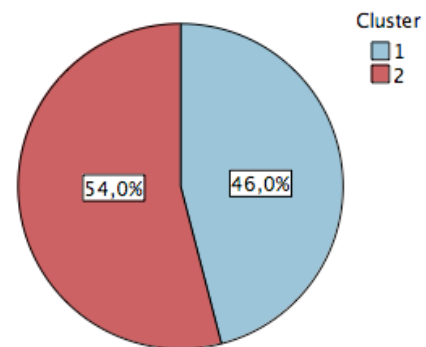


Figure 1. Cluster Sizes

Input (Predictor) Importance		
1,0 0,8 0,6 0,4 0,2 0,0		
Cluster	2	1
Size	54,0% (87)	46,0% (74)
Inputs		
	Family 3,09	Family 5,24
	Children 3,02	Children 5,41
	Partner 3,54	Partner 5,51
	Friends 2,98	Friends 5,05
	Nurses 4,07	Nurses 5,77
	Coworkers 2,84	Coworkers 4,77
	Physicians 4,17	Physicians 5,73
	Diabetes_Patients 3,22	Diabetes_Patients 4,97
	Associations 3,36	Associations 4,95
	Wat is uw hoogstgenoten opleiding waarvan u een diploma heeft...	Wat is uw hoogstgenoten opleiding waarvan u een diploma heeft...
	Welke methode gebruikt u op dit moment om uw diabetes te ...	Welke methode gebruikt u op dit moment om uw diabetes te ...
	Wat is uw leeftijd? 42,90	Wat is uw leeftijd? 44,41
	Wat is uw geslacht? Female (52,9%)	Wat is uw geslacht? Female (51,4%)

Figure 2. Clusters and Input Importance

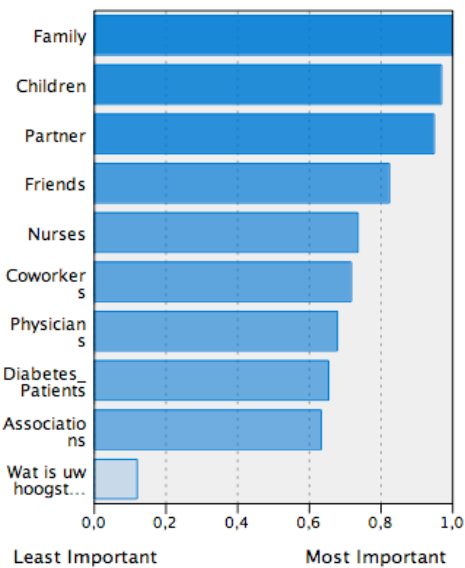


Figure 3. Predictor Importance

In the following, it will be examined how important the different variables are for the formation of the two segments. SPSS calculates a chi-square statistic that compares the observed distribution of an item to the overall one. It further tells how big the difference is between the average in the whole group compared to the averages in the specific clusters. A higher value of the chi-square (possible range from zero to one) leads to a bigger difference among and higher importance of the variables in the cluster analysis. As can be seen in Figure 2 and Figure 3, the input importance is already arranged in a descending order and in Figure 2 the different chi-square statistics are shaded dark to light purple whereby a darker shade corresponds to a more important item.

4.1.Input Family

The predictor variable 'Family' stands for respondents' perception of their family members' expectations to commit or not commit to a certain behaviour, i.e. to use or not use the AP. The item's chi-square has a score of 1 which is at the same time the highest among all input criteria. This means that the two clusters have the greatest contrast with regards to family members' influence and that the item is most important for clustering the patients. On a rate ranging from one to seven, the overall mean rate of the variable family is 4.55 with a standard deviation of 1.46. In comparison, Figure 2 shows that the mean rate for cluster 1 is 5.24 whereas the mean rate for cluster 2 is 3.09. Thus, relatives of patients from cluster 1 have a significantly high influence on AP acceptance whereas family members' influence on patients from cluster 2 is relatively low.

4.2.Input Children

'Children' represents respondents' perception of their children's expectations to use or not use the AP. The item has the second largest effect on clustering the patients with a Chi-Square statistic of 0.97. The overall mean score of the variable children is 4.5 with a standard deviation (SD) of 1.61. Again the mean of cluster 1 (5.41) is higher than the overall mean and the one of cluster 2 (3.02). Therefore, children of patients from cluster 1 influence their decision towards AP acceptance more than do children of patients in cluster 2. For cluster 1, the effect of children is a little bit bigger than the one of family members (5.41 versus 5.24). On the other hand, the difference between

children's and family's influence on cluster 2 patients is relatively small (3.02 versus 3.09).

4.3.Input Partner

The predictor variable 'Partner' represents in how far patients do rely on their partner's opinion on the AP and to what extent they are affected by their opinions and expectations. Its Chi-Square has a value of 0.95, therefore, it is still very meaningful and almost as important as the variables family and children for the cluster analysis. Likewise to the predictors before, the mean score of partner's influence (5.51) is higher than the overall average (4.8, SD = 1.29) and also higher than the average of cluster 2 (3.54), meaning that patients from cluster 1 are more influenced by partners, children and relatives than patients from cluster 2.

4.4.Input Friends

The item 'Friends' is the next variable in the descending order of Chi-square statistics with a value of 0.82 (see Figure 3). The item depicts the social influence of friends on the sample. The overall mean of answers to the questions is 4.42 with a standard deviation of 1.45. The mean rate of patients of cluster 2 with regards to the item friends is comparably low. On average, patients in cluster 2 valued the social impact of their friends with 2.98. From this it can be inferred that in their decision-making, relatively less consideration is taken on their friends' opinion towards the AP. The overall answer of cluster 1 patients is 5.05, thus, still higher than the general mean.

4.5.Input Nurses

'Nurses' represents patients' perceived impact of this social group when deciding whether to use or not to use the AP. The overall mean (5.19, SD = 1.21) has the highest score. Therefore, for all clusters, nurses play a crucial role in patients' decision-making processes. Even though the variable is less important for the cluster analysis (Chi-square = 0.74), for cluster 2 (mean = 4.07), the influence of nurses is higher than the influence of friends, relatives, partners and children. Concerning cluster 1, the mean of 5.77 is even the highest among all items which signifies that nurses are the main driver for patients decisions revolving around using the AP.

4.6.Input Coworkers

Coworkers' impact on diabetes patients' consideration of making use of the AP is low. The Chi-square of 0.72 is relatively high, hence, it is still important for the cluster analysis itself, but both clusters rate the item as the one with the lowest social impact. Out of all variables, the item 'Coworkers' has the lowest overall mean (4.06, SD = 1.41), too. Patients from cluster 1 (mean score = 4.77) are least affected by coworkers' perceptions and suggestions towards the AP. The same applies to cluster 2 whose mean score of 2.84 is in all the lowest. It can be concluded that overall, coworkers' influence has the lowest impact on patients decision-making.

4.7.Input Physicians

The input predictor importance for 'Physicians' amounts to a Chi-square of 0.68. Nevertheless, for cluster 2, physicians have the greatest importance of all items as the mean rate is 4.17. Cluster 1 rated physicians' impact on their decisions next to nurses as most applicable with a mean of 5.73. The overall mean of the item is 5.2 with a standard deviation of 1.2. As the data show, for cluster 2, physicians followed by nurses are perceived to have the highest social impact on their decision-making.

4.8.Input Diabetes Patients

The item 'Diabetes Patients' illustrates the extent to which other diabetes patients are perceived as potential influential

social entities on deciding whether to use and accept the AP or not. The total mean score of answers is 4.32 with a standard deviation of 1.41. The difference between the mean scores of cluster 1 and 2 is not that high (4.97 versus 3.22) which is why the Chi-square value of 0.65 compared to the first three items, depicts a relatively low predictor importance for the cluster analysis.

4.9. Input Patient Associations

Patient Associations' influence on diabetes patients' decisions with regards to usage of the AP is of all social groups the least important item for the cluster analysis with a Chi-square statistic of 0.63. The overall mean of the item is 4.35 with a standard deviation of 1.31. Both clusters rated the influence of patients associations similar to the impact of diabetes patients as low. The mean of responses in cluster 1 is 4.95 and 3.36 in cluster 2.

4.10. Input Education, Diabetes Treatment, Age and Gender

Figure 2 shows that the predictor items educational level, diabetes treatment, age and gender are shaded light purple. This means that these variables have a low impact on the cluster analysis which further indicates that the differences between cluster 1 and 2 on these items is not that big.

4.10.1. Input Education

'Education' is a categorical variable. Respondents were not asked to answer on a Likert scale, instead they had to choose among Primary school, Secondary school, High school, Bachelor degree and Master degree as possible answer options. The Chi-square of education is 0.12. Thus, very low compared to the others. Figure 4 (Appendix 10.2.) illustrates that most respondents of cluster 1 (39.2 %) stated that they finished high school as highest educational level, followed by a bachelor's degree (approximately 20%) and a master's degree (approximately 16%). In cluster 2, most patients (50.6 %) got a bachelor's degree, followed up by secondary school and high school (approximately 20% each).

4.10.2. Input Treatment Method

The Chi-square of treatment method is 0.05. So, the item can nearly be disregarded in the cluster analysis. With regards to treatment methods, respondents were asked to choose whether they currently treat their diabetes with an Insulin pen, Insulin pump or with an Insulin pump and CGM. 57.5% of the Patients from cluster 1 indicated that they are currently treating their diabetes with an insulin pump. More than 30% are using an insulin pen and the remaining make use of an Insulin pump and CGM. As Figure 5 (Appendix 10.2.) shows, there are nearly as many insulin pen- than insulin pump users (around 40-45% each) whereas a minority of 15-20% are operating with an insulin pump and CGM. The overall distribution of treatment methods as stated in 3.1. Study subject and sample shows that 44.9 % are insulin pump-, 39.6 % are insulin pen- and 13.3 % are CGM-users.

4.10.3. Input Age

The Chi-square of age (0.01) is even smaller than the one of treatment method. It can be concluded that there are nearly no age differences among the clusters and that the distribution of age classes is similar. The mean age of the total sample was 39.8 with a standard deviation of 16.24. The mean age in cluster 1 is 44.41 and of cluster 2, 42.90. So the mean age in each segment is analogical to the mean age of the total group.

4.10.4. Input Gender

The item 'Gender' has a Chi-Square of 0. Therefore, gender does not have any effect on the cluster analysis. The

distribution of female and male respondents in both clusters is alike to the overall distribution (see Figure 6, Appendix 10.2.). The sample was composed of 231 female (53.5%) and 201 (46.5%) male patients. In comparison, cluster 1 consists of 51.4 % and cluster 2 of 52.9 % females. No difference in gender distribution can be discovered.

5. DISCUSSION

5.1. Summary of Findings

The aim of this study is to investigate into which customer segments diabetes type 1 patients can be distinguished and in how far subjective norm as a segmentation variable has an influence on the cluster analysis. As the results show, two segments can be identified, of which one accounts for 54% and the other of 46% of the sample, i.e. diabetes type 1 patients (see Figure 1). It has to be noticed that the following conclusions do apply to the data generated in this present study and deviations compared with different input is possible.

The cluster analysis is based on the variables age, gender, educational level, diabetes treatment and subjective norm, which in total add up to 13 input items. With a chi-square value ranging from 0.63 to 1, all nine criteria relating to subjective norm were indicated as important for the segmentation process, as the patients differ mostly with regards to these variables (see Figure 2 and 3). By way of comparison, the chi-square of the variables age, gender, educational level and diabetes treatment ranged from 0 to 0.12 which implies that these criteria do not heavily constitute to the formation of the two clusters.

With regard to cluster 1 it can be concluded that the patients in this group are relatively easily led as they attach great importance to the opinion and suggestions of others. As can be noted from Figure 2, cluster 1 patients rated questions concerning subjective norm on average with a 5 or higher which is above the mean of 3.5 and the median value of 4. Additionally, Figure 2 depicts the importance of each predictor for the cluster analysis (see also section 4. Results) and the mean score of the clusters towards each item. According to this, patients from cluster 1 perceive nurses' social influence as overriding since they rated their influence on accepting the AP at highest (mean= 5.77) followed by physician's social impact (mean = 5.73) which subsequently indicates that they esteem healthcare professionals' opinion the most. It is obvious that physicians, nurses, professors and most people operating in the healthcare sector are in general very knowledgeable about any kind of medical issues and some do even have the required specialized knowledge for dealing with diabetes matters. This may explain why cluster 1 patients attach most importance to nurses' and physicians' viewpoint.

As stated before, there are some authors, for instance R thele (2010), Heisler et al. (2007) and Lutfey and Wishner (1999), who claim that patients do decreasingly rely on external parties' advice, especially the counsel of personal from the medical sector. This view is not consistent with the cluster analysis' outcomes as the patients from cluster 1 really do rely on professionals' advice. But since there are no data available which depict the differences in time, regarding patients and the degree to which they rely on professionals, it is difficult to make any suggestions about a possible change in patients' attitude towards nurses and physicians by this time.

Nevertheless, as Kao, Green, Davis, Kolpan and Cleary (1998) point out, even well-informed, experienced and independent patients have to a greater or lesser extend rely on medical specialists as they support them „with appropriate information, keep personal information confidential, provide competent care, and act in their best interests“ (p. 681). Still, the degree to

which patients in the long run depend on physicians' and nurses' recommendation is diverging (Guadagnoli & Ward, 1998).

Next to professionals, the majority of cluster 1 declares that they depend on their partners' (mean = 5.51), children's (mean = 5.41), families' (mean = 5.24) and friends' (mean = 5.05) advice and point of view. These groups can be summarized into respondent's closer social environment. As pointed out by Thompson, Pitts and Schwankovsky (1993), patients perceive medical staff to be more knowledgeable about each possible treatment type, its outcome and (side-) effects, but in the end it are the patients who are in the position to decide upon which effects and treatments they prefer, as long as no medical knowledge is required. When facing decision making processes, people do rarely handle such situations in isolation (Bearden & Etzel, 1982; Park & Lessig, 1977; Merton & Rossi, 1949) as they tend to act and behave in such a way that they are consistent with the social groups with which they identify and to whom they belong (Childers & Rao, 1992). Therefore, people are inclined to rely on reference groups like partners, children, family members and friends as they support them in balancing costs and benefits of certain situations and in maintaining a positive self-identity through close relationships and social belonging (Wood & Hayes, 2012). Additionally, individuals are inclined to compare themselves with people or groups that are neither socially close to them nor do they belong to their membership groups but which share the same norms, attitudes and values and may therefore be in the position to shape their behaviour and influence their decisions (Bearden & Etzel, 1982). Diabetes associations, diabetes patients and co-workers can be numbered among such groups.

However, cluster 1 values associations', patients' and co-workers' beliefs and thoughts as least important in their decision making process. It may be that this group of patients is not (heavily) involved with diabetes associations, other diabetes patients or their co-workers, meaning that there is no deep relationship between these parties which would explain why cluster 1 pays less attention to these groups, their opinions and suggestions. A different suggestion may be that overall, this segment does not identify itself with those groups which consequently has a negative influence on trust building and bonding with each other (Bearden & Etzel, 1982) and which would explain why patients do not rely on the groups' expertise. The literature provides certain theories which give an insight of reasons why people are hostile to come in contact or identify oneself with others. One of these is the proximity avoidance approach, which Schaffer (1966) describes as fear of strangers. This basically means that people often avoid to talk to other individuals with whom they are not familiar with or which they do not know. Foddy, Platow and Yamagishi (2009) introduced the concept of group-based trust which implicates that „people may trust strangers with whom they share a salient social category more strongly than those with whom they do not" (p. 419) which is consistent with Bearden & Etzel (1982) who claimed that groups who are not socially close to individuals may have an influence on them only when these people relate to those groups.

The same is true for cluster 2 patients, who also imply that they perceive co-worker's social influence as having the lowest impact on their decision making process. But different from cluster 1, there is no social group that seems to have a relatively high impact on cluster 2 patients since the overall mean level of perceived influence is 3.4 (out of 7). Therefore, compared to cluster 1, this segment might consist of more or less self-determined people that do not (want to) reckon and rely on other individuals' opinion. Cluster 2 patients also rated

professional's influence as having the highest impact. Nevertheless the mean scores of 4.07 for nurses respectively 4.17 for physicians indicate that they relatively put little emphasize on their notion which in turn correlates with R thele (2010), Heisler et al. (2007) and Lutfey and Wishner (1999) who investigate a decrease in patients' reliance and dependency on healthcare professionals. Again, there are no data available which provide a comparison of numbers throughout the years, wherefore possible correlation should be made cautiously.

In general, cluster 2 perceives the influence of any kind of social groups as low, but nevertheless it is conspicuous that the impact of diabetes associations and patients on their decision making process is higher than for instance the impact of family members, children or friends as it is the case for cluster 1 patients. It is likely that other diabetes patients and associations are more knowledgeable about the diabetes topic than for instance family members, children and friends. Besides, the majority of these groups is suffering from the disease as well and accordingly may know best how to cope with it. Therefore, cluster 2 patients may feel more confident and more connected with them and thus value their counsel more. There may be additional reasons why cluster 2 proportionally esteems the notion of diabetes associations and patients more than cluster 1 does. One possible explanation might be the difference concerning the patients' educational level. Most people of cluster 1 (approximately 30%) stated that their highest educational level is a high-school diploma whereas more than 50% of cluster 2 got a bachelor's degree. As noted by Goldberg, Sweeney, Merenda and Hughes (1998) „more highly educated individuals tended to describe themselves as somewhat more intellectual than less well educated persons" (p. 401) which is why cluster 2 people might tend to focus on specialists' and like-minded people's opinion more than the judgement and advice of their children, other family members or friends. It may also be, that cluster 2 consists of singles or couples without kids or a relatively small circle of friends which also would explain why they do not pay attention on children's and friends' opinion.

The bottom line with regards to the variable subjective norm is that cluster 1 relies far more on the advice of other social groups, especially on the counsel of professionals, partners, children and family members, than cluster 2 does. Generally speaking, cluster 2 pays not much attention to social influence determinants, nevertheless, they rate the impact of some groups like professionals, diabetes associations and other diabetes patients higher than for instance friends, children and family members.

Regarding age, gender and treatment methods, the two segments are similarly distributed, furthermore these variables have nearly no effect on the cluster analysis itself. Other than the segmenting criteria subjective norm which turned out to have the biggest impact on the analysis as it is categorized as the most important predictor. In this way, the biggest varieties among the clusters arise on behalf of the items family, children, partner, friends, nurses, physicians, co-workers, diabetes patients and associations which lead to the conclusion that subjective norm indeed can serve as a valuable segmentation variable.

5.2.Evaluation and Limitations

There are several limitations and restrictions which should not be neglected. First of all, the sample consists of diabetes patients who voluntarily signed up to cooperate with Inreda Diabetic B.V.. Therefore, the sample is more or less biased and does not represent diabetes patients' overall perception of the AP as the respondents were already aware of and familiar with

the device, its benefits and advantages and also were to some degree interested in it. This may lead to an overall slighter chance of negative assessments and a potential high chance of biased variables like for instance AP awareness and intention to use the device. It is therefore advisable to repeat the same study with diabetes patients which are neutral and have no prior knowledge of the AP. Second, after performing the cluster analysis, the sample size decreased from 414 to 161 diabetes type 1 patients which is still representative but rather small. Accordingly, future studies addressing this topic should consist of more respondents as it would increase the reliability of the findings and also simplifies the generalization of the outcomes. Next to that it should be noticed that the sample is composed of Dutch, German, Austrian and Belgian respondents wherefore conclusions being made in this research are not directly generalizable to countries which are different in terms of cultures and beliefs. This problem could be solved by working with a cross-country sample. Third, respondents were asked to rate their perceived influence of certain social groups on a seven point Likert scale. Nevertheless, this list of social groups may not be complete and precise as there may be additional individuals who also are seen as crucial influencing parties in patients' decision-making processes. Future studies should take the possibility of supplementary social entities into account and in case additional entities were found, they should investigate their impact on people's decision-making processes and also on cluster analyses. Fourth, the study is merely focussing on the AP as technological device for treating diabetes diseases. Outcomes and conclusions are accordingly not applicable to other (non-medical related) technological tools and innovations which is why the study's framework should also be tested and adapted to other technology devices or innovations. Fifth, as the survey was originally written in English, translations into German and Dutch may lead to loss of validity as well as incorrect or inaccurate formulations and interpretations. Questionnaires written in the required language are therefore more enhanced.

5.3. Recommendations and Implications

5.3.1. Practical

5.3.1.1 Recommendations for Inreda Diabetic B.V.

It should be noted that pharmaceutical marketing is closely regulated by for instance the U.S. Food and Drug Administration (FDA) or the European Federation of Pharmaceutical Industries and Associations (EFPIA) whose purpose is to assure that promotional materials are precise, fairly balanced and limited to information that have been approved by these entities. Additionally, there are certain pharmaceutical guidelines which set standards for cooperations between health care providers and marketers (PhRMA, n.d.). Therefore it may be true that the following recommendations do not conform with the appropriate rules and laws which consequently means that they are not feasible.

The study's outcome and conclusions serve as a valuable support for Inreda Diabetic B.V. when establishing appropriate marketing strategies for the publication of the AP. The findings may deliver information with which the company is able to satisfy their customers needs more precisely, leading to an increase in the overall acceptance of the AP.

The results reveal two distinct clusters on which the Inreda should focus on. Nevertheless, the company should bear in mind that additional studies with a greater span of (unbiased) respondents will probably lead to a more precise outcome of diverging clusters.

The biggest difference among these two segments is the degree to which the patients take others' opinion into account and let

them be part in their decision making processes. Cluster 1 is composed of patients that are familiar and social oriented as social groups, in particular, partners, children, family members and friends but also professionals like physicians and nurses have a relatively big say in their decision formation. Therefore, Inreda may try to address diabetes patients' close social surrounding like family and friends to get to their customers. Put another way, Inreda has to position the AP in such a way that next to the diabetes patients themselves, their close social environment feels the need to buy the AP (Blythe, 2009).

These groups may be reached through for instance providing family oriented seminars in which the AP is being introduced and explained to the participants with focus on convincing not only the diabetes patients themselves but especially their relatives as they are in the position to affect their opinion. According to Blythe (2009), there are several types of media through which advertisement can take place. The most important ones are active media, print and internet advertising. Active media can be used for family-oriented promotions like TV spots or radio announcements. Print media are mainly divided into magazines/newspapers, leaflets and flyers. The latter can easily be distributed in for instance waiting rooms or pharmacies. Banners and Pop-ups about the AP, as part of internet advertisement, can be placed on website which are concerned with diabetes, e.g. forums for sick people or hospital websites. The company may also allocate advertisements in social media channels like Facebook, Twitter or Instagram which Röthele (2010) summarizes as 'compliance programs'. With their homepage, Inreda is already present on the internet, nevertheless, as soon as the AP is being introduced to the market, the company should consider to offer more information regarding the AP, e.g. reviews of users or pictures/videos of patients and their daily life with the device in order to convince diabetes patients and their social environment.

As cluster 2 cares mostly about professionals' counsel but as a whole does pay relatively less attention to others' opinions, it is more sensible for Inreda to target these patients solely. As cluster 2 patients to some degree value the viewpoint of distinct diabetes associations and patients it may be a clever idea to host special events/seminars/meetings in which all diabetes patients come together, possibly accompanied by physicians, nurses or other specialists which provides Inreda the opportunity to present the features, benefits and advantages of the AP. Since it might be relatively time consuming and costly for some people to attend one or several meetings, it might also be a good solution to establish a website or forum where like-minded people who also are suffering from diabetes and professionals can have the opportunity to exchange information and ask questions. Further, all the advertisement strategies as stated before like flyers, pop-ups or website hold also true for cluster 2 patients.

These way of direct communication between the patients and Inreda would increase customers' responsiveness which in turn serves Inreda with valuable information and feedback which consolidates the relationship between the company and its customers simultaneously (Vargo & Lusch, 2004; Hohensohn, 1998). As Röthele (2010) points out, providing patients with health related information creates trust towards the company on patients's side which in turn serves as basis for customer loyalty. In addition, the acquisition of information enables Inreda to align their corporation more precisely to their customers' needs which may increase their company's image and awareness (Röthele, 2010).

5.3.1.2 Recommendations for Practicals in General

The findings reveal that subjective norm is a valuable part and important variable in this cluster analysis. Therefore, it is likely that subjective norm plays also in different contexts a crucial role. Accordingly, marketers should consider to add the variable in their segmentation processes. It can not be ensured that the effect of subjective norm is the same for every market segmentation but at best the variable helps to define and cluster the customer base more precisely. Dependent on the situation and the background of a marketing plan, the impact of additional social groups can be examined as some groups may be more relevant for a cluster analysis than others. It is obvious that generating information with regards to social influences may be more expensive than gathering data of traditional variables like age or gender (Shapiro & Bonoma, 1984), which is why it should be evaluated whether it is of worth to make use of subjective norm as segmentation criteria or whether the traditional variables are sufficient.

5.3.2. Theoretical

Next to the practical contributions, this paper also provides theoretical recommendations and implications for further research. As emphasized throughout the study, subjective norm, respectively the impact of social groups towards an individual, plays a crucial role in different application areas as for instance in behavioural psychology, Business-to-Consumer-Marketing and in technology and innovation acceptance models. But when it comes to market segmentation strategies, subjective norm as a potential segmenting criteria was not often taken into consideration. Thus, the aim of this research was to investigate the impact of subjective norm on the cluster analysis and how wide its influence is on segmenting the patients. As the results show, the input criteria was the most important variable in the analysis which verifies its importance. However, this finding is related to specific input data of diabetes patients wherefore the effect of subjective norm as segmenting criteria should also be examined in different contexts to confirm its validity. An additional suggestion is to research the impact of social influence on individual's decision making processes in general, not relating to the adaption of new technology innovations like the AP. Furthermore, it would be interesting to examine whether the effect of subjective norm varies when the sample size and number of potential influencing parties in- or decreases or when additional variables like age, gender or nationality have a bigger impact on the cluster analysis than in this study. Moreover, for marketers in general but also for Inreda it would be of value if the impact of variables different than subjective norm or the traditional ones would be explored. In case of Inreda and the AP, but also for any other company introducing a new technology onto the market, examining the influence of criteria like product characteristics or the personality and individual characteristics of the consumers on their intention to use a device may deliver useful information.

Next to the importance of subjective norm as segmentation variable, the outcome also proves that there are differences between people and their responsiveness towards social influences. Accordingly, it is possible that not every customer is responsive to operations which are based on sociality. This may have consequences for marketing or promotion activities which focus on contexts where social networks, word-of-mouth or community activities are necessary. Marketers therefore have to get an insight of people's attitude towards subjective norms to avoid ineffective marketing strategies.

6. CONCLUSION

Taken all together, the research conducted in this paper investigates which customer segments of diabetes type 1

patients can be distinguished and in how far subjective norm can be used as a segmentation variable and how wide its influence on clustering a market is. As the outcome reveal, two distinct segments emerged, which distinguish themselves from the degree to which they take various social groups' advice and opinion into account and also from the order of priority of social groups' importance on their decision making processes. Thereby, the segmenting criteria subjective norm turned out to be the most important item as it has the biggest impact on the research's cluster analysis. However, more research and studies are needed which validate the effect of subjective norm as a valuable market segmentation variable also in a cross-border context.

7. ACKNOWLEDGEMENTS

I would like to thank my supervisors Dr. A.M. von Raesfeld-Meijer and PhD(c) T. Oukes for giving me the opportunity to work with them on this research project. Throughout the whole process of writing and elaborating, they supported me in the best possible way. Furthermore, I would like to thank all my fellow students who helped me with their useful feedback and advice. The biggest thanks goes to my family and friends who always supported and believed in me!

8. REFERENCES

1. Alagöz, F., Ziefle, M., Wilkowska, W., Valdez, A. C. (2011). Openness to Accept Medical Technology - A Cultural View. *Information Quality in e-Health*, 151-170.
2. Anderson, C., Vincze, J. W. (2000). *Strategic marketing management*. New York. Houghton Mifflin.
3. Babbie, E. (2010). *The practice of social research*. Wadsworth (Vol. 12th edition). Belmont.
4. Baruch, Y., Brooks, C. H. (2009). Survey response rate levels and trends in organizational research. *Human Relations*, 61(8), 1139-1160.
5. Bearden, W. O., Etzel, M. J. (1982). Reference Group Influence on Product and Brand Purchase Decisions. *Journal of Consumer Research*, 9(2), 183-194.
6. Becker, M. C., Lillemark, M. (2005). Marketing/R&D integration in the pharmaceutical industry. *Research Policy*, 35, 105-120.
7. Berger, J. T. (1998). Cultural discrimination in mechanisms for health decisions: a view from New York. *Journal of Clinical Ethics*, 9, 127-131.
8. Blythe, J. (2009). *Principles and practice of marketing*. Andover, Hampshire: South-Western/Cengage Learning.
9. Brennan, R., Canning, L., & McDowell, R. (2011). *Business-to-business marketing*. Los Angeles, CA: SAGE.
10. Cain, M., Mittman, R. (2002). *Diffusion of Innovation in Health Care*. California HealthCare Foundation.
11. Campiniha-Bacote, J. (2002). The Process of Cultural Competence in the delivery of Health care Services: A Model of Care. *Journal of Transcultural Nursing*, 13(3), 181-184.

12. Childers, T. L., Rao, A. R. (1992). The Influence of Familial and Peer-based Reference Groups on Consumer Decisions. *Journal of Consumer Research*, 19(2), 198-211.
13. Croft, M. J. (1994). *Market segmentation: A step-by-step guide to profitable new business*. London, New York: Routledge.
14. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-339.
15. Davis, F. D., Bagozzi, R. P., Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982-1003.
16. Day, G. S. (1990). *Market-Driven Strategy: Process for Creating Value*. New York: The Free Press.
17. Field, A. (2009). *Discovering Statistics using SPSS: and sex and drugs and rock'n'roll*. Los Angeles, Thousand Oaks, Calif.
18. Greengrove, K. (2002). Needs-based segmentation: principles and practice. *International Journal of Market Research*, 44(4), 405-421.
19. Fishbein, M., Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Addison-Wesley, Reading, MA.
20. Foddy, M., Platow, M. J., Yamagishi, T. (2009). Group-Based Trust in Strangers. The role of Stereotypes and Expectations. *Psychological Science*, 20 (4), 419-422.
21. French, J. R. P., Raven, B. (1959). *The bases of social power. Studies in Social Power*. Institute for Social Research, Ann Arbor.
22. Germar, M., Schlemmer, A., Krug, K., Voss, A., Mojzisch, A. (2013). Social Influence and Perceptual Decision Making: A Diffusion Model Analysis. *Personality and Social Psychology Bulletin*, 23, 1-15.
23. Glynn, W. J., Lehtinen, U. (1995). *The Concept of Exchange: Interactive Approaches in Services Marketing. Understanding Services Management*. New York: John Wiley & Sons.
24. Goldberg, L. R., Sweeney, D., Merenda, P. F., Hughes, J. E. (1998). DEMOGRAPHIC VARIABLES AND PERSONALITY: THE EFFECTS OF GENDER, AGE, EDUCATION, AND ETHNIC/RACIAL STATUS ON SELF-DESCRIPTIONS OF PERSONALITY ATTRIBUTES. *Person. individ. Diff.*, 24(3), 393-403.
25. Guadagnoli, E., Ward, P. (1998). PATIENT PARTICIPATION IN DECISION-MAKING. *Soc. Sci. Med.*, 47(3), 329-339.
26. Hauber, A., Gale, E. A. M. (2006). The market in diabetes. *Diabetologia*, 49, 247-252.
27. Heisler, M., Cole, I., Weir, D., Kerr, E. A., Hayward, R. A. (2007). Does Physicians Communication Influence Older Patients' Diabetes Self-Management and Glycemic Control? Results from the Health and Retirement Study (HRS). *Journal of Gerontology*, 62A(12), 1435-1442.
28. Hohensohn, H. (1998). *Patientenorientiertes Pharmamarketing: Kommunikation und Entscheidungsverhalten am Markt für verschreibungspflichtige Medikamente*. Wiesbaden: Deutscher Universitäts-Verlag.
29. Huang, J., Tzeng, G., Ong, C. (2007). Marketing segmentation using support vector clustering. *Expert Systems with Applications*, 32, 313-317.
30. Inreda Diabetic BV. (n.d.). Retrieved April 26, 2015, from <http://www.inredadiabetic.nl/>
31. PhRMA (n.d.). Retrieved June 15, 2015, from http://www.phrma.org/sites/default/files/159/marketing_and_promotion_facts_071108_final.pdf
32. International Diabetes Federation (2013). *IDF Diabetes atlas (6th edition)*. Brussels, Belgium: The International Diabetes Federation.
33. Kao, A. C., Green, D. C., Davis, N. A., Koplan, J. P. & Cleary, P. D. (1998). Patients' Trust in Their Physicians – Effects of Choice, Continuity, and Payment Method. *Journal of General Internal Medicine*, 13(10), 681-686.
34. Kelman, H. C. (1958). Compliance, identification and internalization: Three processes of attitude change. *J. Conflict Resolution*, 2, 51-60.
35. Klessig, J. (1992). Cross-cultural Medicine A Decade Later. The Effect of Values and Culture on Life-Support Decisions. *The Western Journal of Medicine*, 157, 316-322.
36. Kotler, P. (1967). *Marketing Management Analysis, Planning, and Control*. Englewood Cliffs, NJ: Prentice Hall.
37. Kotler, J., Gordon, M. (1983). *Principles of market*. Canada: Prentice Hall.
38. Kravitz, R. L., Hays, R. D., Sherbourne, C.D., DiMatteo, M. R., Rogers, W. H., Ordway, L., Greenfield, S. (1993). Recall of recommendation and adherence to advice among patients with chronic medical conditions. *Arch Intern Med.*, 153, 1869-1878.
39. Kulviwat, S., Bruner, G. C., Al-Shuridah, O. (2009). The role of social influence on adoption of high tech innovations: The moderating effect of public/private consumption. *Journal of Business Research*, 62, 706-712.
40. Kumar Dey, D. (2013). MARKET SEGMENTATION TECHNIQUES IN THE HEALTH CARE INDUSTRY: A REVIEW FOR APPLICABILITY IN INDIA. *ZENITH International Journal of Multidisciplinary Research*, 3(7), 253-258.
41. LimeSurvey Partner Services. (n.d.). Retrieved May 21, 2015, from <http://www.limesurvey.com>
42. Liu, H., Ong, C. (2008). Variable selection in clustering for marketing segmentation using genetic algorithms. *Expert Systems with Applications*, 34, 502-510.

43. Lovich, D., Silverstein, M.B., Lesser, R. (2001). *Vital Signs: the impact of e-health on patients and physicians. A report on the US market*. Boston Consulting Group.
44. Lutfey, K. E., Wishner, W. J. (1999). Beyond „compliance“ is „adherence“. Improving the prospect of diabetes care. *Diabetes Care*, 22, 635-639.
45. Macdonald, E. K., Wilson, H., Martinez, V., Toossi, A. (2010). Assessing value-in-use: A conceptual framework and exploratory study. *Industrial Marketing Management*, 40, 671-682.
46. MacLennan, J. & Mackenzie, D. (2000). Strategic Market Segmentation: An Opportunity to Integrate Medical and Marketing Activities. *International Journal Medical Marketing*, 1(1), 40-52.
47. Malhotra, N. K. (1989). Segmenting hospitals for improved management strategy. *Journal of Health Care Marketing*, 9(3), 45-52.
48. McCarthy, I. J. (1960). *Basic Marketing. A Managerial Approach*. Homewood, IL: Richard D. Irwin.
49. Merton, R. K., Rossi, A. K., (1949). *Contributions to the Theory of Reference Group Behavior*. Social Theory and Social Structure, New York: The Free Press.
50. Myers, J. H. (1996). *Segmentation and positioning for strategic marketing decisions*. Chicago: American Marketing Association.
51. Norušis M. J. (2011). *IBM SPSS Statistics 19 Statistical Procedures Companion*. Prentice Hall.
52. Normann, R., Ramirez, R. (1993). From value chain to value constellation: Designing interactive strategy. *Harvard Business Review*, 71(4), 65-77.
53. Park, C. W., Lessig, V. P. (1977). Students and Housewives: Differences in Susceptibility to Reference Group Influences. *Journal of Consumer Research*, 4, 102-110.
54. Pinnell, J. (2003). *Improving Healthcare Marketing Through Market Segmentation And Targeting*. World Association of Research Professionals, ESOMAR, Healthcare Conference, New York, February 2003.
55. Rao, C. R., Wang, Z. (1995). Evaluating alternative segmentation strategies in standard industrial markets. *European Journal of Marketing*, 29(2), 58-75.
56. Röthele, S. (2010). Direct-to-Consumer (DTC)-Marketing der deutschen Pharmaindustrie: Nutzen und Grenzen. *Public Health Forum*, 18(68).
57. Rogelberg, S. & Stanton, J. (2007). Understanding and dealing with organizational survey nonresponse. *Organizational Research Methods*, 10, 195-209.
58. Rubin, A., Babbie, E. (2011). *Research Methods for Social Work*. Belmont, CA: Thomson, Brooks, Cole (7th Ed.).
59. Schaffer, H. R. (1966). THE ONSET OF FEAR OF STRANGERS AND THE INCONGRUITY HYPOTHESIS. *J. Child Psychol. Psychiat.*, 7, 95-106.
60. Searight, H., Gafford, J. (2005). Cultural Diversity at the End of Life: Issues and Guidelines for Family Physicians. *American Family Physician*, 71(3), 515-525.
61. Shapiro, B. P., Bonoma, T. V. (1984). *How to Segment Industrial Markets*. Harvard Business School.
62. Smith, W. R. (1956). Product differentiation and market segmentation as an alternative marketing strategy. *Journal of Marketing*, 21(1), 3-8.
63. Stewart, M. A. (1995). Effective Physician-Patient Communication and Health Outcomes: A Review. *CAN MED ASSOC*, 152(9), 1423-1433.
64. Taylor, S., Todd, P. (1995a). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4), 561-570.
65. Thompson, S. C., Pitts, J. S., Schwankovsky, L. (1993). Preferences for involvement in medical decision-making: situational and demographic influences. *Patient Education and Counseling*, 22, 133-140.
66. Tynan, C & Drayton, J. (1987). Market Segmentation, *Journal of Marketing Management*, 2(3), 301-335.
67. van Bon, A.C., Kohinor, M. J. E., Hoekstra, J. B. L., von Basum, G., DeVries, J. H. (2010) Patients' Perception and Future Acceptance of an Artificial Pancreas. *Journal of Diabetes Science and Technology*, 4(3), 596-602.
68. van Bon, A. C., Brouwer, T. B., von Basum, G., Hoekstra, J. B. L., DeVries, J. H. (2011). Future Acceptance of an Artificial Pancreas in Adults with Type 1 Diabetes. *Diabetes Technology & Therapeutics*, 13(7), 731-736.
69. Vargo, S. L., Lusch, R. F. (2004). Evolving to a new Dominant Logic for Marketing. *Journal of Marketing*, 68, 1-17.
70. Venkatesh, V., Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186-204.
71. Venkatesh, V., Morris, M. G. (2000). Why don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. *MIS Quarterly*, 24(1), 115-139.
72. Warshaw, P. R. (1980). A new model for predicting behavioral intentions: An alternative to Fishbein. *J. Marketing Research*, 17, 153-172.
73. Weinstein, A. (1987). *Market segmentation: Using Niche marketing to exploit new markets*. Chicago: Probus.
74. Wilkowska, W., Gaul, S., Ziefle, M. (2010). *A Small but Significant Difference - The Role of Gender on Acceptance of Medical Assistive Technologies*. Leitner, G., Hitz, M., Holzinger, A.: Springer, Heidelberg.

75. Wilkowska, W., Ziefle, M. (2011). User diversity as a challenge for the integration of medical technology into future home environments. *Human-Centred Design of eHealth Technologies*: 95-126.
76. Wood, W., Hayes, T. (2012). Social Influence on consumer decisions: Motives, modes, and consequences. *Journal of Consumer Psychology*, 22, 324-328.
77. Ziefle, M., Schaar, A. K. (2011). Gender differences in acceptance and attitudes towards an invasive medical sent. *Electronic Journal of Health Informatics*, 6(2), 1-18.

10.APPENDIX

10.1.Tables

Table 1. Operationalization of the variable Subjective Norm

Construct	Definition	Original Item	Source	(Adapted) item
Subjective Norm	Perceptions one may have of the social expectations of referent others to commit or not commit to a certain behavior	People who influence my behavior think that I should use the system	Venkatesh & Davis (2000)	SN_00_SN_01: People who are important to my health care services think that I should not use the artificial pancreas. SN_00_SN_02: People who are important in assessing my patient care and management think that I should not use the artificial pancreas.
Social influence partner	Perceptions one may have of the social expectations of partners to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_01: My partner would think that I should use the artificial pancreas SI_00_SI_02: Generally speaking, I want to do what my partner think I should do
Social influence family	Perceptions one may have of the social expectations of family members to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_03: My family would think that I should use the artificial pancreas SI_00_SI_04: Generally speaking, I want to do what my family think I should do
Social influence children	Perceptions one may have of the social expectations of children to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_05: My children would think that I should use the artificial pancreas SI_00_SI_06: Generally speaking, I want to do what my children think I should do
Social influence friends	Perceptions one may have of the social expectations of friends to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_07: My friends would think that I should use the artificial pancreas SI_00_SI_08: Generally speaking, I want to do what my friends think I should do
Social influence coworkers	Perceptions one may have of the social expectations of coworkers to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_09: My coworkers would think that I should use the artificial pancreas SI_00_SI_10: Generally speaking, I want to do what my coworkers think I should do
Social influence physician	Perceptions one may have of the social expectations of physicians to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_11: My physician would think that I should use the artificial pancreas SI_00_SI_12: Generally speaking, I want to do what my physician think I should do
Social influence diabetes nurse	Perceptions one may have of the social expectations of diabetes nurses to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_13: My diabetes nurse would think that I should use the artificial pancreas SI_00_SI_14: Generally speaking, I want to do what my diabetes nurse think I should do
Social influence patient association	Perceptions one may have of the social expectations of patient associations to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_15: Patient associations would think that I should use the artificial pancreas SI_00_SI_16: Generally speaking, I want to do what patient associations think I should do
Social influence other diabetes patients	Perceptions one may have of the social expectations of other diabetes patients to commit or not commit to a certain behavior		based on Taylor & Todd (1995a)	SI_00_SI_17: Other diabetes patients would think that I should use the artificial pancreas SI_00_SI_18: Generally speaking, I want to do what other diabetes patients think I should do

Table 1. Operationalization of the variable Subjective Norm

Construct	Item/Question	Answer Option/unit
Age	AGE: What is your age?	in years (0-99)
Gender	GEN: What is your sex?	male/female
Educational Level	EDU: What is your highest educational level?	Primary school/Secondary school/High school/Bachelor degree/Master degree
Current treatment of Diabetes Type 1	METHOD: How is your diabetes currently treated?	Insulin pen/Insulin pump/Insulin pump and CGM

10.2.Figures

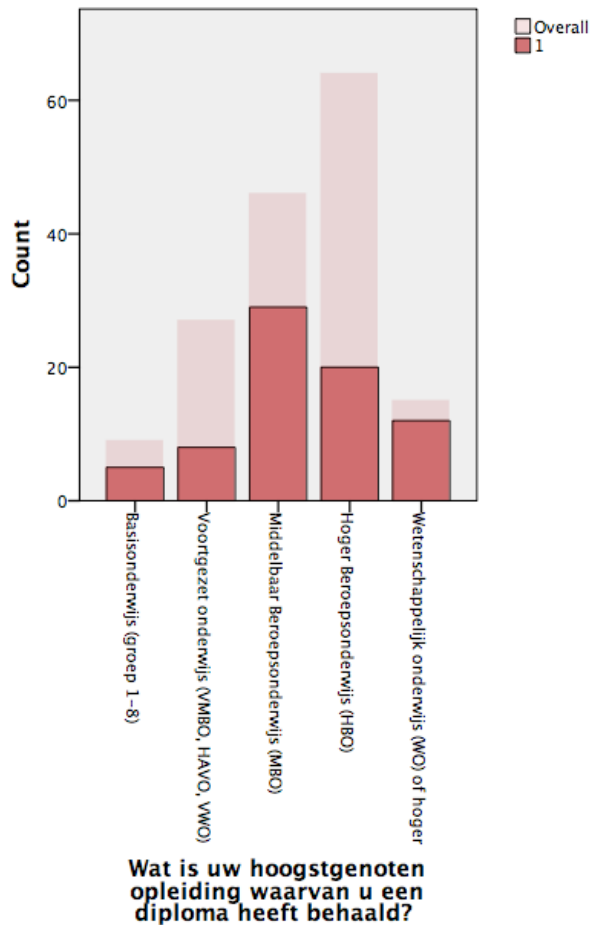


Figure 4. Cell Distribution Educational Level

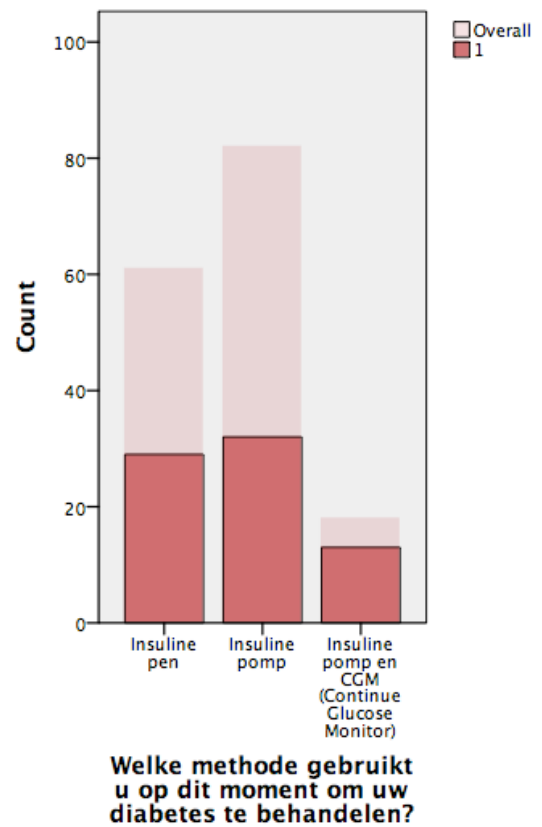


Figure 5. Cell Distribution Treatment Method

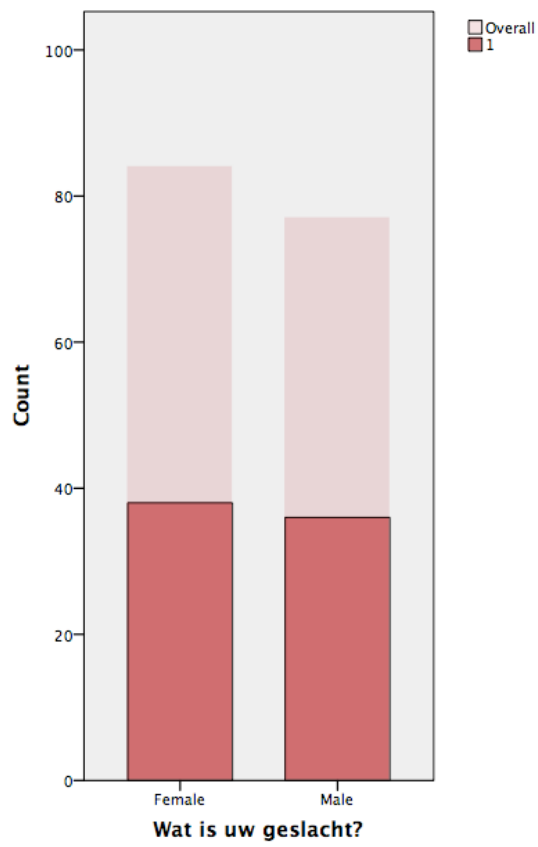


Figure 6. Cell Distribution Gender