The extent to which product characteristics of new innovations influence nurses' intention to advise them

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ABSTRACT

Purpose – The increasing spread of diabetes and its associated dangers for the health of the world's population leave an enormous market potential for firms striving to find a cure and new solutions to this disease. Current treatment options rely on continuous patient involvement. Only recently, the Dutch company Inreda B.V. has started developing an artificial pancreas, which automates the blood glucose level monitoring as well as balancing and does not require patient involvement. In order to successfully enter the market, the aim of this research is to find out whether certain product characteristics influence the decision of nurses' to advise a new product.
Design/methodology/approach – Data obtained from a survey sent out to the Dutch Association for Diabetes Care Professionals (EADV) was analysed. The analysis covers the answers from 77 nurses. Correlation and regression coefficients were calculated to test the relationship between product characteristics and the intention to advise.
Findings – The data revealed that there is a partially mediating effect of the perceived usefulness of a product and the relationship of compatibility and intention to advise. Further, a statistically positive relationship between the compatibility of a product and the intention to advise was found. The data revealed that there is a statistically insignificant negative relationship between complexity of a product and the intention to advise.
Practical implications – Since tailoring a marketing strategy to the needs of stakeholders' involved increases the chances of adoption, it is recommended that Inreda focuses on educating nurses on the compatibility of the artificial pancreas.
Theoretical implications – The study contributes to the growing body of literature concerning technology acceptance by highlighting the need of further validation of the TAM and IDT in the medical and diabetes sector.
Originality/value – The research results highlight that Inreda must include nurses in their marketing efforts and tailor their strategies towards product characteristics, especially compatibility.

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1. INTRODUCTION

The phenomenon of innovation has gained extensive recognition by scholars in a variety of sectors and has been associated with significant benefits for organizations (Teece, 1986; Kimberly & Evanisko, 1981). Innovations are directly linked to the introduction of new technologies (Antonelli, 2014). The role of technology and the number of technology-based products and services have been growing rapidly (Parasuraman, 2000). As a consequence, the acceptance of such technologies has received attention in the body of literature.

The introduction of a new technology generally involves and affects several parties, such as customers and the developing companies (Katila & Ahuja, 2002). As such, the needs, interests, and preferences of each party must be carefully considered. Extensive research has been done to investigate how people react to new technologies and what product characteristics influence them in their perceptions (Godoe & Johansen, 2012; Parasuraman, 2000; Venkatesh & Davis, 2000; Rogers, 1995; Davis et al., 1989; Davis, 1989; Fishbein & Ajzen, 1975; Thomson, 1965).

For centuries, technological innovations have proven to be aiding and simplifying people's lives. According to Bronzino (2014), this holds true especially in the medical sector, where new technologies enhance treatment methods and even cure diseases that have been considered incurable. Likewise, the Dutch company Inreda Diabetic B.V. (hereafter Inreda) has developed a new technology to help diabetes patients.

Recent statistics of the International Diabetes Federation (IDF) (IDF, 2013) highlight the severe development of diabetes mellitus (henceforth diabetes). An astounding and growing estimate of 382 million people are suffering from diabetes. Diabetes exists in a variety of forms, namely type 1, type 2, and gestational diabetes, which differ in both occurrence and malfunctioning. While Type I diabetes cannot be prevented and patients lack insulin production resulting in high blood glucose levels, Type II patients are suffering from a resistance of insulin to unlock body cells for glucose entrance, which ultimately leads to a very high blood glucose level as well. As opposed to the former, Type II diabetes can usually be prevented or delayed by adopting a healthy lifestyle (Whiting et al., 2011; Dey & Attele, 2011; Daneman, 2006). A more detailed elaboration of the three types of diabetes is presented in the appendix (14.1.).

Thus, as mentioned above, patients are not able to keep their blood glucose level at a constant level. In order to regulate and keep the blood glucose level on a healthy balance, patients heavily rely on the use of insulin and glucagon, which decrease respectively increase the blood glucose level (Van den Berghe et al., 2006; Hansen & Johansen, 1970).

Consequently, diabetes and its treatment options will continue to offer a very attractive and increasingly growing market for companies in the health care sector. Currently, patients can choose from a range of different medical devices in the market, namely insulin pumps, insulin pens, insulin syringes, and inhaled insulin devices, all of which bring certain advantages and disadvantages along (Muniyappa et al., 2008).

Only recently, Inreda has developed the so-called artificial pancreas (henceforth AP). The AP is an automated device used in the treatment of diabetes, which regulates the patient's blood glucose level. It uses a reactive control algorithm that automatically defines when and how much insulin or glucagon has to be injected. Therefore, it is less time consuming for patients to use and requires no manual injections, thereby simplifying the patient's life significantly (Inreda Diabetic BV, 2015). Further, Inreda and other scholars (El-Khatib et al., 2010) expect the AP to reduce complications and the threat of sudden hyperglycaemia (high blood sugar) and hypoglycaemia (low blood sugar) due to stable glucose measures. Clinical trials will continue to be carried out in 2015 and 2016 and will lead to an introduction to the market soon after. As mentioned by Doyle et al. (2014) "AP technology is advancing quickly" (p. 1196) and will thus continue to gain increasing recognition and importance in the field of medical innovation. Only very recently, the first AP algorithm ever has received regulatory approval with the CE mark in Europe (Diatribe, n.d.)

Within the medical sector, several hurdles have to be taken before a patient actually receives treatment (Ferlie et al., 2005). Despite the fact that medical innovations can lead to improvements in (cost-) effectiveness and convenience for patients, the introduction of the AP requires doctors to accept, prescribe, and recommend them before the patient actually receives treatment (Herzlinger, 2006). Likewise, nurses can also directly initiate the adoption of an innovation by taking an advisory role to the patients and physicians (Huston, 2008, Timmons, 2003). In fact, nurses are directly involved with patients suffering from diabetes, for example through giving dietary advise. Thus, they play a very important role in the treatment of diabetes patients (Keanealy et al., 2004). However, the factors and forces affecting the acceptance of nurses are largely unexplored and unknown. This leads to some innovations never reaching their full potential. Many simply remain "unexplored, rejected, or forgotten" (Orlikowski, 2000, p. 406). A considerable amount of research has been done on the general acceptance of technologies and innovations (Yarbrough & Smith, 2007). However, it is mostly unknown how nurses react to a newly introduced medical innovation and what factors drive them to accept or reject those. Precisely, it is unknown which features of an innovation have an influence on the nurses' attitude towards the product.

Therefore, this research paper will investigate the following research question:

"To what extent do the product characteristics of new innovations influence nurses' intention to advise them?"

By investigating the relationship between product characteristics of an innovation and the intention to make use of the innovation, in this case advising it, this research paper can give Inreda an insight into the factors influencing the nurses' decisions; thereby, allowing Inreda to use this understanding when developing an adequate market entry- and marketing strategy. Further, this research contributes to closing the knowledge gap in the body of literature by adding an important aspect concerned with technology acceptance models in the medical sector. To be precise, it explains how nurses react to new medical innovations. Thereby, showing researchers if technology acceptance models can be applied in the medical sector and possibly even to other contexts.

In the following, the paper will follow a clear and systemized structure. Previous literature will be introduced, analysed, and evaluated, thereby explaining the relevant theories for this research paper. Subsequently, the methodology used to analyse the data will be explained. The following results section will highlight the main insights gained from the analysis and will be followed by the conclusion in which the main findings will be summarized and discussed.

2. THEORIES OF TECHNOLOGY ACCEPTANCE AND INNOVATION

In the subsequent section, existing literature concerning technology acceptance and innovation is critically reviewed and connected; thereby investigating the underlying concepts and creating the basis for an analysis of the research question. An overview can be found in table 1 in the appendix.

As a relatively new application in diabetes treatment, the technology acceptance of the AP remains rather unknown. First small scale studies have found that the overall attitude of patients towards the AP is positive in terms of perceived usefulness (van Bon et al., 2011 & van Bon et al., 2010). However, it remains unknown how larger and other stakeholder groups accept technologies. Consequently, it is of great value to investigate how technologies are accepted. In a subsequent step, investigating the process through which newly introduced innovations go can bring valuable insights for marketing purposes.

As one of the most capital-intensive industries, the medical device industry suffers to a large extent from huge upfront investments. Next to the pharmaceutical industry, the medical device industry invests the largest percentages of revenue into research and development (Pansecu, 2006). Nonetheless, Renard (2010) suggested that the medical sector should "dedicate more funds to support therapeutic education in the near future" (p.31). Leonard-Barton and Kraus (1985) support that ambiguity by reporting that many companies struggle to adequately market a new technology, indicating difficulties in tailoring marketing strategies to customers.

This supports the findings of other recent studies (Reinhardt et al., 2015; Herzlinger, 2006), which outline the difficulty of introducing innovations in the health care sector. In this context, other researchers found that technology acceptance of nurses shows significant resistance to information technologies, for example computerized nursing care plans (Rawstorne et al., 2000), error reporting systems (Karsh et al., 2006), computer systems (Timmons, 2003), personal digital assistants (Liang et al., 2003), and electronic logistic systems (Tung et al., 2008). However, Timmons (2003) found that nurses' resistance to a new information technology did not succeed in a sense that the technology would be laid off; rather, it was still implemented and termed "resistive compliance" (p. 267). Similarly, Lai (2014) recently observed major resistance of patients to accept a new medical technology. Consequently, resisting forces could display a major constraint on the introduction of medical innovations.

Investigating such resisting forces, Davis (1989) developed the Technology Acceptance Model (TAM) based on previous works of Fishbein and Ajzen (1975). It explains that technology acceptance by individuals is primarily determined by the *perceived usefulness* (PU) and *perceived ease of use (PEOU)* of a system. Despite the fact that new technologies often offer significant performance improvements (Brynjolfsson & Hitt, 2000), they are frequently congested by users' unwillingness to make use of them (Bowen, 1989). Accepting a technology can be seen as the first and most important step towards making use of it. Consequently, the TAM gives a clear indication that technology acceptance relates to the usage of it. However, in an elaborate review of Lee et al. (2003), out of 101 studies, only 58 showed a significant relationship between PEOU and dependent variables, signifying that PEOU is an unstable measure to predict the *intention to use*. Likewise, Gefen and Straub (2000), as well as Keil et al. (1995) questioned the usefulness of PEOU in TAM. After all, PEOU was found to have a significant effect on PU, rather than the *intention to use*, which classifies it as an antecedent, rather than a parallel of PU (Davis et al. 1992). In fact, many researchers have used the *perceived usefulness* concept as a mediating variable to test for mediating effects (Godoe & Johansen, 2012; Henderson & Divett, 2003). In the context of nurses, the TAM sheds light on how the acceptance of the AP can lead to the *intention to advise* the product to physicians and patients. In their study of the future acceptance of the AP with adults, Van Bon et al. (2011), found that most patients with diabetes type 1 have the *intention to use* the AP and have a positive attitude towards *perceived usefulness*. More recently, Bevier et al. (2014) conducted a pilot study of 36 patients and found similar results and confirmed that individuals with AP technology experience "expressed high likelihood of future acceptance" (p.590) and, amongst others, support *perceived usefulness* and *intention to use* as reliable scales. In the specific medical context of artificial pancreas, the concept of *perceived usefulness* deems the most appropriate for two reasons. First of all, most technologies are said to be developed with a specific purpose in mind (Winkelman et al., 2005), which holds to be true for the artificial pancreas by replacing existing technologies, such as the insulin pump (Hovorka, 2008). Secondly, as the artificial pancreas is yet to be commercialized, the hypothetical notion of *perceived usefulness* matches the imaginative aspect of the product.

Other scholars have tested the TAM model in different, non-medical settings, such as database programs and workstations, and thus contribute to the legitimacy of this model (Vatnani & Verma, 2014).

Nevertheless, some researchers argue that results from the TAM model are conflicting at times and should only cautiously be used when applied to non-validated contexts (Tan & Chung, 2005). This indicates that caution has to be taken when drawing conclusions about the findings of this particular study as they might not be generalizable to other contexts. It is unreasonable to expect that one model can explain decisions completely across a range of technologies and situations. Further, Bagozzi (2007) expressed doubt that *PEOU* and *PU* are the only determinants of actual usage, suggesting to also consider the absence of motivation to act in a certain way. In that sense, a person might recognize the *PEOU* or *PU,* but still has no intention to use it. This concern will be dealt with by carefully analysing the total variance explained during the statistical analysis.

Yet, of all the theories, the TAM is considered the most influential and commonly used theory to describe an individual's acceptance of innovations (Szanja, 1996). It has been tested empirically, and many authors helped to validate, apply, and replicate it. As of June 2015, Google Scholar listed over 25,000 citations to the two journal articles that introduced TAM (Davis, 1989; Davis et al., 1989)

Besides technology acceptance models, the literature reveals a vast amount of work that has been done to investigate how certain product characteristics influence the spread of innovations.

The AP is a rather complex technology as it is an improved and modified version of an insulin pump that extends the old technology with improved control and sensing components (Weinzimer et al., 2008). Though removing the need for patient involvement due to automated measuring and control of the blood glucose level, the AP still remains a technology that requires a great deal of trust in its functionality.

A breakthrough contribution to the body of innovation literature was made by Rogers (1995) in his study on diffusion of innovations. Diffusion research is largely focused on conditions, which could lead to an increase or decrease in the probability that an innovation will be adopted (Kinnunen, 1996). Rogers (1995) developed the Innovation Diffusion Theory (IDF), which explains the rate of adoption of an innovation and described this process as "an uncertainty reduction process" (p.232). Considering the fact that the medical device sector is constantly evolving and changing with new products reaching the market regularly, it is important to know how an innovation diffuses. Fundamentally, he proposed a set of characteristics of innovations that define why certain innovations, such as products, spread and get accepted at a faster pace than others. He stated that the perception of these characteristics predict the rate of adoption: *relative advantage* (the degree to which an innovation is perceived as better), *compatibility* (the degree to which an innovation is perceived as being consistent with existing values), *complexity* (the degree to which an innovation is perceived as difficult to understand), *trialability* (the degree to which an innovation may be experimented with), and *observability* (the degree to which the benefits of an innovation are visible to others) (p. 212-244). As such, innovations with high levels of *relative advantage, observability, compatibility*, and *trialability* combined with low levels of *complexity* are predicted to be adopted quicker in comparison to other innovations. Tidd and Bessant (2013) refer to these five factors as characteristics of innovation. However, Rogers (1995) also mentioned that even when an innovation brings obvious advantages, it is still difficult to get a new idea adopted.

However, as found by Tornatzky and Klein (1982) in their meta-analysis of over 100 innovation studies, only *relative advantage*, *complexity*, and *compatibility* have a direct influence on the rate of adoption. Considering the fact that the development of an artificial pancreas is a rather complex issue, *complexity* and *compatibility* deem appropriate for this particular research. *Triability, relative advantage,* and *observability* deem inappropriate due to the aforementioned findings of Tornatzky and Klein (1982) and the fact that the AP is not yet available on the market. Further, relative advantage is argued to be relatively closely related and overlapping with *perceived usefulness* and *complexity* is equal to the *perceived ease of use* in TAM (Moore & Benbasat, 1991). Additionally, *relative advantage* and *observability* are said to be difficult to test in predictive settings such as the AP (Osbourne & Clarke, 2006).

Due to the vast attention given to this model, several limitations and critiques have emerged over time. Damanpour (1996) highlights the complexity of quantification, as it is widely unknown what exactly causes an adoption. Further, it seems difficult to account for all variables and get consistent results (Plsek & Greenhalgh, 2001; Downs & Mohr, 1976). As such, though comprehensively developed and evolved, innovation diffusion models are criticized as being too linear (Wolfe, 1994). Bayer and Melone (1989) criticized the binary nature of adoption, as in the only possibilities being to adopt or not and proposed instances of partial adoption. Further, the IDT is said to not be able to distinguish between adoption of an innovation at the individual level and adoption at the organizational level (Sahin, 2006). For example, adoption at an organizational level will disregard many individual perceptions, thereby lowering the influence of an individual's perception of the five characteristics. In the context of the adoption of an innovative medical device by nurses, this concern is valid, as nurses do not themselves prescribe the device to patients. However, it remains the most appropriate model to use and the aforementioned concerns will be coped with adequately, for example by testing the strength of all relationships of the study.

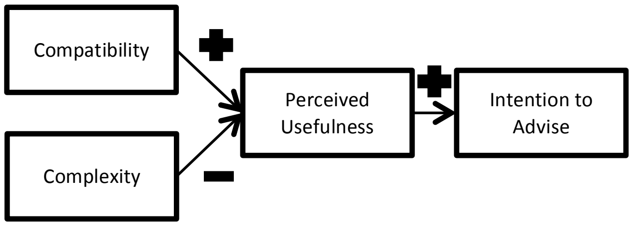
To summarize, a vast amount of literature on technology acceptance and the spread of innovations is available, suggesting several variables of importance that deserve consideration. The insights gained from the literature will be used to develop a research model. Based on the literature reviewed, it is hypothesized that different product characteristics of the AP will have an influence on the nurses' intention to advise them.

3. RESEARCH MODEL AND HYPOTHESES

3.1 The Research Model

The research question *"to what extent do the product characteristics of new innovations influence nurses' intention to advise them?"* will be investigated through consecutive hypotheses testing. The research model is visualized in Figure 1.

Figure 1: Research Model



The model was derived from the research conducted by Davis (1989) and Rogers (1995) with influences of Parasuraman (2000). To the best of the author's knowledge, no research has combined these approaches and applied them to the specific area of medical innovations and artificial pancreas. Lee et al. (2003) used a combination of TAM and IDT to develop an instrument for evaluating information systems. However, not all three complete models will be used. Instead, this research focuses on parts of each of them resulting in the new research model.

For one, this paper will concentrate on *intention to advise* as its dependent variable, which is derived from the *intention to use* explained in Davis (1989). Considering the fact that nurses do not actually make use of the new technology, but rather advise it, this is only a logical modification. This variable has been subject to many researches as a predictor of an action. In particular, the intensively discussed and constantly developed TAM model by Davis (1989) has made use of this variable. Further, it is similar to the probability that an innovation will be adopted by users, as suggested by Rogers (1995).

In essence, this paper concentrates on the numerously confirmed relationship of *perceived usefulness* and *intention to advise* the product, and neglects the statistically insignificant effect of *perceived ease of use* on the *intention to advise*. Instead, in accordance with other researchers previously mentioned, it uses the *perceived usefulness* as a mediating factor between two independent variables and the *intention to advise.*

3.2 Compatibility

The concept *compatibility* has been chosen from the IDF of Rogers (1995). In the previously reviewed literature, it is discussed that only two factors of innovation diffusion are eligible for testing in this particular context, namely *compatibility* and *complexity.* Compatibility refers to the degree to which an innovation is perceived as being consistent with existing values (Rogers, 1995), meaning the capability to perform in congenial combination with existing values. When a new technology is not compatible with an individual's life or work, the person will be reluctant to perceive the technology as useful. That being said, high levels of compatibility influence the degree of perceived usefulness. According to Berwick (2003), compatibility is a crucial element when adapting a new technology, as the new concept must match existing values and believes. Additionally, it needs to match the current needs of the individual in order for it to diffuse.

This line of reasoning is reflected in the first hypothesis:

H1: Product compatibility has a positive effect on perceived usefulness.

Its hypothetical notion justifies the fact why *compatibility* is assumed to have an effect on *perceived usefulness* rather than *intention to advise*.

3.3 Complexity

The second construct of this research *complexity* has also been derived from Roger's research (1995) on innovation diffusion theory and reappears in numerous other studies as a main predecessor of adoption behaviour (Rogers, 1995; Davis, 1989). Despite its similarity to *ease of* use, it has been chosen due to aforementioned shortcomings of Davis's (1989) construct. In a study of 810 employees of a multi-site financial service provider, Walczuch et al. (2007) found that the majority of respondents "felt overwhelmed by the complexity of technology" (p.212). Further, in a recent study, Schreier et al. (2012) found that products that have been co-developed by users are being perceived as less complex. Mukherjee and Hoyer (2001) argued that customers critically weigh the cost and benefits of complex products, which can lead to negative reactions and abandonment. This component assumes that new products differ in their degree of complexity. Thus, the more difficult a new technology is to use, the more complex it is perceived, because if an individual recognizes an innovation as more complex than assumed, the individual will be less likely to perceive the product as useful.

Consequently, the second hypothesis follows Roger's (1995) initial expectations that new technologies and innovations are perceived to be easier to use when they show less complex characteristics:

H2: Product complexity has a negative effect on perceived usefulness.

Again, the fact that the AP is yet to be commercialized explains that *complexity* is argued to influence *perceived usefulness* and not *intention to advise* directly.

3.4 Perceived Usefulness

The third and last construct of this research paper is *perceived usefulness* and is based on the notion that an individual perceives a new technology or innovation to outperform existing practices (Davis, 1989). In this research, it will be used as a mediating variable between the two aforementioned independent variables and the *intention to advise.*

It has frequently been used by prior research (Godoe and Johansen, 2012) as a mediating variable and will take the same role in this research, because *perceived usefulness* has been found to have a direct significant effect on the *intention to use* (Godoe and Johansen, 2012).

Various streams of research have been explaining the belief that internal positive attitudes about technological innovations lead to potential intention to make use of those technologies (Karahanna & Straub, 1999; Thompson & Higgins, 1991). Further, Hu et al. (1999), in a sample of 407 physicians, found that *perceived usefulness* was a significant determinant of attitude and *intention to use* a telemedicine technology, but perceived ease of use was not. Additionally, Lai (2014) found that *perceived usefulness* had a positive and direct effect on intention to use in his study of 443 patients. On the contrary, any innovation that does not lead to an increase in performance is highly improbable to be treated preferentially by users (Mathieson, 1991). Though frequently being used as a direct precedent of actual usage, this study will focus on its effect on the *intention to advise*, as it is assumed that the intention will eventually lead to the actual usage. This component assumes that people primarily decide to adopt a new technology based on their functions. Therefore, users of a new technology or innovation are willing to adopt them even if they are difficult to use, as long as it captures a critical function (Godoe and Johansen, 2012). This is especially true in the medical context, as most of the products are rather difficult to use and understand. Consequently, the third hypothesis is:

H3: The perceived usefulness of a product has a positive effect on behavioural intention to advise.

4. METHODOLOGY

4.1 Subjects for Study

Broadly speaking, this study is concerned with the acceptance of new innovations and technologies. It focuses on medical application innovations and specifically on the AP developed by the Dutch company Inreda. This study examines a particular stakeholder group, namely nurses who deal with diabetes patients' intention to adapt the AP. In order to gain relevant empirical insights and to test the nurses' intention to advise the AP as described in Figure 1. A survey was created based on a database from the EADV (Dutch Association for Diabetes Care Professionals). In total, the survey was sent out to all 188 nurses of the database. The sample captured all nurses associated with the EADV, assumedly most of the nurses in the Netherlands. This type of sampling can be considered as convenient sampling (Babbie, 2010), allowing this study to examine the most suitable respondents for this context.

Out of the 188 surveys delivered, 94 surveys were returned constituting a response rate of exactly 50%. However, 17 responses were discarded due to incomplete or missing answers, resulting in an effective sample size of 77 nurses. As stated by Cobanoglu and Cobanoglu (2003), a response rate of over 30% is considered to be extremely high. Based on Sheehan (2001), the relatively high response rate can be attributed to multiple factors. First of all, the survey was directed at a group of people with the same profession and thus research affiliation. Due to the fact that the survey was distributed in cooperation with the EADV, the respondents easily recognized its importance. Lastly, the design of the survey was appealing and rather short. The mean age of respondents was 51.4 ranging from 36 to 63 and a standard deviation of 5.9.

Six nurses (6.4%) have been working as a nurse for 0-5 years, 16 (17%) for 6-10 years, 18 (19.1%) for 11-15 years, and 37 (39.4%) for more than 15 years. 67 (71.3%) nurses were female and 10 (10.6%) male. This percentage is in line with existing literature and could be caused by the natural underrepresentation of males in the nursing profession (Williams, 1992). Overall, these descriptives provide no reason for sensing biases in this research.

4.2 Measures

The construction of the survey was based on the operationalization of the variables highlighted in the theory section and the underlying research model of this paper. Existing questionnaires were used to test the acceptance and adoption of innovation and were revised to develop a questionnaire that tests the acceptance of the AP. Specifically, the work of Chismar and Wiley-Patton (2003) was used as a template. In the original work, a Likert scale was used, ranging from one to seven. For the purpose of this study, these numbers were translated into 'strongly disagree' and 'strongly agree', respectively. The survey also contained simple "yes" or "no" questions. Respondents were asked to state their age, sex, highest level of education, and duration of employment in the current position. Further, the survey was translated from English into Dutch by a Dutch native in order to increase respondents' comprehension and prevent the danger of misinterpretations, considering that all recipients of the survey were Dutch nationals. Consequently, this allows better measurements, as the respondents will have less trouble answering the questions and the chances of misunderstandings are reduced. Overall, the study mainly used closed-ended questions, which facilitated an easy quantification process.

Both, the Dutch and the English version of the questions can be found in the appendix (14.3.)

4.2.1. Item Requirements

When developing the questionnaire, mainly closed-ended questions were used. Open-ended and closed-ended questions differ in several characteristics, such as the role of respondents (Reja et al., 2003). Despite the fact that closed-ended questions force a respondent to choose from a range of answers and thus might be subject to bias by the researcher (Foddy, 1993), the use of such brings along several advantages, especially when considering the limited time frame and scope of this research. First of all, closed-ended questions provide greater homogeneity of responses and enable the researcher to easier analyse and process the responses (Babbie, 2010). As with all quantitative research, the researcher avoids receiving more, potentially irrelevant information than really needed (Creswell, 2013). Further, closed-ended questions allow the author to easily export the quantified results for statistical testing.

Table 2. Construct and Item Description and Operationalization

Construct	Definition	Original Item	Author and Cronbach's alpha	Adapted Item
Compatability	The degree to which an innovation is perceived as being consistent with existing values values and experiences of a person	1. Using the system is compatible with all aspects of my work 2. I think that using the system fits well with the way I like to work 3. Using the system fits into my work style	Rogers (1995); Adapted from Venkatesh et al. (2003) based on Thompson (1991) Cronbach's alpha: Minimum 0.7	COM_00_COM_01: I expect that using the artificial pancreas is compatible with all aspects of my life, including work as well as free time activities COM_00_COM_02: I think that using the artifical pancreas fits well with the way I like to live and work COM_00_COM_03: I expect that using the artifical pancreas fits into the way I perform my daily duties
Complexity	The degree to which a system is perceived as relatively difficult to understand and use	1. Using the system takes too much time from my normal duties 2. Working with the system is so complicated, it is difficult to understand what is going on 3. Using the system involves too much time doing mechanical operations 4. It takes too long to learn how to use the system to make it worth the effort	Rogers (1995); Venkatesh et al. (2003) based on Thompson et al. (1991), Cronbach's alpha: Minimum 0.73	ING_00_ING_01: I expect that using the artificial pancreas will take too much time from my normal duties. ING_00_ING_02: I expect that working with the artificial pancreas is so complicated, it is difficult to understand what is going on. ING_00_ING_03: I expect that using the artificial pancreas involves too much time doing mechanical operations. ING_00_ING_04: I expect that it takes too long to learn how to use an artificial pancreas to make it worth the effort.
Perceived Usefulness	An individual's perception that the application of a certain technology or innovation will outperform existing practices	1. Using the system improves my performance in my job 2. Using the system in my job increases my productivity 3. Using the system enhances effectiveness in my job 4. I find the system useful in my job	Venkatesh (2000), Cronbach's alpha: Minimum 0.87	VN_00_VN_01: I expect that using the artificial pancreas would enable me to accomplish tasks more quickly. VN_00_VN_02: I expect that using the artificial pancreas improves my productivity in my job. VN_00_VN_03: I expect that using the artificial pancreas will increase my effectiveness in my job. VN_00_VN_04: I expect that using the artificial pancreas will be useful in my job. VN_00_VN_05: I expect that using the artificial pancreas would make it easier for me to accomplish my daily tasks. VN_00_VN_06: I expect that the artificial pancreas will make the execution of my work easier.
Intention to Use	An individuals intention to use a particular device or technology	1. Assuming I have access to the system, I intend to use it 2. Assuming I have access to the system, I predict that I would use it	Venkatesh and Davis (2000), Cronbach's alpha: Minimum 0.82	ITU_00_ITU_01: Assuming my organisation has access to an artificial pancreas, I intend to recommend it to the corresponding doctor. ITU_00_ITU_02: Assuming my organisation has access to an artificial pancreas, I intend to recommend it to the corresponding doctor for the patient treatment.

4.2.2. Item Selection

An overview of constructs used, their definition, and corresponding items, as well as the original reliability measures can be found above in table 2. In order to tailor the original items to the specific context of APs, several changes had to be made. Further, all items were tested for validity by means of Cronbach's alpha. Ultimately, this led to a more sophisticated questionnaire with lower chances of asking vague and unclear questions, thus, increasing the probability of reliable results. Almost all constructs had to be adapted towards a possible, hypothetical experience of using it, since the AP is not yet commercially available. This enabled respondents to answer all questions appropriately without having actually used it before. Further, the original constructs, standardized as they were, had to be adapted in a way that questions are specifically tailored towards the AP instead of simply 'systems'. In general, no double-barrelled questions were asked, giving respondents always the opportunity to answer a question. Also, strong attention was paid to avoid asking negative questions, which enhances the quality and ease of use of it (Bradburn et al., 2004). Precisely, avoiding a mix of negative and positive questions leads to less potential for confusion and misinterpretation. Considering the limited time frame of this research in combination with the busy work schedules of nurses, a major flaw of this questionnaire was time with regard to response rates. Therefore, it was of outmost importance to keep the time needed to fill out the questionnaire at a minimum. The maximum time needed to complete it was around 15 minutes.

4.3. Questionnaire Construction

As opposed to others (van Bon et al., 2010 & van Bon et al., 2011) who made use of direct observation methods, this research made use of a self-administered questionnaire sent out via the web survey program LimeSurvey. The questionnaire was jointly developed and tested by other researchers (Bolks, 2015; Klabbers, 2015; Preußner, 2015; Schnarr, 2015; Schnarr, 2015; Schoenbeck, 2015, and Uncu, 2015). Alternatively, direct interviews could have been conducted in person, via telephone or video. However, due to the relatively large sample (n=188), short time frame, and geographical dispersal, the execution of such would have been difficult and not feasible (McCoyd & Kerson, 2006). Further, as mentioned by Williams (1964) and Holbrook et al. (2003), responses are likely to be biased due to respondent-interviewer interaction. Further, advantages of interviews such as direct observation (Opdenakker, 2006) vanish as they are not of importance to this particular research due to the fact that the purpose of this study was not to observe nurses working with the AP, rather to get insights on their perceptions towards it. The use of questionnaires, on the other hand, allows for easy administration and professional appearance (Ramsaran-Fowdar, 2007). Additionally, questionnaires delivered via email enable respondents to flexibly answer the questions at their convenience and offer some sort of anonymity (Synodinos, 2003). Throughout the course of development, special attention was paid to making the questionnaire as visually appealing and easy as possible, meaning a well-arranged layout and constant support in the form of explanations and guidance. To answer a question, the respondent solely had to tick a box.

4.4. Control Variables

The survey sent out to the nurses contained several questions that qualify to be used as control variables. The study at hand will control for four demographic variables, namely *age, sex, years of working experience in the profession,* and *participation in clinical trials of the AP.* This is due to the fact that these variables seem the most influencing in this specific context. Venkatesh and Morris (2000) found that *age* and *sex* indeed seem to have an influence on the technology acceptance. Further, *years of working experience in the profession* and the *participation in clinical trials of the AP* can be argued to possibly have an effect as well. For example, if a nurse has already tested the AP, he or she might be more or less willing to advise the AP, based on the individual experience. Further, age has received attention primarily in studies concerned with Roger's (1995) IDT (Sahin, 2006) and was often found to be the most significant predictor of technology usage. The control variable *educational* level was left out due to its different categories. The purpose of this is to control whether these variables considerably influence the hypothesized relationship between product characteristics and the intention to advise. This will enhance the quality of this research.

4.5. Data Collection

The empirical data was collected using an online survey created via LimeSurvey. Before sending it out via an incorporated email function to the recipients, the questionnaire (see appendix 14.3.) was internally tested by students, PhDs, and two nurses in terms of validity and applicability.

As suggested by Taylor and Todd (1995), the initial email consisted of an explanation of the survey and informed the recipients that the results of the survey would solely be used for the purpose of conducting bachelor theses at the University of Twente in cooperation with a variety of companies, such as Inreda. Further, the email gave an introduction to what an AP is, including extensive visualizations, in order to ensure respondents' complete comprehension of all questions posed. Invitations were sent out on October 8th, 2014 to nurses from the Netherlands and answers were collected within a pre-determined time range of one month, as it is assumed that after a certain period of time all interested respondents have filled in the survey.

After two weeks, on October 22nd, 2014, a reminder was sent out to those who have not filled out the survey yet in order to increase the response rate (Babbie, 2010).

LimeSurvey itself is very easy to understand and use. It allows the nurses to pause the questionnaire whenever necessary and continue at a later point in time. Additionally, a 'previous' button enables the nurses to review his/her responses and also the information about AP's given upfront.

4.6. Analysis

The data collected will be analysed using Microsoft SPSS. SPSS is a predictive analytics software which is commonly used in many research studies (Norusis, 2007). The stored data in the LimeSurvey program is easily transferable into SPSS and facilitates an easy analysis. In the following, a regression analysis will be performed to investigate whether *compatibility* and *complexity* have an influence on the *perceived usefulness*, and in turn if that affects the *intention to advise* the product. To measure the reliability of the hypothesized relationships, a reliability analysis will be conducted and evaluated based on Cronbach's alpha. General descriptive statistics will be expressed, including sample size, means, and standard deviations of the constructs of this study In order to check for a true mediating effect of *perceived usefulness*, the four-step Baron and Kenny (1986) method will be applied.

5. RESULTS

5.1. VALIDITY

As described by Field (2009), validity is a measure that indicates whether an instrument indeed measures what it initially set out to measure. Consequently, the author set out to verify that the constructs chosen indeed measure what they intend to. In accordance with Harman (1960), the author chose to conduct a factor analysis to test the discriminant validity of the scales used via the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). The analysis shows a KMO of .736. In line with Dziuban and Shirkey (1974), who recommend a minimum level of .5, the author is confident that the strength of the relationships is strong enough. This indicates that the sample size is sufficiently large enough. Further, Bartlett's test of sphericity is significant ($p < .001$), which indicates that the correlations are large enough to proceed. The results are shown in table 4.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,736
Bartlett's Test of Sphericity	Approx. Chi-Square	574,572
	df	78
	Sig.	,000

Further, the factor analysis revealed that a total of four components could be used for the total variance explained. The scree plot and the factor analysis total variance show that the

Eigenvalue levels off with the fifth component. Both can be found in the appendix (14.2.).

Field (2009) states to only include components on the left-hand side of the inflexion point. Therefore, a new factor analysis was conducted with a total of four components. The pattern matrix, which expresses the strength of the respective construct with the item, revealed an interesting finding, which led the author to split the variable *perceived usefulness* into two separate parts. As summarized in table 5, the items VN_00_VN_01, VN_00_VN_03, and VN_00_VN_04 measured a different component than VN_00_VN_02, VN_00_VN_05, and VN_00_VN_06. Therefore, the author interprets that the questions belonging to these components measure effectiveness on the one hand, meaning that the AP usage will actually lead to a better life, and efficiency, meaning that the AP usage will lead to higher productivity, on the other. For further analyses, the author named the two different variables *perceived usefulness effectiveness* and *perceived usefulness efficiency*. This means that the author will have to continue the statistical testing with two mediating variables. As this will significantly change the research model, the revised model can be found in the appendix (14.2.).

Table 4: Factor Structre Matrix of Loadings and Cross-loadings

	1	2	3	4
Perceived Usefulness				
VN_00_VN_01			.804	
VN_00_VN_02	.654			
VN_00_VN_03			.669	
VN_00_VN_04			.770	
VN_00_VN_05	.861			
VN_00_VN_06	.833			
Compatibility				
COM_00_COM_01				.834
COM_00_COM_02				.868
COM_00_COM_03				.877
Complexity				
ING_00_ING_01		.768		
ING_00_ING_02		.837		
ING_00_ING_03		.861		
ING_00_ING_04		.784		

No item showed loadings on any other second construct. It is therefore reasonable to conclude that a strong validity is provided. As explained by Tabachnick and Fidell (2001), the value of each item should be at least >.5, which is the case in all instances. *Perceived usefulness effectiveness* showed loadings of a minimum of .669 to a maximum of .804. *Perceived usefulness efficiency* on the other hand showed loadings of a minimum of .654 to a maximum of .861, indicating a reasonable validity. *Complexity*'s loading ranged from a minimum of .768 to a maximum of .861. Lastly, *compatibility* showed very high loadings ranging from .834 to a maximum of .877.

5.2. Reliability

Despite the fact that all scales used in this study have been validated by previous research, the author tested all adapted scales to the context of product characteristics of the AP and the acceptance by nurses.

To determine the reliability, the author made use of Cronbach's alpha. Cronbach's alpha is a measure of internal consistency (Cronbach, 1951) and is supposed to indicate how closely related a set of items are as a group.

Table 5: Model Reliability Index: Cronbach's Alpha

Construct	Cronbach's alpha	N of Items
Intention to advise	.975	2
Perceived Usefulness Effectivenes	.786	3
Perceived Usefulness Efficiency	.832	3
Compatibility	.842	3
Complexity	.841	4

As shown in table 5, the values for *perceived usefulness effectiveness, perceived usefulness efficiency, compatibility* and *complexity* are all relatively high: As argued by many authors, a level of .700 can be considered as the minimum threshold (Tavakol & Dennick, 2011; Gliem & Gliem, 2003; Santos, 1999). Peterson (1994) argued that levels of higher than .820 are considered to be highly significant. All four items are well above .700 and four are in fact even above .820, thereby strengthening the results of this research. As stated earlier in table 2, the Cronbach's alpha values used by the original researchers ranged from .70 to .87, indicating that this analysis of nurses in the context of the AP is considered to have a high reliability. These results indicate a very strong internal consistency among the items. The item total statistics indicated that Cronbach's alpha would increase from .832 to .834 if VN_00_VN_02 were deleted. This marginal increase led the author to the decision to keep the item. However, the item total statistics further revealed an increase from .842 to .929 if item COM_00_COM_01 was deleted. This represents a more significant increase, but the item was kept in the analysis because it still correlates very well with the composite score from the other items and is well above the .7 threshold. In all other cases, the discharge would lead to lower Cronbach's Alpha results.

5.3. Descriptives

The results of the descriptive analysis can be found below in table 3. 77 valid answers (n=77) were taken into consideration. The sample size is said to have a large influence on the reliability of the analysis (Field, 2009). Different opinions about the most appropriate sample size have been expressed in the literature. Nunally (1978) recommends a sample size that is at least a multiple of ten compared to the variables. Similarly, Tinsley et al. (1980) recommend having between five and ten respondents per variable. Therefore, this analysis deems to have an appropriate sample size with regard to the five variables used. On the other hand, Hooper et al. (2008), as well as Caprara et al. (1993) argue that sample sizes should be around 300 to be able to conduct a proper factor analysis. However, considering the circumstances of this research and the fact that test parameters tend to level off as they approach a sample size of 300 (Tinsley et al., 1980), the sample size of 77 deems appropriate for this analysis.

Table 3: Correlation Matrix and Construct Level Statistics

	Sample Size (n)	Standard Deviation	Mean	1	2	3	4	5	6	7	8	9
1 Intention to Advise	77	1.021	5.662	1								
2 Perceived Usefulness Effectiveness	79	.8224	5.291	.398**	1							
3 Perceived Usefulness Efficiency	79	1.111	4.346	.074	.536**	1						
4 Compatibility	79	1.057	5.160	.376**	.428**	.346**	1					
5 Complexity	79	1.094	3.125	-.225**	-.205	-.192	-.320**	1				
6 Years of working in profession	77	1.000	3.12	.155	-.064	-.141	-.156	.097	1			
7 Age	77	5.858	51.377	-.225**	.07	.175	-.118	-.111	.166	1		
8 Gender	77	.338	1.13	-.179	-.019	-.049	-.045	.008	-.051	.111	1	
9 Participation in clinical trials	77	.114	1.99	-.162	-.167	-.143	-.182	.104	.136	.176	.044	1
Valid N (listwise)	77											

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

In a very first step, it was tested if the variables are normally distributed. The results of the Shapiro Wilk test revealed that only *perceived usefulness effectiveness and efficiency* were normally distributed. In a second step, the author made use of a non-parametric test, Spearman's Rank, and received similar results. Further, making use of the bootstrapping method, the author received results that were very similar to the results of the normal regression analysis. Consequently, the assumptions have been violated, yet the analysis was continued.

On the most basic level, as shown above in table 3, the analysis reveals the mean, which describes the middle point or central tendency for each variable. It ranges from 3.125 to 5.662 on a scale from 1-7. Further, the standard deviation, which highlights the spread of the data ranges from .822 to 1.111, indicating similar responses. In a subsequent step, the author performed a correlation analysis to statistically measure if and how the variables are related. As the parametric assumptions, such as non-normally distrusted data have been violated, this was done by means of the Spearman's correlations coefficient; r. Spearman's correlation coefficient r is a value between -1 and +1. According to Field (2009), a positive coefficient corresponds to an increasing monotonic trend between the variables, and vice versa.

When looking at the correlation data from this particular analysis, one can see that there are no correlations above 0.8 or 0.9, which indicates no large correlation. This means that there is no multi-collinearity. To confirm, the variance inflation factor (VIF) indicates values <10. A multi-collinearity would be existent if two or more independent variables not only correlate with the dependent variable, but also amongst each other (Field, 2010). Testing for the control variables resulted in no significant correlations between the control variables and the independent and dependent variables of this study.

5.4. Model Testing

Due to the changed nature of the study with two mediating variables, the author tested all relationships individually using a regression and multivariate analysis. Assumptions, as previously mentioned, have been tested and violated.

First of all, the effects of *perceived usefulness effectiveness* and *perceived usefulness efficiency* were tested on the *intention to advise*. Secondly, the relationship between *compatibility* and *complexity* and *perceived usefulness effectiveness* and *efficiency* was tested. Thirdly, the direct effects of compatibility and complexity on the intention to advise were tested. The results are displayed in table 7, 8, and 9, respectively, and summarized in figure 2. Dotted lines indicate insignificance and straight lines indicate significance.

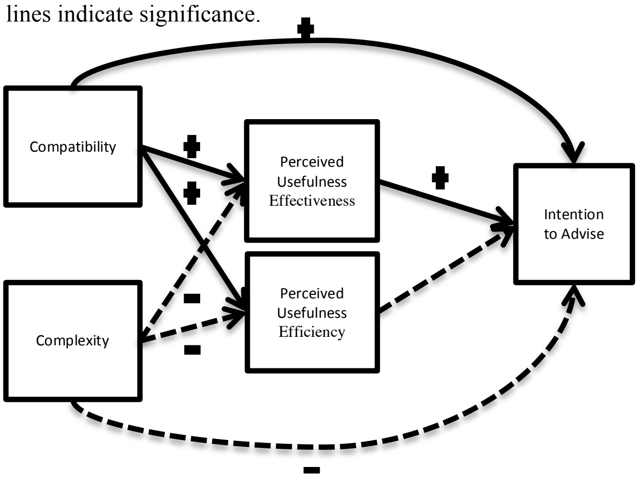


Figure 2: (In)significance displayed

Further elaborations on the model displayed before can be found in the appendix (figure 3). The reader can see that *perceived usefulness effectiveness* has a significant positive effect on *intention to advise* (B=.541, p<0.01), whereas *perceived usefulness efficiency* is not significant (B=-.132, p<0.01).

Table 7: Results Structural Model explaining Intention To Advise

	B	Std. Error	R Square	Beta	t-value	Sig.
Constant	3.366	.722	.144		4.66	.000
Perceived Usefulness Effectiveness	.541	.157		.434	3.45	.001
Perceived Usefulness Efficiency	-.132	.115		-.145	-1.153	.253

a Dependent Variable: Intention to Advise

The effect of *complexity* does not show any significance on *perceived usefulness effectiveness* (F=.136, p<0.01) or *efficiency* (F=.269, p<0.01), yet it is in the hypothesized negative direction. *Compatibility's effect on both the mediating variables is significant* and positive.

Table 8: Results Multivariate Test of Between-Subjects Effects

	Dependent Variable	df	Mean Square	F	Sig.
Compatibility	Perceived Usefulness Effectiveness	1	9.991	18.18	0
Compatibility	Perceived Usefulness Efficiency	1	20.708	21.774	0
Complexity	Perceived Usefulness Effectiveness	1	.075	.136	0.714
Complexity	Perceived Usefulness Efficiency	1	.256	.269	0.605

Lastly, complexity's relation to *intention to advise* is negative, yet insignificant, whereas *compatibility* is positive and significant.

Table 9: Results Compatibility and Complexity explaining Intention To Advise

	B	Std. Error	R Square	Beta	t-value	Sig.
Constant	4.55	.722	.112		6.088	.000
Compatibility	.276	.11		.287	2.502	.015
Complexity	-.101	.106		-.109	-.951	.345

a Dependent Variable: Intention to Advise

In turn, the results show that *perceived usefulness effectiveness* can be considered as a partial mediator, not a full mediator due to the fact that compatibility itself has a direct effect on *intention to use*. The Baron and Kenny (1986) method supports that *perceived usefulness effectiveness* is a partial mediator, as *compatibility's* effect on *intention to advise* remains significant after controlling for *perceived usefulness effectiveness*.

An R^2 value of .112 testifies that the variables *compatibility* and *complexity* explain roughly 11.2% of the variance of *intention to advise*. This implies that 11.2% is the proportion of variance in the outcome variable, *intention to advise,* that is shared by the predictor variables *compatibility* and *complexity*. In turn, an R^2 of .112 means that 88.8% is related to other variables, which have not been included in this analysis and are unknown to the author.

As hypothesized, *compatibility* shows a positive significant influence on *perceived usefulness effectiveness and efficiency*. Unlike hypothesized, *complexity* shows a positive but insignificant influence on *perceived usefulness effectiveness and efficiency*. This leads to a rejection of the initially stated hypothesis. *Perceived usefulness effectiveness* shows a positive and significant influence on *intention to use,* whereas *perceived usefulness efficiency* shows a negative but insignificant influence on *intention to use*.

Lastly, all calculations were re-done including the control variables, which did not alter the results. The results can be found in the appendix (14.2.)

6. DISCUSSION

This research investigated the effects of certain product characteristics on perceived usefulness and eventually nurses' intention to advise an AP, thereby combining the main elements of both TAM (Davis, 1989) and IDT (Rogers, 1955).

To reiterate, the research question underlying this analysis was:

"To what extent do the product characteristics of new innovations influence nurses' intention to advise them?"

In order to answer the question, the author originally set out to test three main hypotheses. Throughout the course of the analysis, it was revealed that the hypothesized mediating variable *perceived usefulness* needed to be split into *perceived usefulness effectiveness* and *perceived usefulness efficiency*. Possible explanations will be discussed in this chapter. Thus, in order to test the three main hypotheses, more statistical testing needed to be done.

The first hypothesis (H1), *"Product compatibility has a positive effect on perceived usefulness"*, was confirmed. The second hypothesis (H2), "*Product complexity has a negative effect on perceived usefulness"*, was rejected. The third hypothesis (H3), "*The perceived usefulness of a product has a positive effect on behavioural intention to advise"*, after being split into two separate variables, indicated that *perceived usefulness effectiveness* indeed showed a positive significant relationship, but *perceived usefulness efficiency* showed a positive, yet insignificant relationship. To test the mediating nature of *perceived* usefulness, it was tested whether *compatibility* and *complexity* have a direct effect on the *intention to advise.* Compatibility showed a positive significant effect on intention to advise, indicating that *perceived usefulness* can only be considered as a partial mediator. Complexity, on the other hand, showed no significant evidence on intention to advise. This is to some extent surprising, as other studies (Venkatesh et al., 2003) have testified *complexity* to be a major constraint in technology acceptance. However, a possible explanation for this is the fact that nurses' main concern about complexity in technology acceptance is the fact that due to the complexity of a product, they might not be able to adequately take care of the patients (Lee et al., 2003). This indicates that, in the context of AP's, nurses might be already very convinced of the technology and its potential benefits, which leads to a diminishment of that concern. This assumption is also supported by the positive significant relationship of *perceived usefulness effectiveness* on *intention to advise.* Further, it can be assumed that nurses are used to deal with new medical devises. In addition, the general perception of the complexity of the AP is rather low, as it was developed to simplify patients' lives. Only the technology behind the product may be complex, but the actual usage is not. As nurses are often in direct contact with patients, they are possibly very likely to correctly assess the positive impact of such innovations and thus disregard its complexity. However, as only 1.3% of the respondents have participated in the clinical trials of the AP, this assumption needs to be confirmed in further studies. On the other hand, since 98.7% of the respondents have not yet participated in clinical trials, one could argue that nurses might not be fully able to imagine the AP and thus cannot precisely assess its complexity.

Surprisingly, *perceived usefulness effectiveness,* but not *perceived usefulness efficiency* is significantly related to the *intention to advise*. This could possibly be due to the futuristic nature of the AP, since it has not yet been commercialized. Effectiveness, in essence, is rather goal- and neither process-, effort-, nor time-oriented. Efficiency, on the other hand, implies a strong focus on an optimal execution, regardless if it is right. Therefore, one might argue that nurses indeed recognize the effectiveness of the AP and consider it as being the right medical device to use, but on the other hand realize that it is hard to determine the efficiency of a yet to be commercialized device. It is possible that this perception might change once the AP has been introduced to the market. Lastly, testing for the control variables indicated no significant effect on either of the other variables used in this study.

To summarize and answer the research question, the study gives enough evidence to state that some product characteristics indeed influence nurses' intention to advise a new product. To be more precise, the degree to which the AP is perceived as being consistent with existing values of the nurses has a positive effect on the *perceived usefulness* and *intention to advise.*

7. MANAGERIAL IMPLICATIONS

The results of this study provide implications from a managerial perspective. In particular, several marketing insights can be provided. Given the research context of the study at hand, the results are specifically interesting for marketers in the diabetes market, like Inreda. However, some results might also be generalizable to other medical innovations. The results can help Inreda identify crucial focus areas, in particular the fact that nurses place attention on the AP being compatible with existing techniques and values. On the other hand, the results give insights on which areas can be disregarded in the beginning, such as that the complexity of the AP has no influence on the intention to advise them. In essence, they will help Inreda to stimulate the intention of nurses to advise a new medical product, the AP.

As discussed by Davis (1989), in order to perceive a product as useful, an individual must be convinced of the fact that the new product will outperform the existing one. Based on the results of this study, Inreda should focus on finding innovative means of communication, such as to highlight that the AP will improve patient's lives. Due to automation, this will further ease the life of nurses (effectiveness). Inreda needs to communicate the perceived benefits clearly, as this has a significant influence on the intention to advise the product. This study showed that the compatibility of the product with the nurses' routine has a positive effect on both perceived usefulness effectiveness and intention to use. This means that Inreda needs to focus on clearly communicating and explaining that the AP will help nurses' to monitor their patients more easily, for example through its wireless data transmission function.

The fact that *perceived usefulness efficiency* showed no significant effect on the intention to use could be a vital insight for Inreda. It highlights the need to continue clinical trials and commercialize the AP, as efficiency could be a factor that nurses take for granted and expect to be fulfilled. Therefore, it is important for Inreda to fulfil and possible exceed those expectations.

8. THEORETICAL IMPLICATIONS

This study combined elements of Roger's (1995) IDF, namely *compatibility* and *complexity*, and Davis' (1989) TAM, *perceived usefulness* and *intention to advise*. The results contribute to the existing theory in multiple ways.

First and foremost, this study confirmed and provided additional evidence on the findings of Godoe and Johansen (2012) who found that combing TAM elements with IDM elements provide a holistic view and are well possible to be used together. This study contributes to the reliability and validity of the applicability of the constructs used. When comparing the Cronbach's alpha of the constructs used in this study to their original context, most of them showed higher reliabilities than the existing scales. For example Venkatesh et al. (2003) found a Cronbach's alpha of .73 for complexity, whereas this study showed a Cronbach's alpha of .84. This could be attributed to the fact that the scales have been adopted to the purpose of this study.

In their review of TAM, Lee et al. (2003) found that most of the TAM research has been done in information systems (IS) and information technology. As highlighted in the literature review (section 2), the TAM has mostly been used for computer technologies. Further, the author noticed that most tested technologies were non-physical, such as reporting systems or logistic systems. This study proved that two of the variables used in TAM, perceived usefulness and intention to advise, can also be used in the medical sector with a physical product, such as the AP.

Further, this research provides the interested reader with a brief summary on artificial pancreas and its current state of the art on the specific example of Inreda. As the AP is considered to have a great influence on the diabetes market in the future, the information can be used by researchers, marketers, as well as other involved stakeholders as a knowledge foundation.

Lastly, the results of this study suggest that the widely applied mediating variable *perceived usefulness* needs to be split into *perceived usefulness effectiveness* and *perceived usefulness efficiency*. To the author's best knowledge, no other study has suggested or indicated such a step. This could be of value to peers especially when researching yet to be commercialized technologies.

9. LIMITATIONS

This study is subject to several relevant limitations. First of all, the study, as a bachelor thesis, was conducted with limited resources, especially time wise. Further, the study made use of what is considered as convenient sampling (Babbie, 2010). The survey was sent to nurses from a database of EADV. The fact that 92% of the nurses indicated that they have already heard about the AP strengthens the assumption of possible bias. Further, a response rate of 50% is relatively high. The author suspects that another sampling method, such as random sampling could have yielded different results. Further, although suggested otherwise by the KMO, the sample size (n= 77) would normally be considered as too small to conduct certain statistical tests, for example a factor analysis. Larger sample sizes could reveal different results.

Second, all items that were originally used in the frameworks have been adapted to the AP. For example, the notion "the system" was replaced with "the artificial pancreas". Many researchers work like this, however, the validity could still be affected by it. Also, the survey was based on validated scales in English, yet this particular survey was translated into Dutch which could affect the validity as well, as it leaves room for possible misunderstandings or misinterpretations. Likewise, this paper only investigated the *intention*, but not the actual usage. The author adapted the questions to this circumstance, but it still leaves room for bias.

Third, this study is limited in its external validity. The research only investigated Dutch nurses, which at the moment deems appropriate because they represent the primary target group for Inreda. However, the findings are limited to a very specific technology, the AP, and might differ among other technologies, countries and cultures. Lastly, the model was not tested holistically, but instead tested in three subsequent steps. A variance based statistical analysis could reveal different results.

10. DIRECTIONS FOR FURTHER RESEARCH

The settings as well as the results of this research leave some directions and suggestions to be further investigated. Overall, this study proved that the AP is widely being recognized by nurses in the Netherlands, which should encourage more clinical testing alongside theoretical analyses to further de-validate concerns about the AP (Colton, 1995).

First and foremost, while this study confirmed the validity of the sample size (n= 77), the usage of a larger sample is highly recommended as it might reveal different relationships among the variables. As previously mentioned, and in line with other researchers, the author suggests using a sample size between 200 and 300. This research was conducted within a relatively limited time frame and at a point in time where the AP was yet to be commercialized. Consequently, the author suggests to re-do the same analysis with the same respondents at a later point in time when the AP is more widely diffused and used to see and control if the established relationships are consistent over time. Thereby, the results of this research can be (de-) validated and a foundation for further research can be built. Further, future research could focus on the actual usage, not only the *intention*, as the intention is not always a determinant of actual usage (Limayem et al., 2001). Moreover, several variables, such as *trialability* and *observability* were not included in the analysis due to the unavailability of the AP. Testing for these variables as well could bear interesting results. Another direction which researchers could potentially investigate are the effects in other countries, as this study solely focused on nurses from the Netherlands. In a first step, the author suggests to investigate countries with similar cultures, such as Germany or Austria, especially as Inreda is also interested in those markets. In a subsequent step, the proposed relationships could also be tested in other geographical settings where the development of the AP is also being pursued. Straub et al. (1997) found that TAM does not hold to be applicable in some Asian countries, such as Japan. Considering the globalization of business, and the global impact of diabetes, researching how technology acceptance and diffusion of innovation differ among cultures embodies a highly interesting domain. A useful framework taken into consideration could be the work of Hofstede (2003), who identified different dimensions that characterize a culture. For example, *uncertainty avoidance* could be of influence in TAM, as proposed by Hwang (2005). Additionally, in a more elaborate analysis, researchers could take a holistic approach and combine the TAM and IDT for example with the technology readiness index (TRI) developed by Parasuraman (2000), which examines the effects of individual characteristics on technology acceptance. The author further suggests to make use of a variance based statistical analysis, e.g. SmartPLS, as this program does not require a very large sample size and enables the author to do a holistic analysis instead of having to split it into parts. Lastly, as a medical innovation, the AP must undergo a large amount of regulatory approval rounds before it can be introduced to the market. Therefore, it would be interesting to examine how other stakeholder groups, such as insurance companies, pharmacies, or medical device suppliers perceive the AP. This would allow companies to gain insights on how to anticipate this process.

11. CONCLUSION

The commercialization of the AP will set a major milestone in the treatment of diabetes. While first companies have received regulatory approval for their algorithms, Inreda plays a vital role in the development of this technique in the Netherlands. Through empirical testing, this research has delivered insights into how different product characteristics influence nurses' intention to advise the AP. This can help Inreda to tailor their marketing efforts towards nurses.

12. ACKNOWLEDGMENTS

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14. APPENDIX

14.1. Background Information on Diabetes

Based on the recent report of the International Diabetes Federation (IDF, 2013), this section provides a more detailed overview on the disease diabetes. According to estimates of IDF, the usually progressive disease diabetes has caused more than 5 million deaths by 2013. Healthcare spending is expected to exceed the $ 500 billion mark. Currently, more than 382 million people are living with diabetes; a figure that is expected to increase to 471 million by 2035. Without intervention and concentrated efforts, this number is expected to increase even further to around 600 million people. Several major healthcare companies have invested heavily into the research and development of new treatment options and expertise to cope with this disease that is becoming an increasing threat to humanity with enormous costs.

The majority of people suffering from diabetes come from south-east Asian and the western pacific area.

Diabetes is a long term, usually progressive, disease that gets worse over time. In essence, it causes high blood glucose levels. In a healthy and normal condition, the artificial pancreas of the human body releases insulin, which opens up the cells and allows glucose to enter. The disease distinguishes between three main types: Type 1, type 2, and gestational diabetes. All of them occur when the body cannot produce enough insulin or make use of it effectively.

Type 1 diabetes accounts for about 10% of all diabetes cases and has a very sudden onset (IDF, 2013). In this case, the body is not able to produce insulin itself, thereby leading to the fact that glucose cannot enter the cells but enters directly into the blood. In this case, instant treatment is needed in order for the patient to survive.

Type 2 diabetes, on the other hand, accounts for the majority of cases and can go unnoticed for a long period of time. In this case, the body produces insulin, but the amount is not sufficient or the cells resist to open up. Type 2 diabetes is usually caused by an unhealthy lifestyle and obesity. In turn, this kind of diabetes can usually be prevented by a healthy lifestyle.

The third type of diabetes is called gestational diabetes and affects females during pregnancy. The basic problem is similar to the type 2, i.e. the body is unable to produce enough insulin to transport all of the glucose into the cells, ultimately leading to rising glucose levels. Similar to type 2, this form of diabetes can mostly be prevented and controlled with exercising. Only a marginal amount of women actually need to receive treatment.

Diabetes can show a number of different symptoms, ranging from blurred vision to weight loss. To summarize, the malfunctioning of the pancreas can lead to very high blood glucose levels (Hyperglycemia). High blood glucose levels are a serious threat to patients, which can lead to unconsciousness and in the worst case to the patient falling into a coma. Similarly, especially type 2 patients are subject to extremely low blood glucose levels (Hypoglycemia). Forgetting to eat, sports and alcohol in combination with an insulin injection can lead to low levels. If not treated, the patient is likely to encounter complications such as kidney problems, high blood pressure or vision problems.

To avoid complications and to keep the blood glucose level on a constant and controllable level, the medical industry has developed several treatment options. Patients with access to such technology are less likely to encounter major problems.

Currently, the market offers a variety of options, such as test strips, insulin pens, insulin pumps, and insulin syringes.

As mentioned before in section 1, a new technology, the artificial pancreas, has only received regulatory approval in Europe. The artificial pancreas is a device that is carried close to the body and automatically monitors, controls and adjusts the blood glucose level of the patient. As an automated closed-loop system, it does not require any user intervention. Thereby, the artificial pancreas can significantly simplify patients' lives and enable them to live a more convenient daily life.

14.2. Graphs and Figures

Table 1: Review of prior research on technology acceptance

Prior Studies	Independent Variable(s)	Dependent Variable
Davis et al. (1989)	Attitude, Perceived usefulness, Perceived ease of use	Adopter's perception of the technology
Rogers (1995)	Relative advantage, Compatibiliy, Complexity, Trialability, Observability	Rate of diffusion
Venkatesh and Davis (2000)	Subjective norm, job relevance	Intention to use

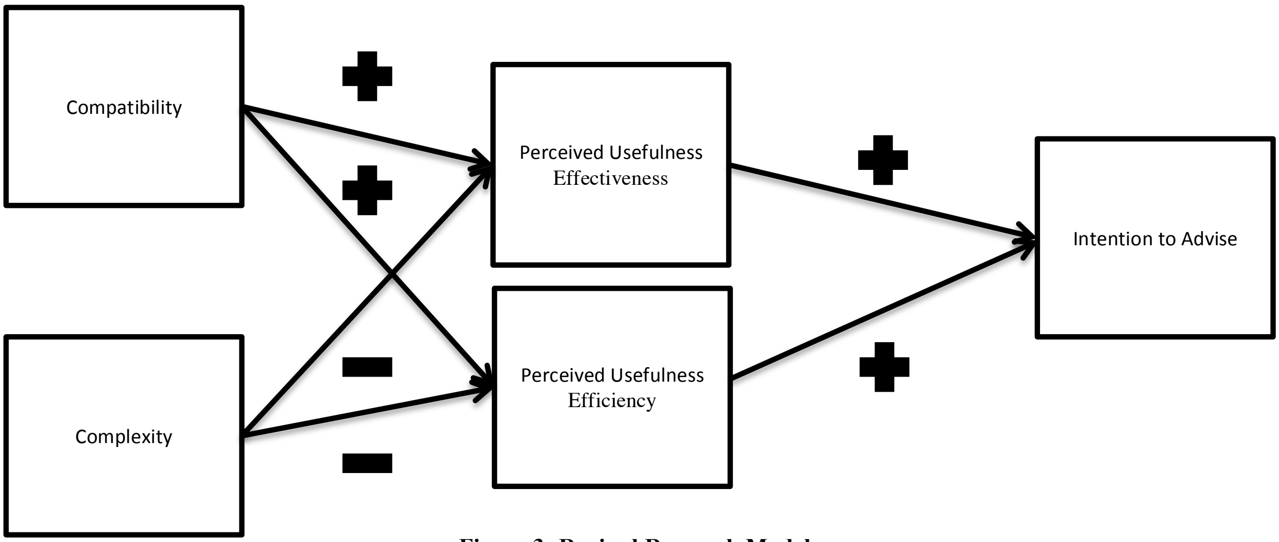

Figure 3: Revised Research Model

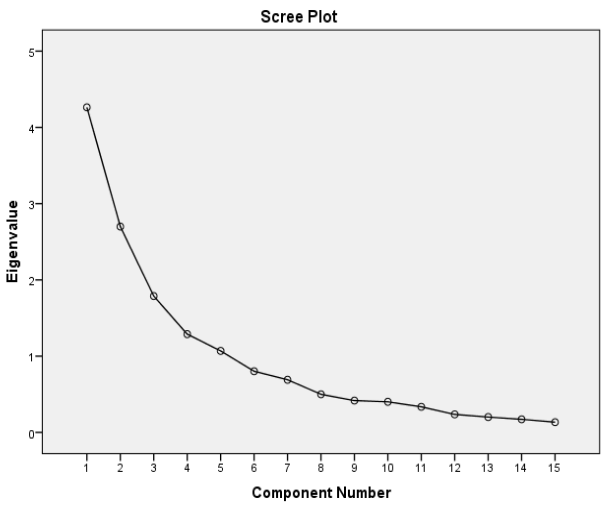

Figure 3: Scree Plot of the Principal Component Analysis of the items of Perceived Usefulness, Compatibility, and Complexity.

Table 10: Factor Analysis Total Variance

Component	Rotation Sums of Squared Loadings
1	3.137
2	3.013
3	2.763
4	3.528

Table 11: Compatibilitty, Complexity and Control variables explaining Intention To Use

	B	Std. Error	R Square	Beta	t-value	Sig.
Constant	7.25	2.219	.231		3.268	.002
Compatibility	.286	.108		.298	2.656	.01
Complexity	-.134	.103		-.145	-1.302	.197
Age	-.036	.019		-.205	-1.836	.071
Gender	-.44	.32		-.146	-1.375	.173
Years of working in profession	.26	.112		.254	2.313	.024
Participitation in clinical trials	-.57	.982		-.064	-.58	.564

a Dependent Variable: IntentionToAdvise

Table 12: Results Perceived Usefulness Effectivess, Efficiency, and Control variables explaining Intention To Use

	B	Std. Error	R Square	Beta	t-value	Sig.
Constant	6.454	2.155	.241		2.995	.004
Perceived Usefulness Effectiveness	.514	.154		.413	3.349	.001
Perceived Usefulness Efficiency	-.078	.115		-.086	-.68	.498
Age	-.038	.02		-.219	-1.935	.057
Gender	-.399	.318		-.132	-1.255	.214
Years of working in profession	.19	.113		.186	1.678	.098
Participitation in clinical trials	-.687	.975		-.077	-.704	.484

a Dependent Variable: IntentionToAdvise

14.3. Survey

Table 13: Constructs and Item Translation

Construct	Dutch Item	English Item
NL: Compatibiliteit; EN: Compatibility	COM_00_COM_01: Ik verwacht dat het gebruik van de kunstmatige alvleesklier aansluit bij alle aspecten van mijn werk. COM_00_COM_02: Ik denk dat het gebruik van de kunstmatige alvleesklier goed past bij de manier waarop ik graag werk. COM_00_COM_03: Ik denk dat het gebruik van de kunstmatige alvleesklier goed past bij de manier waarop ik graag werk.	COM_00_COM_01: Other people come to you for advice on new technologies COM_00_COM_02: In general, you are among the first in your circle of friends to acquire new technology when it appears. COM_00_COM_03: You can usually figure out new high-tech products and services without help from others.
NL: Ingewikkeldheid; EN: Complexity	ING_00_ING_01: Ik verwacht dat het gebruik van de kunstmatige alvleesklier te veel tijd wegneemt van mijn normale taken. ING_00_ING_02: Ik verwacht dat het werken met de kunstmatige alvleesklier zo ingewikkeld is dat het moeilijk is om te begrijpen is wat er precies gaande is. ING_00_ING_03: Ik verwacht dat het gebruik van de kunstmatige alvleesklier te veel tijd kost in de vorm van de uit te voeren handelingen. ING_00_ING_04: Ik verwacht dat het te lang zal duren om te leren hoe de kunstmatige alvleesklier gebruikt dient te worden om het de moeite waard te maken.	ING_00_ING_01: I expect that using the artificial pancreas will take too much time from my normal duties. ING_00_ING_02: I expect that working with the artificial pancreas is so complicated, it is difficult to understand what is going on. ING_00_ING_03: I expect that using the artificial pancreas involves too much time doing mechanical operations. ING_00_ING_04: I expect that it takes too long to learn how to use an artificial pancreas to make it worth the effort.
NL: Verwachte Nut; EN: Perceived Usefulness	VN_00_VN_01: Ik verwacht dat het gebruik van de kunstmatige alvleesklier de prestaties in mijn werk zal verbeteren. VN_00_VN_02: Ik verwacht dat het gebruik van de kunstmatige alvleesklier de productiviteit in mijn werk zal verbeteren. VN_00_VN_03: Ik verwacht dat het gebruik van de kunstmatige alvleesklier de effectiviteit in mijn werk zal verbeteren. VN_00_VN_04: Ik verwacht dat het gebruik van de kunstmatige alvleesklier nuttig zal zijn in mijn werk. VN_00_VN_05: Ik verwacht dat het gebruik van de kunstmatige alvleesklier me zal helpen om bepaalde taken in mijn werk sneller te volbrengen. VN_00_VN_06: Ik verwacht dat het gebruik van de kunstmatige alvleesklier het makkelijker maakt om mijn werk uit te oefenen.	VN_00_VN_01: I expect that using the artificial pancreas would enable me to accomplish tasks more quickly. VN_00_VN_02: I expect that using the artificial pancreas improves my productivity in my job. VN_00_VN_03: I expect that using the artificial pancreas will increase my effectiveness in my job. VN_00_VN_04: I expect that using the artificial pancreas will be useful in my job. VN_00_VN_05: I expect that using the artificial pancreas would make it easier for me to accomplish my daily tasks. VN_00_VN_06: I expect that the artificial pancreas will make the execution of my work easier.
NL: Bedoeling tot Gebruik; EN: Intention to Use	ITU_00_ITU_01: Er van uitgaande dat mijn organisatie of werkgever toegang heeft tot een kunstmatige alvleesklier, ben ik van plan om het aan te bevelen aan de verantwoordelijke arts om patiënten te behandelen. ITU_00_ITU_02:Er van uitgaande dat mijn organisatie of werkgever toegang heeft tot een kunstmatige alvleesklier, voorspel ik dat ik het zou aanbevelen aan de verantwoordelijke arts om patiënten te behandelen.	ITU_00_ITU_01: Assuming I have access to an artificial pancreas, I intend to recommend it to use it. ITU_00_ITU_02: Assuming I have access to an artificial pancreas, I predict that I would use it.
NL: Demografische Vragen; EN: Demographic Questions	AGE: Wat is uw leeftijd? GEN: Wat is uw geslacht? EDU: Wat is uw hoogst genoten opleiding waarvan u een diploma heeft behaald? BER:Hoeveel Jaren werkt u in uw huidige beroep? KLITEST: Heeft u deelgenomen aan een klinische test van de kunstmatige alvleesklier?	AGE: What is your age? GEN: What is your sex? EDU: What is your highest educational level? BER: How many years are you working in your profession? KLITEST: I have participated in a clinical trial testing the artificial pancreas

14.4. SPSS Syntax

Factor Analysis with all independent variables based on Eigenvalue

```
GET
  FILE='F:\Raw data - Diabetes nurses_TT(1).sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
FACTOR
  /VARIABLES VN_00_VN_01 VN_00_VN_02 VN_00_VN_03 VN_00_VN_04 VN_00_VN_05 VN_00_VN_06
COM_00_COM_01 COM_00_COM_02 COM_00_COM_03 ING_00_ING_01 ING_00_ING_02 ING_00_ING_03
ING_00_ING_04
  /MISSING LISTWISE
  /ANALYSIS VN_00_VN_01 VN_00_VN_02 VN_00_VN_03 VN_00_VN_04 VN_00_VN_05 VN_00_VN_06
COM_00_COM_01 COM_00_COM_02 COM_00_COM_03 ING_00_ING_01 ING_00_ING_02 ING_00_ING_03
ING_00_ING_04
  /PRINT UNIVARIATE INITIAL KMO EXTRACTION ROTATION
  /FORMAT BLANK(.4)
  /PLOT EIGEN ROTATION
  /CRITERIA MINEIGEN(1) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=CORRELATION.
```

Reliability test of the items of Perceived Usefulness Effectiveness

```
RELIABILITY
  /VARIABLES=VN_00_VN_01 VN_00_VN_03 VN_00_VN_04
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /SUMMARY=TOTAL.
```

Reliability test of the items of Perceived Usefulness Efficiency

```
RELIABILITY
  /VARIABLES=VN_00_VN_02 VN_00_VN_05 VN_00_VN_06
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /SUMMARY=TOTAL.
```

Reliability test of the items of Compatibility

```
RELIABILITY
  /VARIABLES=COM_00_COM_01 COM_00_COM_02 COM_00_COM_03
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /SUMMARY=TOTAL.
```

Reliability test of the items of Complexity

```
RELIABILITY
  /VARIABLES=ING_00_ING_01 ING_00_ING_02 ING_00_ING_03 ING_00_ING_04
  /SCALE('ALL VARIABLES') ALL
```

```
 /MODEL=ALPHA
 /SUMMARY=TOTAL.
```

Reliability test of the items of Intention to Advise

```
RELIABILITY
 /VARIABLES=ITU_00_ITU_01 ITU_00_ITU_02
 /SCALE('ALL VARIABLES') ALL
 /MODEL=ALPHA
 /SUMMARY=TOTAL.
```

Creation of the variable Perceived Usefulness Effectiveness

```
COMPUTE
PerceivedUsefulnessEffectiveness=(VN_00_VN_01 +
VN_00_VN_03 + VN_00_VN_04) / 3.
EXECUTE.
```

Creation of the variable Perceived Usefulness Efficiency

```
COMPUTE PerceivedUsefulnessEfficiency=(VN_00_VN_02
+ VN_00_VN_05 + VN_00_VN_06) / 3.
EXECUTE.
```

Creation of the variable Compatibility

```
COMPUTE Compatibility=(COM_00_COM_01 +
COM_00_COM_02 + COM_00_COM_03) / 3.
EXECUTE.
```

Creation of the variable Complexity

```
COMPUTE Complexity=(ING_00_ING_01
+ ING_00_ING_02 + ING_00_ING_03 +
ING_00_ING_04) / 4.
EXECUTE.
```

Creation of the variable Intention to Advise

```
COMPUTE
IntentionToAdvise=(ITU_00_ITU_01 +
ITU_00_ITU_02) / 2.
EXECUTE.
```

Descriptive Statistics

```
DESCRIPTIVES VARIABLES=Complexity
IntentionToAdvise Compatibility
PerceivedUsefulnessEffectivness
PerceivedUsefulnessEfficiency
 /STATISTICS=MEAN STDDEV MIN MAX.


FREQUENCIES VARIABLES=IntentionToAdvise
PerceivedUsefulnessOne PerceivedUsefulnessTwo
Compatibility Complexity BER AGE GEN KLITEST
 /STATISTICS=STDDEV MEAN
 /ORDER=ANALYSIS.
```

Test for normality via bootstrapping

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT IntentionToAdvise
  /METHOD=ENTER PerceivedUsefulnessEffectiveness PerceivedUsefulnessEfficiency Compatibility Complexity
  /RESIDUALS DURBIN.
```

Correlation Analysis

```
NONPAR CORR
  /VARIABLES=Complexity Compatibility PerceivedUsefulnessEffectiveness PerceivedUsefulnessEfficiency
IntentionToAdvise
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Correlation Analysis Spearman's of all variables including the Control Variables

```
GET
  FILE='F:\Raw data - Diabetes nurses_TT(1LATEST).sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
NONPAR CORR
  /VARIABLES=IntentionToAdvise PerceivedUsefulnessOne PerceivedUsefulnessTwo Compatibility BER AGE GEN
KLITEST
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

Regression Analysis of all variables on the Intention to Advise

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT IntentionToAdvise
  /METHOD=ENTER PerceivedUsefulnessEffectiveness PerceivedUsefulnessEfficiency Compatibility Complexity
  /RESIDUALS DURBIN.
```

Regression Analysis of the mediating variables Perceived Usefulness Effectiveness and Perceived Usefulness Efficiency on the Intention to Advise

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT IntentionToAdvise
  /METHOD=ENTER PerceivedUsefulnessEffectiveness
PerceivedUsefulnessEfficiency.
```

Regression Analysis of Compatibility and Complexity on the Intention to Advise

```
REGRESSION
```

```
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT IntentionToAdvise
/METHOD=ENTER Complexity Compatibility.
```

Multivarite Analysis of Compatibility and Complexity on the mediating variables Perceived Usefulness Effectiveness and Perceived Usefulness Efficiency

```
GLM PerceivedUsefulnessEffectiveness PerceivedUsefulnessEfficiency WITH Complexity Compatibility
 /METHOD=SSTYPE(3)
 /INTERCEPT=INCLUDE
 /CRITERIA=ALPHA(.05)
 /DESIGN=Complexity Compatibility.
```

Testing for collinearity

```
GET
  FILE='F:\Raw data - Diabetes nurses_TT(1LATEST).sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT IntentionToAdvise
  /METHOD=ENTER PerceivedUsefulnessEffectiveness PerceivedUsefulnessEfficiency Compatibility Complexity
  /RESIDUALS DURBIN.
```

Frequencies of Clinical Trials

```
GET
FILE='F:\Raw data - Diabetes nurses_TT(1LATEST).sav'.
DATASET NAME DataSet1 WINDOW=FRONT.
FREQUENCIES VARIABLES=KLITEST
/ORDER=ANALYSIS.
```