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PREVENTIVE FACTORS AND INNOVATIONS IN WEARABLES

Preventive Factors and Innovations for Continuous Adoption of Smart Wearables

Master of Science Thesis
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ABSTRACT

Vijay Sadananda: Preventive Factors and Innovations in Wearables: Preventive Factors and Innovations for Continuous Adoption of Smart Wearables
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Wearable technology over time has become an integral part of our everyday lives, with these smart wearables holding immense potential in personal health management. This thesis explores the factors influencing user's continuance intention to use smart wearables with a primary focus on the perceived benefit of preventing future diseases. The objective is to find the overlap between technological adoption, health behavior, and the cognitive factors that influence user decisions.

The study leverages a comprehensive research framework that blends elements of technology adoption, health behavior, and user experience. It utilizes both quantitative and qualitative research methods to collect and analyze data from a diverse sample of smart wearable users.

Findings from this research demonstrate that the perceived benefits of preventing future diseases significantly impact users' intentions to continue using smart wearables. Users who attribute the continued use of these devices to a reduction in their susceptibility to future health conditions exhibit higher continuance intention.

The research also uncovers a range of determinants within the smart wearable context, including perceived ease of use, perceived usefulness, health consciousness, and technological self-efficacy. These determinants play a crucial role in shaping the user's perceived benefits, thereby influencing their continuance intention.

Implications from this study offer valuable insights for manufacturers, healthcare providers, and policymakers. They highlight the need to design smart wearables that address health concerns with the findings that suggest the importance of user education and user experience design in enhancing the perceived benefits and overall user satisfaction.

As the prevalence of smart wearables continues to grow, understanding the factors driving users' continuance intention for disease prevention is paramount. This research contributes to the evolving landscape of wearable technology and provides guidance for optimizing these devices to meet the healthcare challenges of the future.

Keywords: Smart wearables, Continuance Intention, Perceived Benefits, Preventing Future Disease, Health Behavior, User Experience, Health Technology Adoption

Turnitin Originality Check service was used to check the originality of this thesis.

PREFACE

This documented thesis was made for Center for Innovation and Technology Research, Tampere University. The area of interest changed couple of times and was finally fixated on the pursued topic.

After going through a demotivated time of writing thesis, I came to realization that no matter what, I am not going to pursue my career in academia. I cannot frustrate myself to write the paper. I finally realised that putting the thoughts into paper is hard. Finally, was able to pull off finishing the paper in late February 2024.

I must express my gratitude to my supervisor who exercised a lot of patience with my slow progress and timely constructive criticism to build the paper of acceptable quality.

Tampere, 29 February 2024

Vijay Sadananda

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LIST OF SYMBOLS AND ABBREVIATIONS

IS	Information Systems
DOI	Diffusion of Innovation
TRA	Theory of Resonated Action
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TAM3	Technology Acceptance Model 3
TPB	Theory of Planned Behavior
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
IT	Information Technology
UTAUT	Unified Theory of Acceptance and Use of Technology
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
PIR	Perceived Irreplaceability
PCR	Perceived Credibility
COM	Compatibility
SI	Social Influence
PLS-SEM	Partial Least Square Structural Model
STDEV	Standard Deviation
CR	Composite Reliability
AVE	Average Variance Extracted
HTMT	Heterotrait-Monotrait Ratio
R^2	Coefficient of Determination
f^2	Effect Size
VIF	Variance Inflation Factor

1. INTRODUCTION

1.1 Background

Wearable devices are the smart gadgets that fall under wearable technology which can be worn near or over the skin. They help in exploring, distinguishing and sending the concerned data related to body gestures or signals such as heartbeat and other information that can provide immediate biofeedback to the wearer (Singhal et al., 2021).

Early on, the general public used wearable devices as a fashionable accessory. However, they were mainly used in military technology (Tehrani et al., 2014). There are currently two primary categories of wearable medical technology available to consumers. The first is the wearable devices for fitness that monitor steps, distance covered, calories burnt, sleep quality and timings, and diet monitoring. The second is the medical wearable devices mostly adopted by elderly population to monitor certain diseases such as diabetes and cancer.

Wearable health devices include smart watches, glasses, wrist bands, and wearable body metric textile that can track parameters such as heart rate, blood pressure, steps, body temperature, and sleep condition (Swan, 2012). Information System (IS) academics in their studies made the assumption that user's decisions on wearable devices are permanent and unchanging. However, this is not the case for wearable health IS (Sun et al., 2014). People are more likely to reuse wearable technology even after making the decision to stop using it in the past because their interaction with it often involves a number of dynamic and coherent decision-making processes (Epstein et al., 2016).

Though there are many innovations in healthcare wearable technologies, an important question is how to attract and keep users. Extensive research has been done focusing on influencing users to buy wearable technology validating the significance of the Technology Acceptance Model (TAM) in predicting the intention to purchase (Almuraqab, 2021). TAM was paired with a variety of factors, including cost and social influence, to forecast and explain consumers' purchase decisions. Consumers perceive smart wearables on two dimensions, that is technology and fashion (Yang et al., 2016). Tzou and Lu (2009) argued that an individual owning a consumer electronics product with a pleasing fashionable look and a well design, allowed people to express differentiation. Consequently, many people may find that the pertinent theories regarding fashion adoption fit them better.

Other than just being a fashion accessory, there are wide benefits one may get by inculcating smart wearable devices in everyday life. The biggest influence could be on health and wellness. However, sedentary lifestyles have increased influencing individuals to show little to no interest towards such devices. Health monitoring systems are used to constantly monitor health indicators in wide areas. Particularly, smart wearable devices are used to carry out this task. Smart wearable devices have emerged as a transformative technology that holds tremendous potential in revolutionizing the prevention and management of health conditions. Smart wearables are widely used in healthcare observation. Collection of data using sensors is the prominent use of smart wearables. Though, it is proven that smart wearables can be used by individuals to monitor their health, individuals' perception on continuous adoption of smart wearables focusing on prevention of future health condition is unknown.

The purpose of this research proposal is to determine the driving forces behind the ongoing adoption of smart wearables while considering and assessing based on the public's perception of these devices on their ability to prevent future health issues.

1.2 Research Questions and Objectives

Factors influencing the continuous intention of an innovation and their understanding provides a great opportunity to understand the consumer needs that could serve base for further R&D of the innovation. Therefore, the objective of this study is to:

Recognize the elements influencing current wearable smart device users' intentions to continue such devices, particularly studying the factors related to prevention of health conditions. The research will be driven by following questions:

What are the key motivations and incentives that can drive individuals to sustain long-term usage of smart wearable device for prevention?

How does perceived usefulness of smart wearables with respect to preventive healthcare and long-term motivations regarding fitness goals and health monitoring influence user's intentions to continue their usage?

How do demographic variables like age, gender, or socioeconomic status influence likelihood of continuous usage of smart wearable devices?

How does the user satisfaction play influence in continuous intention to use smart wearables?

Finally, the study seeks to find if preventive factors of this innovation, related to the prevention of future health conditions, influence continuous adoption.

1.3 Research Process

Starting in the month of May 2023, background work started by familiarizing with the research area. Identifying the research gap in smart wearables started with literature review of continuous adoption intention, discontinuation intention, and preventive intention papers of innovations.

The literatures related to smart wearables is growing, yet it has not looked specifically at the user's perception on continuous use of the smart wearables offering insights in prevention of diseases in the future.

The research timeline is presented in Table 1.

Table 1. *Research Timeline.*

Task	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**
Problem Identification	■	■								
Literature Review	■	■	■	■	■	■	■			
Problem clarification		■								
Data collection		■	■							
Data Analysis			■	■						
Write first draft			■	■	■					
Write second draft					■	■				
Write final draft						■	■	■	■	■

From the table, it can be seen that the research process was started in June after deciding the research area during May and June. Extensive reviews of literature were done to understand the research gap in smart wearables adoption and map with preventive innovation.

Final research question was built on the knowledge of existing literature to contribute to the understanding of preventive innovation in smart wearables adoption. There questionnaires were then distributed to users of smart wearables and surveyed starting in June until end of July.

With enough responses, results were analyzed to draw conclusions. With these results, the first paper draft was presented in September and was finalized in early December.

1.4 Structure of the Thesis

The thesis consists of 4 chapters. The first chapter introduces the subject of the research work and its objective. Importance of the study regard to smart wearables and their adoption is discussed. The background of the research, the goals and questions of the study, and the overall methodology are all covered in detail in this chapter.

Chapter two delves into the theoretical background, carefully going over important ideas like innovation adoption, acceptance, models of acceptance, and factors that influence acceptance. It also explores factors related to wearable continuance and discontinuance, highlighting the complexities of factors influencing the continued use or discontinuation of smart wearables. Preventive innovation insights are abundant in this chapter, providing a theoretical framework for the research.

The third chapter, methodology, explains how the data was gathered and analyzed. This includes a thorough examination of the literature review procedure, utilizing knowledge from excellent, peer-reviewed publications. This chapter also describes the empirical study, which is informed by the findings of the literature. The results are examined in detail in the following chapters, which also include path coefficients, measurement model evaluation, structural model evaluation, and PLS-SEM model.

Chapter four presents the discussion into the findings of the PLS-SEM model. It examines the constructs and their p-values in detail and provides suggestions for improvement. Path coefficients come into play, answering unexpected results and matching supported hypothesis with theory. The chapter highlights important ideas and learnings from the research.

The final chapter, conclusions, encapsulates the theoretical contributions, practical implications, research limitations, and avenues for future research, providing a comprehensive and insightful closure to the thesis.

2. THEORETICAL BACKGROUND

2.1 Adoption

2.1.1 Innovation Adoption

Innovation is the act of producing something that is novel, valuable and has wider implications for the advancement of technology and of the economy (Edwards-Schachter, 2018). Although technological developments are frequently linked to innovation, non-technological factors like business models, organizational procedures, and social or cultural shifts can also be included (Edwards-Schachter, 2016).

Innovation adoption is the process through which people, groups, or organizations accept and integrate a new technology, service, product, or idea into their current routines or behaviors (Rogers, 2003). It involves the decision-making and adoption behaviors that occurs when individuals encounter and evaluate an innovation, ultimately leading to its acceptance or rejection (Rogers, 2003). In his book, Everette M. Roger, an American communication theorist and sociologist, outlines five attributes of innovations which help distinguish innovations from one another, namely relative advantage, compatibility, complexity, trialability, and observability.

- Relative advantage indicates the extent to which an innovation is considered superior to the previous concept within a specific user group. This judgment is based on factors that hold significance for those users, such as economic benefits, social status, convenience, or overall satisfaction (Rogers, 2003). Innovations that are perceived to have a greater relative advantage or benefit diffuse more quickly, increasing the likelihood that they will be quickly adopted.
- Compatibility indicated the extent an innovation or invention is thought to align well with the values, previous encounters, and requirements of possible adopters (Rogers, 2003). Adoption and diffusion of an innovation are correlated with its ability to coexist and integrate with current technologies and social patterns.
- Complexity is a measure of difficulty in comprehending and to operate or use an innovation (Rogers, 2003). Novel concepts that are easier to grasp are swifter in

adoption and diffusion compared to innovations that demand the adopter to acquire new abilities and insights.

- Trialability indicates to which extent an innovation can be tested and tried out with minimal investment and commitment. An innovation that can be tried out with limited risk reduces uncertainty for individuals who are contemplating its adoption (Rogers, 2003).
- Observability refers to the individuals observing the outcome of an innovation from other user experiences and then acknowledge its usefulness. The more readily they can observe the results of the innovation, the higher the likelihood of them embracing it (Rogers, 2003). Observable outcomes decrease uncertainty and encourage discussions among peers about a new concept. When the observing individual is convinced from the evidence of improved user experience, functionality, and outcomes, the more likely are they to adopt it.

The attitude and intention of an individual in adopting an innovation are shaped by the combination of these adoption factors. It's crucial to remember that these variables interact and change in importance based on the innovation's context and the adopter's attributes.

In addition, Rogers (2003) also emphasized the factors such as communication channels, social systems, time, and the stages of the innovation-decision process in influencing adoption decisions. These factors collectively contribute to the diffusion of innovations within a population.

Participants generating and sharing knowledge among each other in order to achieve understanding that is mutual in nature and occuring through channels between sources is defined as communication (Rogers, 2003). According to Rogers, a source is either a person or an organization that create a message. Channel is the path a message takes to travel from its source to its destination. Diffusion, in his words, is a specific kind of communication that consists of three essential elements: an innovation, two individuals or other units of adoption, and a communication channel. Interpersonal and mass media communication are the two avenues of communication. A television, newspaper, or radio are examples of mass media channels, but two-way communication between individuals, two or more in number is known as an interpersonal channel. Diffusion is a social process involving interpersonal communication relationships, according to Rogers. Communication channels between members of the social system and external sources are divided into two categories: cosmopolitate and locality channels.

Rogers (2003) claims that mojority of the behavioral research ignore time as an aspect. Rogers argues that in the innovation-diffusion process, adopter categorization, and rate of adoption all take time into account.

Rogers (2003) defined the social system as ‘‘a set of interrelated units engaged in joint problem solving to accomplish a common goal’’. Rogers argues that because innovation is a product of the social system, its diffusion is influenced by the same.

In an organizational evolution, innovation lies at the heart of the organization, enabling companies to adapt, improve, and meet the evolving needs of their customers. Adoption is a process that begins with acknowledging a need and searching for a solution, progresses to the decision to try adopting the solution, and ends with the decision to try carrying out the solution's implementation (Damanpour and Schneider, 2006). Pre-adoption-knowledge of innovation, peri-adoption-ongoing access to innovation information, established adoption, or commitment to the adoption decision by the adopter, are characteristics of the adoption process (Greenhalgh et al. 2004).

Rogers (2003) mentioned that the process of making individual decisions about adopting innovations was portrayed as an endeavor focused on gathering and processing information. Individuals are motivated in reducing the uncertainty regards to benefits and drawbacks of an innovation through this information-seeking and information-processing endeavor (Sahin, 2006). Rogers (2003) identified five steps in the innovation-decision process: (1) Knowledge (2) Persuasion (3) Decision (4) Implementation (5) Confirmation. This process is shown in Figure 1.

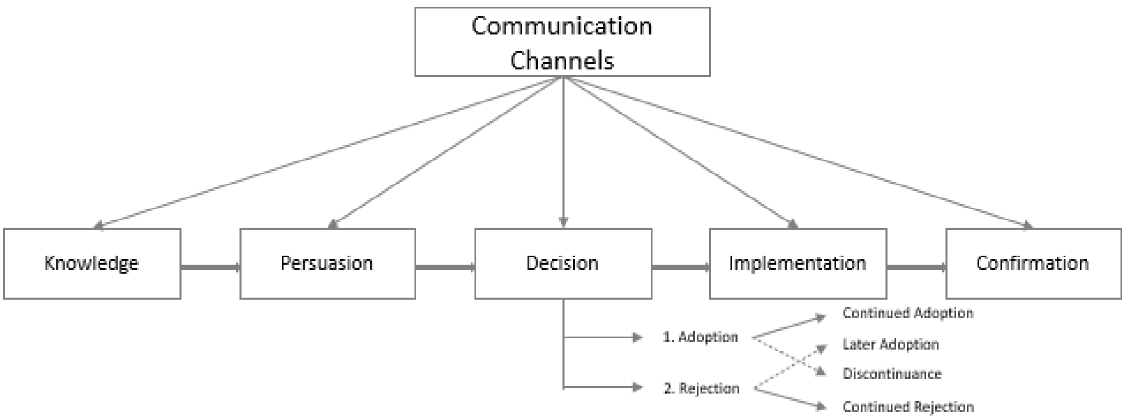

Figure 1. *Five Stages in the Innovation-Decision Process (Source: Diffusion of Innovations, Fifth Edition by Everett M. Rogers.)*

Knowledge. The knowledge phase is where the innovation-adoption process begins. An individual becomes aware of the existence of an innovation and further starts looking for more information about it at this stage. “What?”, “How”, and “Why?” are the pivotal questions considered at this phase. The individual tries to understand what the innovation is, how, and why it functions (Rogers, 2003). The three categories of knowledge that Rogers claims these questions cover is awareness, how-to, and principles-knowledge.

Awareness-knowledge pertains to recognizing the existence of an innovation. It serves as a catalyst for an individual to explore much more about the innovation and potentially adopt it. Further, it encourages that individual to delve into the other two knowledge types.

How-to-knowledge provides guidance on the correct usage of the innovation. Even individuals with technological backgrounds might refrain from using technology if they lack a proper understanding of how to utilize it effectively (Wetzel, 1993). Rogers deemed this knowledge crucial within the innovation-decision process. To enhance the chances of adopting an innovation, individuals need a satisfactory level of how-to-knowledge before attempting to use it.

Principles-knowledge is the final type of knowledge encompassing the functional principles that explains and clarifies as how and why an innovation operates. Though without this knowledge an innovation can be adopted, improper use can lead to its discontinuation. The principal obstacle to integration of a technology into teaching was because of the absence of a clear vision regarding why or how to incorporate technology in the classroom (Sprague et al., 1999).

Persuasion. This stage is reached when either a positive attitude or a negative attitude about the innovation is built in an individual. But adopting or rejecting an innovation, whether directly or indirectly, may not always follow from the development of a positive or negative attitude towards it (Rogers, 2003). Knowledge stage in the innovation-decision process is followed by persuasion because an individual's attitude is shaped once they are aware of the innovation.

Additionally, according to Rogers, the persuasion stage is more of a feeling-centered, whereas it is more cognitively centered for the knowledge stage. As a result, the person engages with the innovation at the persuasion stage with greater sensitivity. An individual's convictions and views regarding an innovation are greatly influenced by their degree of uncertainty about its workings as well as by social reinforcement from peers and colleagues. The most persuasive to the individual are typically the subjective assessments of the innovation made by close peers, which serve to allay concerns about the innovation's potential consequences. As Sherry (1997) noted, teachers often seek information about new innovations from trusted friends and colleagues, whose personal opinions hold more weight.

Decision. The decision to either accept an innovation or reject it is a critical one that the person makes during the this of the innovation-decision making process. Rejection denotes the choice not to adopt the innovation, whereas adoption denotes the decision to fully utilise it as the best possible course of action (Rogers, 2003).

Having an innovation that is available for a subtest typically results in faster adoption. Most people would prefer to test an innovation out in their own situations before the decision to adopt. Making decisions about innovation can be sped up in its entirety by using this "vicarious trial." Rejection, however, is still a possibility throughout the entire process.

Rogers distinguishes rejection into two types: active and passive rejection. In an instance of active rejection, a person considers adopting an innovation after trying it, but ultimately makes the decision not to. Discontinuing the use of an innovation after previously adopting it falls under the category of active rejection. When someone rejects an innovation passively, they don't even consider using it Rogers mentions that these types of rejection have previously not been sufficiently highlighted in diffusion studies and have not been adequately considered in research.

In certain cases, the stages of knowledge, persuasion, and decision may not always occur in that order. One example of this is when knowledge comes before decision. This change is most common in nations having a collectivistic culture such as eastern nations, where the group’s influence over the adoption of an innovation can turn decisions about individual innovations into decisions about collective innovations (Rogers, 2003). The decision stage is always followed by the implementation stage, regardless of the exact order.

Implementation. At this point, the innovation is used in real-world situations. But when an innovation is introduced, it also brings with it a certain amount of novelty, and novelty raises some doubts about how widely it will be adopted or in its diffusion. At this point, there may still be difficulties due to the uncertainty surrounding the innovation's results. Because of this, the person putting the innovation into practice might need some form of technical support from change agents and other sources to lessen this outcome uncertainty. Furthermore, the innovation decision-making process is complete as “the innovation loses its unique identity while the distinct identity of such new ideas diminishes” (Rogers, 2003).

Reinvention typically takes place during the implementation stage, making it a vital component of this phase. The degree or extent to which an innovation is modified by a user during the process of its adoption and implementation is what Rogers (2003) defines as reinvention. Additionally, Rogers clarifies the difference between innovation and invention. According to Rogers (2003), adoption of an innovation involves making use of an already-existing idea, even though invention is the process by which any new idea is created or is discovered. Rogers continues by stating that innovations are adopted and standardised more quickly the more reinvention there is. For instance, computers are especially open to innovation since they are versatile devices with a wide range of possible uses.

Confirmation. The innovation-decision process has already concluded, but during the confirmation stage, the individual seeks validation for their decision. As per Rogers (2003), if the individual receives contradictory information regarding the innovation, they may decide to change their mind. The person, however, usually steers clear of these contradicting signals and actively looks for messages that support their decision. Consequently, attitudes become especially crucial during the confirmation stage. Within this phase, decisions about adoption or discontinuance are made based on the level of support for implementing the innovation and the individual’s attitude toward that innovation.

Discontinuance can manifest in two ways during this phase. The first step in what is called "replacement discontinuance" is when the person rejects the innovation of the moment in favour of a better substitute. "Disenchantment discontinuance" is the name given to the other type of discontinuance. In this scenario, the individual, because of unhappiness of the innovation and it’s working, rejects that innovation. This kind of discontinuance could also occur when an innovation doesn't satisfy the needs of the individual, which leaves them without a perceived relative advantage—the main factor influencing the innovation adoption rate.

In the past, a number of models were developed to describe the choices and procedures involved in adopting innovations. A few examples of these theories are the following: institutional theory (DiMaggio and Powell 1983, Teo et al. 2003), innovation-diffusion (Rogers 2003, Premkumar et al. 1994), task-technology fit (Goodhue and Thompson, 1995), information processing theory (Premkumar et al. 2005, Galbraith 1973), and innovation-diffusion (Davis 1989). A Technology-Organization-Environment (TOE) framework is a method used in organisations to explain adoption and decision to implement based on technological, environmental, and organisational factors (Tornatzky and Fleischer 1990, Pudjianto et al. 2011).

Apart from the innovation-diffusion theory, there are many theories and phenomenon that were developed to explain how innovation (technology) is adopted in an organization. They are:

Organizational theory – organizational (risk taking) culture. Organizational culture is a multi-dimensional and a phenomenon complex in nature (Schein 1996, Hofstede et al. 1990). This research focuses on the extent of risk-orientation influencing the decision process of the innovation adoption. Organizations are oriented towards process or results (Hofstede et al. 1990). Process-oriented organizations typically perceive themselves as averse to risk and exhibit minimal enthusiasm for change as their daily tasks tend to remain constant. In contrast, results-oriented organizations thrive in unfamiliar situations, exert maximum effort, and view each day as an opportunity for fresh challenges.

Organizational theory – top management support. For a long time, experts in the world of information technology have emphasized how crucial it is to have the backing of top managers. Generally, people believe the need for the support of top executives to make the most of the IT benefits. This included the participation of the executives in IT planning, development and implementations, investment of energy and time in related matter (Jarvenpaa and Ives 1991). Innovations that involve sharing information, the most important factor has been found to be the support of the top management (Ramamurthy et al., 1999, Premkumar et al. 1994).

Institutional theory – environmental factors. According to institutional theory, three different kinds of pressures—coercive, mimetic, and normative—cause organizations to become more alike (DiMaggio and Powell 1983). Teo et al. (2003) figured that these pressures had a major impact on an organization's intention to implement Financial EDI (Financial Electronic Data Interchange) technologies. Studies conducted by DePietro et al. (1990) have demonstrated that environmental pressures can expedite the decision-making process concerning innovations. Institutional theory is a good way to explore the external environment of an organization and how it affects the time duration to decide.

In addition, Rogers also emphasized the role of communication channels, social systems, and the stages of the innovation-decision process in influencing adoption decisions. These factors collectively contribute to the diffusion of innovations within a population.

According to Rogers (2003), there are five consumer groups that adopt innovations or technology: innovators, early adopters, early majority, late majority, and laggards. The adopter categorization based on innovativeness is displayed in Figure 2.

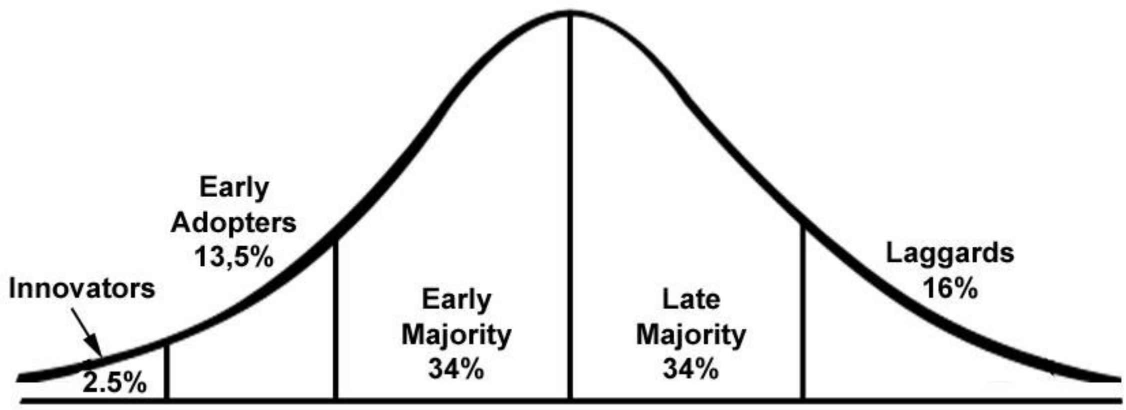

Figure 2. *Adopter Categorization on the Basis of Innovativeness (Source: Diffusion of Innovations, fifth edition by Everett M. Rogers.)*

Innovators. This segment of customers or individuals are receptive to trying out new and novel concepts. Therefore, they ought to be equipped to handle innovation that are partially successful and unprofitable as well as some degree of uncertainty. These individuals have great financial lucidity helping them absorb these failures. Rogers further mentions that innovators are the gatekeepers who introduce new ideas into the system from outside of it. Due to their intimate connections outside of the social structure and adventurous nature, they may not always be respected by the other members of that system. Innovative people need to possess sophisticated technical knowledge in order to be this daring.

Early adopters. In comparison to innovators, early adopters are more restricted by the rules of society. According to Rogers (2003), early adopters in the social system are highly likely to hold leadership positions, which draws in other members of the community looking for guidance or information about the innovation. Through interpersonal networks, early adopters' attitudes toward innovation and their subjective assessments of it are communicated to other members of society. The leadership of these people has a positive effect on the diffusion process by lowering the level of ambiguity surrounding the innovation.

Early majority. Early majority individuals get along well with others in the social system, but they do not hold the same leadership positions as early adopters, according to Rogers (2003). Nevertheless, the innovation-diffusion process depends heavily on their social networks. Just before the other half of their peers adopt the innovation, the early majority does so, as Figure 2 illustrates. According to Rogers, even though they are not the first or last group to adopt a technology, they are eager to do so. They are therefore the ones who, after varying lengths of time, adopt an innovation.

Late majority. These people comprise one-third of all social system participants who hold off on adopting the innovation until the majority of their peers do. Despite their general scepticism about the innovation and its results, they adopt it out of economic necessity and peer pressure. The interpersonal networks of close peers further persuade them to adopt the innovation, reducing their uncertainty about it.

Laggards. Rogers (2003) mentions that laggards hold the conventional point of view and are less accepting of the innovations and agents of change compared to the late majority They are the social system's most confined group, and most of the people in their interpersonal networks are also members of the same social system category. They are not in a leadership position. and factors like scarce resources, ignorance of the innovations, and lack of awareness of them, they want to wait to adopt innovations until they are absolutely clear about their benefits. As a result, these people often make their decision based on how well other social system members have previously adopted the innovation. The innovation-decision period for this segment is therefore rather lengthy.

To ensure the development and survival of companies, the generation of new ideas and implementation and innovative solutions are essential. Without them, there is a risk of stagnation, deterioration of competitive advantage, and even business failure. The topic of innovation adoption remains highly relevant due to its crucial role in socio-economic development and industrial competitiveness.

2.1.2 Acceptance Models

It is essential to differentiate between adoption of a technology and acceptance of a technology or innovation. The process of adopting an innovation is a journey that begins when a user first becomes aware of the technology and culminates when they fully embrace it, incorporating it into their daily lives (Biljon et al. 2008). When someone wholeheartedly embraces a technology, they are likely to replace it if it malfunctions, explore creative ways to use it, and cannot imagine their life without it. Many teenagers who use mobile phones provide a clear example of wholehearted technology embrace. On the other hand, acceptance, in contrast to adoption, refers to a user's attitude toward a technology, influenced by various factors. When a user purchases a new tech item, it doesn't necessarily mean they have fully adopted it; there are additional stages beyond the initial purchase, and this is where acceptance becomes crucial. If a user buys a product but doesn't genuinely accept it, the likelihood of complete adoption is significantly diminished. Information Systems (IS) proposes many numbers of technology acceptance models (Biljon et al. 2008). When faced with multiple models, researchers must either select and prioritize one model while disregarding the contributions of other models, or they must "pick and choose" constructs from among these models (Venkatesh et al., 2003). Thus, it is important to review the existing models.

2.1.2.1 TRA

The Theory of Resonated Action, or TRA, was one of the earliest models examined in the context of technological acceptance. TRA was created in 1967 by Ajzen and Fishbein, who employed it to research human behavior in 1980. Based on an individual's beliefs, attitudes, and intentions, this model both explains and forecasts their behaviors (Ajzen and Fishbein, 1980; Ajzen and Fishbein, 1975).

As seen in Figure 3, TRA is organized into three sections. The initial domain pertains to an individual's intention, which serves as the primary predictor and influencer of their attitude. The second category is attitude, which is characterized as a person's feelings—whether favorable or unfavorable—connected to a particular behavior performance. The third category is subjective norms, which are influenced by a person's normative views regardless of whether other people think it is appropriate for them to engage in a given behaviour. The way the TRA is intended to explain human behavior is shown in Figure 3 below.

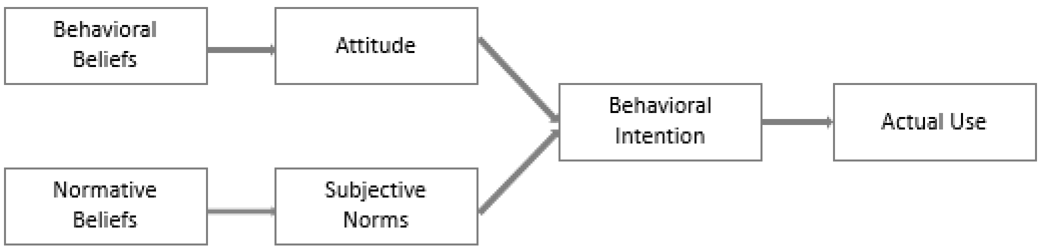

Figure 3. *The Theory of Resonated Action (Source: Ajzen and Fishbein, 1980)*

Because TRA is a general model that isn't specific to any one behavior or a piece of technology, it can be used in a variety of contexts, including social psychology, technology, health, and others.

2.1.2.2 TAM

In order to explain how people, accept and adopt technology, Fred Davis created the Technology Acceptance Model, or TAM, in 1987. The Theory of Planned Behavior (TPB) and the Theory of Resonant Action (TRA) were expanded upon by TAM. According to Davis (1987), the use of the system is a result that can be explained by the motivation of the user, which is influenced directly by outside factors. After making additional improvements to his model, Davis (1987) proposed the TAM, which postulates that three factors—perceived usefulness, perceived ease of use, and attitude toward using—can account for a user's motivation. Figure 4 below depicts Davis's (1987) Technology Acceptance Model.

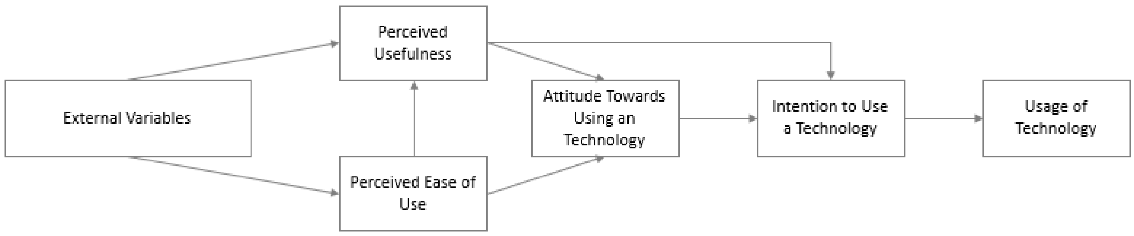

Figure 4. *The Technology Acceptance Model (Davis, 1986)*

However, Davis (1987) postulated that the user's attitude toward the system would be the primary factor in determining whether they choose to use it or not. Two more beliefs that affected the user's attitude were perceived usefulness (PU) and perceived ease of use (PEOU), with perceived ease of use having a direct impact on perceived usefulness. Perceived usefulness is the belief of a person the extent to which that using a particular system could enhance their job performance Davis (1987). The term "perceived ease of use" describes a person's opinion of how easy or difficult it is to use a system. Growing criticism of TAM for only taking a few factors into account led to further development of the model. Since it was originally developed for IT adoption in the workplace, it overlooks the varied requirements relevant in the voluntary consumer setting. Furthermore, there is no information about how to improve the technology's usability or utility in the core constructs PU and PEOU. The development of TAM2 and TAM 3 took into account additional variables, such as age and gender demographics and social influences that affect behavior intention.

2.1.2.3 UTAUT

This theoretical framework (Venkatesh et al., 2003) explains and forecasts people's acceptance of and use of new technologies. It was created by combining and expanding on a number of current theories of technology adoption, such as the Technology Acceptance Model (TAM) and the Theory of Reasoned Action (TRA). The TAM model is used to study constructs like PU (perceived usefulness) and PEOU (perceived ease of use). While in TRA, construct of attitude towards using a technology is studied. The UTAUT model identifies four key factors that influence people's behavioural intentions in adopting and using a technology:

1. Performance Expectancy. It describes the degree to which people think that utilizing a specific technology will increase their productivity and job performance gains.
2. Effort Expectancy. It speaks to the perceived ease of use as well as the amount of work involved in using the technology.
3. Social Influence. It encompasses the influence of others, such as peers, superiors, or influential individuals, on an individual’s choice or the decision to adopt and use technology.
4. Facilitating conditions. It speaks about the infrastructure, support, and resources that are available to make technology easier to adopt and use.

Additionally, UTAUT acknowledges the moderating effect of age, gender, experience, and voluntariness of use on individuals’ acceptance and behaviour of usage (Venkatesh et al., 2003).
Venkatesh et al. (2012) evaluated and expanded the second generation of UTAUT to investigate consumer adoption and usage of technology by adding factors like habit, price value to become UTAUT2, and hedonic motivation,.
According to Rondan-Cataluna et al. (2015), UTAUT2 provides a more thorough explanation than the other models of technology acceptance. Rondan-Cataluna et al., (2015) research discussed on mobile internet technology in Chile, a region where there was an increased use of the internet technology. Rondan-Cataluna et al., (2015) focused on to provide a better explanation of technology use and intention to using various technology acceptance models based on its explanation levels. According to the research work's findings, the UTAUT2 model outperforms the TAM model in terms of explanation power by a margin of 26%. UTAUT2, which has been used to test wearable technology adoption

with other constructs in determining smartwatch adoption among technological professionals, is the model for technology acceptance and use that Wong et al. (2013) supported. While Gu et al. (2016) investigated the elements influencing the consumers' trust toward wearable commerce. The acceptability, use, and intention to recommend of fitness wearable technology were examined by Talukder et al. (2018). UTAUT2 was also used in a study by Gao et al. (2015) to look into the variables related to consumers' intentions to use wearable technology in healthcare.

2.1.2.4 Diffusion of Innovation Theory

Everett Rogers in 1962 created the diffusion of innovation theory to explain how new ideas and technologies proliferate and become embraced by individuals or communities within a society. It classifies people into various adopter categories according to their willingness to accept innovations and provides insights into the variables that affect the adoption and diffusion process. There are four main parts to the Diffusion of Innovation theory.:

Innovation. This pertains to the introduction of a novel idea, product, or technology into a social system. Innovations can encompass both tangible items and intangible concepts or practices. "An idea, practice, or project that is perceived as new by an individual or another unit of adoption" is how Rogers (2003) defined innovation.'' It is important to note that an innovation could have long existed, but if an individual perceives it as novel or something new, to them, it can still be considered as innovation. The outcomes stemming from an innovation can often generate uncertainty. Here, "outcomes" refers to the changes taking place in a person or in a social system because of their acceptance or rejection of an innovation (Rogers 2003). Uncertainty stands as a significant barrier to the acceptance of new ideas. To mitigate this uncertainty involved in innovation adoption, it is imperative that individuals possess comprehensive knowledge regarding the drawbacks and benefits of the innovation in order to fully comprehend all possible outcomes. Furthermore, Rogers suggested classifying these effects as expected or unexpected, direct or indirect, and desirable or undesirable.

Communication Channels. Communication is a “process where participants exchange and distribute information among themselves with the goal of achieving mutual understanding” (Rogers, 2003). Sources are connected through channels that facilitate this communication. Whereas a channel is the way through which a message is transmitted from a source to the recipient, where a source is an individual or an organization that originates a message. Rogers defines diffusion as a particular kind of communication that consists of three communication components: an innovation, two people or other adoption units, and a communication channel. Interpersonal and mass media communication are the two main categories of communication channels. Interpersonal channels involve communication between two or more people, whereas mass media channels involve mass mediums like radio, newspapers, or television. On the other hand, diffusion is essentially a social process involving interpersonal communication relationships, according to Rogers (2003). Therefore, strong individual attitudes are more likely to be created or altered through interpersonal channels. Communication in interpersonal channels may display a homophily characteristic, which denotes that the people interacting have similar characteristics such as socioeconomic status, education, or beliefs. However, heterophily—where those interacting have different qualities—is required for innovations to spread to some extent. Other categories of communication channels include "localite channels" and "cosmopolite channels," which help people in a social system communicate with outside sources.

Time. Rogers (2003) notes that a lot of behavioral research tends to ignore the aspect of time. He argues that the main benefits of diffusion research are highlighted when the time factor is included. A temporal dimension is intrinsic to the diffusion of innovation process, adopter classification, and adoption pace.

Social System. In the diffusion process, the final element is the social system. According to Rogers (2003), the social system is "a collection of interrelated units working together to solve shared problems and achieve shared objectives." The social structure that is ingrained in the social system has a significant impact on how innovations diffuse within it. According to Rogers (2003), structure is "the ordered arrangement of units within a system." Additionally, he argued that the factor mainly used to categorize adopters-an individual's innovativeness-is influenced by the characteristics of the social system.

Momani and Jamous (2017) state that while demonstrability, visibility, image, and trialability do not significantly affect people's adoption and use of new technology, several variables within the Diffusion of Innovation (DOI) framework—specifically, compatibility, relative advantage (performance expectancy), and complexity (effort expectancy)—have a significant impact on people's acceptance. Wu et al. (2016) investigated consumers' intention to adopt smartwatches through a study that used the Technology Acceptance Model (TAM) and DOI. Hsiao (2017) used the DOI to compare Apple and non-Apple watches to investigate the adoption intention of smartwatches. In a similar vein, Jeong et al. (2017) evaluated the DOI framework to determine wearable device purchase intentions.

2.1.3 Determinants for Acceptance

Over time, various technology acceptance models have been developed, including Venkatesh et al.'s UTAUT and UTAUT2, which were published in 2003 and 2012. An intriguing idea was put forth by Buenaflor and Kim (2013) to understand the human aspects of accepting a wearable technology. Their investigation covered a wide range of topics, including user experience and basic human needs. The following is a summary of these factors:

1. Fundamental needs. Users adopt wearable devices to fulfil fundamental needs for safety, drawing from Maslow's hierarchy of needs.
2. Cognitive attitude. User acceptance is impacted by their perceptions of the technology's value and usability as well as their level of risk and fear.
3. Social aspect. Users may have concerns about personal privacy when using wearable devices, but social influences and cultural norms can also drive adoption.
4. Physical aspect. User acceptance is influenced by factors such as physical comfort, safety, aesthetics, appearance, and mobility.
5. Demographic characteristics. Age and gender play a role in influencing acceptance and adoption by the user.
6. Technical experience. One of the most important factors influencing a user's willingness to accept wearable devices is their level of technological experience.

Buenaflor and Kim's (2013) proposal combines elements of two well-known theoretical models: Venkatesh et al.'s (2012) Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and Rogers's (2003) Diffusion of Innovation theory.

To get into the details, extant literature study on determinants of innovation adoption is categorized in two research streams:

1. Determinants of innovation adoption at the individual level.

Much of the literature currently in publication focuses on the individual adoption process, which is impacted by the psychological traits, personal qualities, and perceptions of the user (Rogers and Shoemaker, 1971). The idea that entrepreneurs are innovators, as proposed by Schumpeter in 1934, is the source of this line of inquiry. Within the entrepreneurial literature, there is a psychological perspective that links an individual's inclination to innovate with their personality traits and cognitive capabilities (Croitoru & Alin, 2008).

Adoption of innovations is influenced by an individual's propensity for innovation. Innovativeness is the individual's willingness to try out any new information technology (Agarwal and Prasad, 1988). Research on innovativeness has provided insights into various aspects of adoption within networks. For example, Goldenberg et al., 2009 highlighted the role of innovative hubs in facilitating adoption within networks. Additionally, Wells et al., 2010 explored how individual perceptions of novelty influence the likelihood of technology acceptance, considering it as a significant affective belief. Furthermore, scholars have distinguished between general innovativeness, which relates to individual creativity, and specific innovativeness, which has to do with having the capacity to innovate first in a specific context. (Marcati et al., 2008). While the Goldsmith unidimensional scale (Goldsmith et al., 1995) is frequently used to measure domain-specific innovativeness and innovation speed, scales based on the Kirton Adaptation-Innovation inventory (Kirton, 1976) are frequently used to evaluate general innovativeness.

Furthermore, a number of theories that address people's behavioral intentions to adopt new innovations have been put forth by researchers. Both Ajzen's (1991) Theory of Planned Behavior and Rogers' (1995) seminal Innovation Diffusion Theory—which is based on the earlier Theory of Reasoned Action (Ajzen and Fishbein, 1980)—are major influences on these theoretical models. According to the Theory of Planned Behavior, attitudes toward the perceived behavioral control, behavior, and subjective norms all impact an individual's intention to adopt, which is thought to be the most reliable indicator of behavior (Ajzen, 1991).

By adding more explanatory variables, a number of contributions have built upon these fundamental theories to expand the original Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh and Davis, 1996). The TAM2 (Venkatesh and Davis, 2000) and TAM3 (Venkatesh and Bala, 2008) models are two instances of these extensions. Perceived usefulness and ease of use are assessed by these models in order to forecast behavior. Variables like individual differences, system features, social influence, and enabling conditions are also taken into account in these models' extensions (e.g., Karahanna et al., 2006; Venkatesh, Davis, 2000). Interestingly, Wu and Lederer (2009) particularly examine how environment-based voluntariness influences users' intention to adopt in a moderating way.

Moreover, a number of contributions make reference to the Perceived Characteristics of Innovating approach (1991) developed by Moore and Benbasat. This approach evaluates the possibility of adoption using three constructs: relative advantage, compatibility, and trialability. Plouffe et al. (2001) conducted a comparison between sets of antecedent constructs derived from the TAM and the Perceived Characteristics of Innovating approach. Their findings indicate that the latter approach offers managers a more comprehensive understanding of the determinants of adoption and explains a significantly greater variance in innovation adoption.

2. Determinants of the innovation adoption at the organizational level.

Although adoption at the organizational level is not wholly new, it is comparatively uncommon when compared to the literature on TAM at the individual level (Amoako-Gyampah and Salam, 2004; Yu and Tao, 2009; Zain et al., 2005). Research has looked at adopting decisions or intentions based on the innovation's inherent value. Researchers look at time-to-market (Subramaniam and Youndt, 2005), switching costs (Forman and Chen, 2006), total cost (Autry et al., 2010), and technological opportunism (Srinivasan et al., 2002) among other intrinsic value dimensions.

Kaufmann and Mohtadi (2004) suggest that, when considering the pros and cons of a new technology, organizations are more likely to embrace it if it lowers costs and eliminates uncertainty. Numerous studies take a path-dependent stance, emphasizing that a firm's cognitive capacity affects how it perceives the inherent value of the innovation (Taylor, 2010). Previous studies have highlighted the role that knowledge plays in influencing how an innovation is perceived for its inherent value and how it is subsequently adopted. Adoption is examined by Weigelt and Sarkar (2009) in relation to organizational learning and the awareness of technical difficulties.

A few studies examined the role that imitation plays in adoption choices. The Contagion Theory (Mansfield, 1961), which postulates that the probability of adoption rises with the degree of diffusion, forms the basis for most stochastic representations of adoption. According to research on adaptive emulative emulation, isomorphic behaviors and vicarious learning lead to innovation. Managers in this setting acquire information over time and modify their adoption choices in response (Yoris and Kauffman, 2001).

2.1.3.1 Perceived Aesthetic

The use of wearable technology such as smart clothing, smart glasses, and smartwatches—which are frequently regarded as fashion accessories—has been extensively examined in relation to perceived aesthetics (Kalantari, 20017). According to Chuah et al. (2016), the design, color, shape, and texture of such technological devices are regarded as significant characteristics and can be perceived as a type of visual communication. The distinctive design of a smartwatch, for example, can inspire a positive attitude among consumers and allow them to express their personal taste and style (Kranthi and Ahmed, 2018).

Customers may express their individual tastes and styles and feel good about smartwatches because of their distinctive designs. Incorporating perceived aesthetic into models has also been done in recent empirical studies. The notion of perceived aesthetic was introduced by Yang et al. (2016) and defined as visual attractiveness in their model. Jeong et al., (2016) utilized this concept to assess smartwatch acceptance and adoption, while Hsiao and Chen (2018) examined the impact of perceived aesthetic on the intention to adopt smartwatches. Furthermore, Dehghani, Kim and Dangelico (2018) explored the role of aesthetic appeal in factors influencing the continued use of smart wearable technology. Both latter studies found that aesthetic appeal significantly influenced the initial use and ongoing usage of these devices.

2.1.3.2 Perceived Privacy Risk

When assessing wearable technology, Mills et al. (2016) emphasized the importance of security and data privacy considerations. Through their applications, smartwatches provide a number of features, such as fitness tracking and health tracking. Some applications enable smartwatches to securely transmit health information to healthcare providers for monitoring, however, this also prompts worries about the possibility of unauthorised access or data breaches. To address this concern, the concept of perceived privacy was incorporated into the Diffusion of Innovation (DOI) model, allowing for an examination of consumers' decision-making processes regarding the adoption of health-related wearables and their concerns regarding data privacy.

Several studies have examined the role of perceived privacy risk in the adoption of innovative technologies. For example, Gao et al. (2015) incorporated perceived privacy into the Diffusion of Innovation model to investigate consumers' adoption decisions and concerns regarding data privacy in relation to health-related wearables. Nasir and Yurder

(2015) emphasized the significance of privacy risk as a component in assessing wearable technologies. Shin (2010) investigated how consumers' reliance on data relates to perceived privacy risk, trust, and security. Privacy concerns have the potential to erode consumers' trust and impact their intention to adopt, as shown by Gu et al. (2016). Shin (2010) investigated how consumers' reliance on data relates to perceived privacy risk, trust, and security. Privacy concerns have the potential to erode consumers' trust and impact their intention to adopt, as shown by Gu et al. (2016).

2.1.3.3 Perceived Cost

There are many hindrances in diffusion of technological innovations, among these economic concerns are almost always considered as a bigger hinderance. This refers to the tendency of a user to compare the potential benefits against cost of the technology innovation. With respect to the context of smart wearables, perceived cost is defined as ‘‘the burden on the consumed costs in purchasing, using, and maintaining smart wearable devices’’ (Park et al., 2017; Park and Ohm, 2014). Numerous researchers have confirmed and validated the relationships between perceived cost and the intention to continue using the devices. According to Chee et al. (2018), consumers' perceptions of the fees associated with buying particular goods and services from mobile marketing companies have a negative impact on their intentions.

2.2 Continuance and Discontinuance

2.2.1 Continuance Factors in Wearables

Engaging in physical activity provides a wide range of physiological and psychological advantages, including the maintenance of cardiovascular fitness, the reduction of hypertension, the enhancement of self-esteem, and the alleviation of symptoms associated with depression (WHO, 2020). Over 25% of adults worldwide are still not physically active, despite the well-established benefits of regular physical activity (Guthold et al., 2018). Interestingly, the widespread presence of physical inactivity has gradually increased over the past ten years and is more than twice as high in wealthier countries and poorer ones (Guthold et al., 2018). In response to this issue, behavioral change technologies have emerged and been utilized to promote and increase physical activity levels in recent years.

Previous researchers have predominantly employed various technology usage models to examine users' intention to continue using a technology. These models include the

Expectation-Confirmation Model (ECM) (Cho, 2020), the Technology Acceptance Model (TAM) (Beldad and Hegner, 2018; Chen and Lin, 2018), and the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) (Yuan et al., 2015). Nonetheless, there hasn't been much focus on examining users' intentions to stick with a technology from a relationship commitment standpoint.

There has been a lot of effort in understanding the consumers' post-purchase behavioral process (Churchill Jr. and Surprenanat, 1982). ''Expectancy-confirmation paradigm'' is popularly used among many research frameworks to explain satisfaction of the consumers and their re-purchase decisions (Anderson and Sullivan, 1993). Majority of the previous studies using this paradigm argue that the decisions for satisfaction of the consumer is dependent on two constructs: initial expectations (pre-purchase expectations) of a product or service, and variance between expectation and performance of a product or service. First, buyers develop an expectation towards the product or a service. Second, post-purchase experience builds perception about the product or service performance. It is positive when the gap between the expectation during pre-purchase and the experience of post-purchase is as minimal as possible. This yields buyer's level of satisfaction determining re-purchase decisions (Hong et al., 2006).

Based on this, Bhattacherjee (2001) developed and tested empirically an Expectation-Confirmation model (ECM) of continued IT usage (ECM-IT). This model, ECM-IT is rooted in the ''expectancy-confirmation paradigm''. Figure 5 below shows the model ECM-IT model developed by Bhattacherjee (2001).

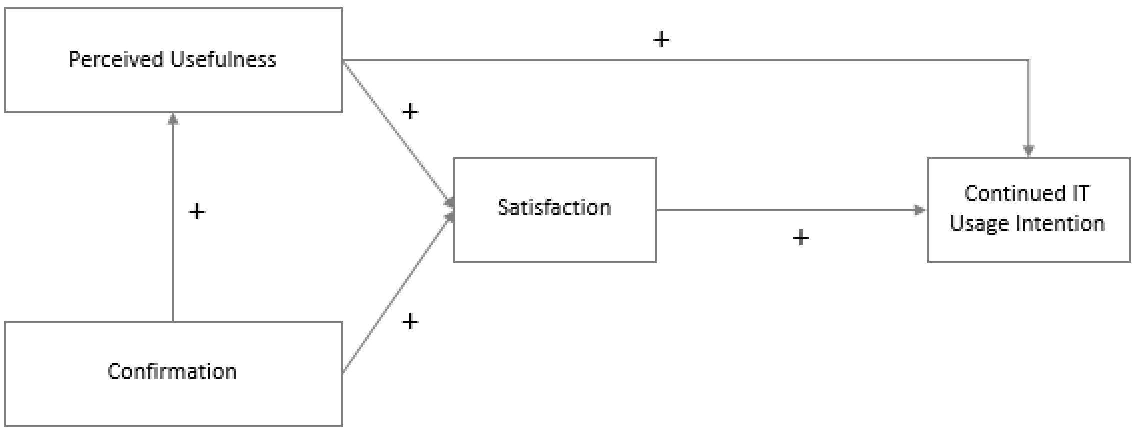

***Figure 5**. Expectation-Confirmation Model of continued IT usage (ECM-IT)*

Because the ECM-IT model assumed that the confirmation construct already captured perceived performance, it failed to take perceived performance into account (Hong et al., 2006). Second, the expectation post-adoption is typically represented in this model as perceived usefulness due to the belief in IS adoption that the perceived usefulness is the most consistent factor in determining the user’s intention over a period of time. Ultimately, the central tenet of the ECM-IT model theory is that IT users' decisions about satisfaction are primarily influenced by their post-adoption expectations (Hong et al., 2006).

To solve this problem, Chiu et al., 2020 created the Investment model (IM). Although it hasn't been used to study the user-app relationship, instant messaging (IM) was first developed to understand the interpersonal relationship in the context of technology (Giovanis, 2016; Giovanis and Athanasopoulou, 2018; Uysal, 2016; Odrowska and Massar, 2014; Lin et al., 2016). According to Jin et al. (2010), the Expectation Confirmation Model (ECM) was created to comprehend users' perceptions of IT products and services. In order to address the commitment and utilitarian perspectives of people using health and fitness apps, Chiu et al. (2020) integrated ECM. In summary, this study uses the Expectation-Confirmation Model (ECM) to propose that people's confirmation of expectations affects how satisfied they are and how useful they perceive fitness and health apps to be, which further influences their intention to keep using them. Customer loyalty even in the face of dissatisfaction is encouraged by their commitment to a product or service, which has been identified as a factor critical in determining their intention to continue using it (Gustafsson et al., 2005; Evanschitzky et al., 2006). Previous research (Zhou et al., 2015; Shaikh et al., 2015; Zhou et al., 2012; Ng and Kwahk, 2010) has examined the ongoing use of IT products or services through the lens of relationship commitment, highlighting the fact that people's intentions are influenced by both their psychological commitment to the product or service and their perceptions of its usefulness and ease of use (Shaikh et al., 2015).

Bölen (2020) also created an ECM-based research model. In contrast to Bhattacherjee's ECM study, perceived usefulness did not, however, directly and significantly affect the intention to continue; rather, the results from Bölen corroborate those of earlier studies by Ayanso et al., (1998) and Hsiao et al., (2016). Through satisfaction, users' perceptions of smartwatches' usefulness and their impact on their intention to stick with them are indirectly felt. One possible explanation for this phenomenon could be the restricted functionality that smartwatches provide. Although smartwatches might be helpful, users do not primarily depend on them to increase productivity or find solutions to particular issues in their lives. It's possible that users won't find much use for running multiple applications on their smartwatches because they see them as extra accessories or as just replicating the features already found on smartphones.

Additionally, this study showed a favorable correlation between a person's mobility and their intention to keep wearing a smartwatch. Given the importance of individual mobility in influencing continuance intention, it stands to reason that people who are more mobile will be more likely to stick with wearing a smartwatch than people who are less mobile.

The study also discovered that perceived usefulness is significantly impacted by individual mobility. The results align with findings of Liébana-Cabanillas et al., (2018) study which argued that important precursor of perceived usefulness is individual mobility. In comparison to the mobile devices, smartwatches are hands-free interaction simplifying various computing tasks such as checking notifications, sending messages or emails, etc. As a result, people with high mobility who frequently travel or attend meetings will find smartwatches to be more beneficial.

In the context of wearable technology, Dehghani et al., (2018) study resulted that a key predictor for continuance intention of smart wearables is perceived aesthetics. Additionally, the anticipated positive effect of perceived aesthetics on user satisfaction were consistently supported and confirmed with the study findings of Coursaris and van Osch (2016) that suggests that in the IS context one of the significant predictors of user satisfaction is aesthetics. These results imply that many users view smartwatches as fashion accessories rather than just practical tools. This is probably due to the fact that fashion-related considerations like visibility, aesthetics, or result demonstrability are more important to users of smart watches than practical ones.

Additionally, it was discovered that habit had the biggest influence on users' intentions to keep using smartwatches out of all the factors. According to Nascimento et al. (2018), habit is the only factor that significantly predicts intention to continue. This indicates that regular wearers of smartwatches choose to keep using them. Nearly 45% of routine behaviors tend to be repeated at the same physical location every day, according to earlier research. Observing one's wrist, for instance, is a habitual behavior. It is possible to form new usage habits for smartwatches. Everyday behavior includes unconscious acts like checking the emails or notifications on one's wrist without picking up the phone. As a result, habit is one of the key elements that favorably influences the intention to continue using smartwatches.

Ahmad et al., (2020) postulated the following factors: perceived irreplaceability (PIR), perceived credibility (PCR), compatibility (COM), and social influence (SI) to have an impact on the elderly diabetic patients' intentions to continue using digital health wearables. Perceived irreplaceability (PIR) was defined ‘‘as a symbolic meaning of a product to a user that they perceive cannot be found in other identical products’’ (Schifferstein and Zwartkruis-Pelgrim, 2008). Users' continuance intention is increased when they perceive that the product they consider is irreplaceable. Attributes and unique functionalities positively influence continuance intention of these elderly patients. The user's extent in choosing to employ a specific technology is based on two factors—data accuracy and security—and this is known as perceived credibility (PCR). The relation between perceived credibility and intention to continue by the user have been established positive in previous studies (Luarn et al., 2005). Elderly diabetic patients under this study using health wearables found it very important that their health data was accurate for their continuance intention to use.

Nahm (2008) defined compatibility (COM) as the extent to which a new technology works with existing technologies without altering any of its functionalities to a large extent. Higher the compatibility degree of any new technology with the existing technology, higher is the continuance intention of the users to use them. For these elderly patients, if the ability of the health wearables to transfer data to remote mobile devices is high, it influences positively their well-being thus impacting the continuance intention in a positive way. Social influence (SI) refers to the extent to which an individual's choice to use a specific technology is influenced by the opinions and actions of their family members, friends, and co-workers (Wei et al., 2009).

2.2.2 Discontinuance Factors

Discontinuance factors refer to the reasons or factors that lead individuals to discontinue or stop using a particular product, service, or technology. These factors can vary depending on the context but commonly include:

1. Perceived Lack of Value: Users may discontinue using a product if they perceive that it no longer provides sufficient value or benefits to justify continued usage.
2. Complexity: If a product or technology is perceived as overly complex or difficult to use, individuals may choose to discontinue its usage.
3. Compatibility Issues: Incompatibility with other devices or systems can be a significant discontinuance factor. If a product is not compatible with the user's existing devices or software, they may decide to discontinue its use.
4. Technological Obsolescence: As technology evolves rapidly, users may discontinue using a product if they perceive it as outdated or if more advanced alternatives are available.

5. Lack of Support or Updates: Insufficient customer support, lack of timely updates, and poor maintenance can contribute to discontinuance. Users may feel frustrated or unsupported, leading to a decision to stop using the product.
6. Cost: High costs associated with using or maintaining a product can be a barrier to continued usage, leading individuals to discontinue its use.
7. Negative User Experience: If users have consistently poor experiences with a product, such as frequent glitches, errors, or performance issues, they may opt to discontinue its usage.

A study by Lazar et al. (2015) described how participants used and gave up using a variety of smart devices. At the beginning of the study, tech company convenience sample participants were offered up to $1,000 to buy smart devices that would help them get closer to a goal they were passionate about. Certain devices were bought by many participants as a result of some participants telling other participants about the devices they had bought. Participants shared their interests and objectives, which ranged from getting fitter to getting less pain to getting better at ping-pong.

Though many people had health and fitness-related goals, it frequently seemed that the gadgets they bought did not match their objectives. Despite wanting to get rid of his shoulder and neck pain, one participant bought a wearable pedometer called Misfit Shine. This implied that users might not have known how to use devices to achieve their goals or might not have known how to use devices to suit their needs. Another possibility is that some of these goals cannot be met by existing devices.

Many participants, almost 80% abandoned the purchased devices within the first two months. The reasons were primarily in three categories:

1. Didn't correspond to her self-perception. Participants often mentioned groups of people other than themselves for whom gadgets might be more beneficial. Typically cited were those with extreme fitness needs, such as athletes and those trying to lose a significant amount of weight. “I don’t really need to know this information every day,” one participant noted. Maybe I would be a die-hard health nut, but I'm not. Participants showed less interest in using sensors because they believed they were more suitable for older people and other people than for them.
2. The information collected was useless. Many participants felt the data was useless because they were not interested in the amount of information provided. Although many participants purchased a pedometer, a large proportion eventually lost interest in the step data. Many found that walking was not considered exercise or had no effect on mood, as noted by the sensor wearer.

3. Additionally, one participant who exercised 18 hours per week said, "How can a Fitbit measure how fit I'm getting?" They don't know that. It doesn't matter if I do a hundred sit-ups...a trainer tells you what you should eat, how much sleep you should get, and what amounts of protein you should eat versus vegetables, or things like that." Interestingly, it was found that the more athletic participants did not find their devices useful, even though the other participants felt that the more athletic types were the ones who benefited the most from them.
4. Excessive work and maintenance. Many participants found the additional work and maintenance to be a significant problem, particularly considering the minimal benefit they were receiving. One of the participants was controlling his phone without taking it out of his pocket by using the Samsung Gera Fit smartwatch. "I have to one-charge it, two-wear it on my wrist, and third-always make sure it is paired with Bluetooth just to have that one benefit," he said. Another participant thought there wasn't enough intrigue with the devices.

The need for frequent maintenance was one of the main deterrents for participants to use. For many people, having to charge their devices was really inconvenient. To cut down on the need to charge gadgets, some participants disabled the "smart" features. One participant who was using the smartwatch for heart rate monitoring eventually just used the device like a timepiece rather than monitoring the heart rate.

Many people's routines did not fit with smart devices. A few people neglected to set them up in sleep tracking mode. Some were compelled to carry their tablets because of phone compatibility issues. They added that it required some time to establish a routine of use, even just remembering to turn on a device, “Even a watch, it’s taught, it’s trained. I have been wearing a watch since I was six. It’s a learned behavior. I’m comfortable wearing a watch. If I don’t wear a watch, I feel naked. I feel something’s missing. But, with a wear-able, I just don’t have that patience to train myself to wear it. I think the biggest thing is the benefit. I just don’t see that much benefit.” The participant admitted that he could teach himself to remember to wear the device, but it was not worth the effort considering the minimal advantages.

2.3 Preventive Innovation

Preventive Innovation are ‘‘new ideas requiring action at one stage in order to avoid the unwanted consequences in the future time’’ (Rogers, 2003). The benefits of introducing preventive innovation often only appear late. They are relatively intangible, and the undesirable consequences are likely not to occur. Rogers mentions that the benefits of preventive innovations are relatively small compared to non-preventive innovations. However, an important factor in the speed of innovation adoption is perceived relative advantage. The rate of innovation can be raised by taking any action that raises the perceived relative advantage of preventive innovation. (Rogers, 2003).

Many previous Change the perceived characteristics of preventive innovations (Lock and Kaner, 2000) studies have developed strategies to spread the use of preventive innovations:

1. Change the perceived attributes of preventive innovation (Lock and Kaner, 2000).
2. Use champions to drive preventive innovation. Anyone who uses their personal influence to drive innovation adoption is a champion. Goodman and Steckler (1989) found that in an organization middle-level level officials were often the champions of health ideas.
3. Change the system's norms around preventive innovation through support of the peers. Changing prevention norms is generally a gradual process that can be carried out. Kaner et al., 1999, Keller & Galanter, 1999.
4. Use entertainment education to promote preventive innovation. The process of incorporating preventative messages and other educational concepts into entertaining messages is called entertainment education (Singhal & Rogers, 1999).
5. Activate peer networks to spread preventive innovations. Diffusion is a social process in which the public or people talk about a new idea, assign meaning to it, and then adopt it. Anything that could be done to encourage communication about preventative ideas among peers, e.g., training addiction counselors to promote acceptance using new addiction treatment techniques (Martin et al., 1998).

There are many models that have been theorized through the lens of innovators to understand the acceptance of technology by end users' such as technology acceptance model (TAM), theory of planned behavior (TPB), the unified theory of use and acceptance (UTAUT), and so on. However, there exists a need to understand the users' health technology acceptance behavior to shed a light on their decision-making process and how it differs when their intention to adoption of a technology for healthcare is different from adoption intention of a general technology (Yong-qiang et al., 2013). Healthcare innovations can be studied as preventive innovations.

Preventive Innovation are ‘‘new ideas requiring action at one stage in order to avoid the unwanted consequences in the future time’’ (Rogers, 2003). Using preventive innovation often has delayed benefits. They might not materialize, and the unintended effects are comparatively ethereal. According to Rogers, preventive innovations have comparatively less advantages than non-preventive ones. Nonetheless, a significant determinant of the innovation adoption rate is perceived as a relative advantage. The adoption of innovations rate can be accelerated by taking any action that enhances the perceived relative benefit of preventive innovations (Rogers, 2003).

Acceptance of health technology and the use of various health services to enhance, preserve, or promote health should be viewed as healthy behaviors (Laugesen et al. 2011; Scammon and associates. in 2011). "Any activity undertaken by an individual, regardless of actual or perceived health status, for the purpose of promoting, protecting, or maintaining health, whether or not such behavior is objectively effective towards the end" is the definition of health behavior given by Nutbeam (1998). Acceptance of health technology as a behavior can be explained by a number of health behavior theories. Of the health behavior theories, protection motivation theory (PMT) is the one that is most frequently applied to explain this phenomenon. Acceptance of health technology is viewed in this light as a coping mechanism for possible health risks.

The health belief model (HBM), protection motivation theory (PMT), subjective expected utility theory (SEU), and theory of resonated action (TRA) are the four primary theories that are used to explain health behavior (Weinstein, 1993). According to the health belief model (HBM), a person's assessment of the perceived risk of doing nothing and the overall benefits of acting on their health determines whether or not they decide to take a health-related action. Evaluation of perceived threat examines two factors: perceived susceptibility referring to an individual’s perception of them experiencing a certain health condition, and perceived severity, which refers to their assessment of how serious their health condition is and the potential consequences of the same. Net benefits are calculated on considering perceived benefits, representing an individual’s belief in the effectiveness of a recommended action to mitigate the threat, and perceived barriers, which considers their views on the tangible and psychological costs associated with taking the recommended action.

In order to explain health behavior, protection motivation theory (PMT) suggests a number of elements that are comparable to HBM. In order to represent perceived susceptibility, perceived benefits, perceived severity, and perceived barriers in HBM, PMT uses perceived vulnerability, perceived efficacy, response severity, and response costs. A new component added to PMT, self-efficacy measures how likely a person is to follow instructions and complete the suggested task (Bandura, 1997). Based on the choices made by the individual, PMT further organizes these factors into two distinct categories: coping appraisals, which include self-efficacy, response efficacy, and response costs, and threat appraisals, which include perceived vulnerability and severity. According to Prentice-Dunn et al. (1986), PMT is generally thought to be a more effective theory than HBM at explaining health behavior.

Subjective expected utility theory (SEU), and theory of resonated action (TRA) are general theories on health behavior. SEU is a ‘‘approach to decision under risk allowing for evaluation of both the variables under consideration and the probabilities associated with them’’ (Shantau J and Pingenot A, 2009) Similarly, TRA mentions that the individual’s behavior is shaped by two factors: attitude that encompasses the collective anticipated outcomes of the behavior, and the subjective norm related to an individual’s perception of whether important individuals in their lives believe that the behavior should be carried out (Fishbean et al., 1975). SEU and TRA are not limited to health behaviors since they are general theories used to explain other technology acceptance behaviors.

A hypothesis on perceived health improvement (PHI) and its impact on behavioral intention to use smart wellness wearables was proposed by Naghmeh et al. set up. in their 2020 study. The PHI hypothesis was found to have a positive impact on the behavioral intention to adopt and continue to use smart wearables, although the research focused on the important factors and barriers affecting the intention to use smart wearables, influence, as well as an appropriate research model that supports this intention.

Lamb et al., (1990) found that individual overall self-rating of their health to be positive, it depended on their performance in sports and other physical activities. Smart wearables enable the users to collect and monitor data related to physical activities and their wellness (Barcena et al., 2014). If a user finds a specific behavior to be beneficial in enhancing their current health status or general health, it is expected that the individuals would use smart wearables (Ernst et al., 2016).

Theory of resonated action (TRA) theorizes that an individual’s decision to adopt a specific behavior is depended on the consequence of such behavior (Ajzen and Fishbein, 1975). Health belief model (HBM) proposes that an individual is highly likely to get involved in a particular behavior if they believe that behavior fruits positive improvements in their current health conditions or status (Janz et al., 1984). From these, it can be concluded that that the positive presumptions about the smart wellness wearables and its influence on positive health improvements can aid in continuous usage of such devices (Ernst et al., 2016).

Future research should further examine users' perceptions of smart fitness or wellness wearables in relation to overall health status (Lunney et al., 2016). Fitness wearable use and perceived health benefits have been found to be positively and directly correlated. Ernst et al. (2016) also found a direct relationship between the behavioral intention to use fitness or smart wearables positively and the perceived health benefits. However, there is not much scientific work to support this claim.

3. METHODOLOGY

This chapter presents the essential elements regarding this research design, data gathering methods, and the literature review for this study.

3.1 Research Design

The primary objective of this study is to investigate the behavioral goals that propel users' ongoing adoption of smart wearables, with an emphasis on comprehending the perceived advantages linked to averting future health issues. The following is the formulation of the driving research question:

‘‘What preventive health variables are involved in the ongoing use of smart wearables by Finnish university students?’’

This study uses a single research design and a quantitative methodology to thoroughly examine the different aspects impacting the ongoing adoption of wearable smart technology. Because it can transform a variety of data sources into numerical form and support thorough statistical analysis, the quantitative method is preferred.

3.2 Data Collection and Analysis

The selected study approach entails surveying a target population-Finnish university students, in order to gather quantitative data. By using surveys, which offer an organized approach to data collection, researchers can investigate the factors that influence continuous adoption behavior and understand the degree of strength to which these factors are correlated with smart wearable devices.

The purpose of the survey instrument is to gather important information about health problem prevention and how it affects the ongoing use of smart wearables. It contains questions that have been specifically designed to gauge user behaviors, perceived benefits, and the adoption environment as a whole.

In order to ensure robustness in the results and the statistical power needed for PLS-SEM analysis, a sample size of 100 individuals is considered sufficient.

Partial Least Squares Structural Equation Modeling (PLS-SEM), the main analytical technique, will be used to conduct a thorough statistical analysis of the survey's quantitative data. This approach makes it possible to investigate the relationships between variables in great detail.

Ensuring participant anonymity, voluntary involvement, and appropriate data treatment, this research complies with ethical standards.

3.2.1 Literature Review

A focused approach was employed to start the literature discovery, starting with the identification of certain papers that matched the research keywords. The goal was to compile a thorough grasp of the current conversation about smart wearable adoption, particularly in the context of preventive healthcare.

The literature review was made using high-quality, peer-reviewed articles from trusted sources of journals. The sources were located by first looking up specific articles using search terms like ‘smart wearables’, ‘continuous adoption behavior’, ‘innovation adoption’, ‘innovation adoption theories’, ‘health devices’, ‘health wearables’, ‘fitness wearables’, ‘preventive health care’, ‘smart wearables’, and ‘preventive adoption’. The sources material obtained were then examined to form the core of the theoretical background. Only materials that have undergone peer review and appeared in respectable publications were taken into account. This approach guaranteed that the literature included in the review was of high standard.

The assessment of the literature also highlighted areas that still need investigation and gaps in the field. Finding these gaps helps to distinguish the current research's distinctive position in the larger academic conversation around smart wearables and preventative healthcare.

3.2.2 Empirical Study

In order to explore the complex dynamics of smart wearable adoption, particularly in the context of preventive healthcare, the empirical study used a strong methodology. A quantitative research design was chosen to facilitate a systematic analysis of data that could be quantified and subjected to statistical methods.

The empirical study offers a strong theoretical framework by adhering to the fundamental ideas of the Diffusion of Innovation Theory. The eleven sections of the survey are arranged in a systematic manner and cover the following critical constructs in that order: continuance behavior, perceived usefulness, continuance intention, disconfirmation, satisfaction, subjective norm, habit, medical disease severity, and medical disease probability. Data on gender, age, education level, income, and student status were also gathered in order to depict the demographic landscape. Different analyses were then carried out to determine the influence of each of these factors on the intention to continue.

To standardize replies, a 5-point Likert scale is used, with 1 denoting Strongly Disagree and 5 strongly Agree. By using this method, research validity and reliability are improved and accurate quantitative comparisons between survey items are made possible.

Respondents, primarily Finnish university students, were administered the survey, yielding a substantial number of responses sufficient for comprehensive study and conclusive findings. Given the sample size of 100, the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was chosen due to its aptitude for complex structural models and its compatibility with smaller sample sizes. According to academics like Hair et al. (2019), PLS-SEM performs especially well for testing intricate theoretical models and attempting to provide a nuanced knowledge of growing complexities.

Before delving into PLS-SEM, rigorous evaluation of both outer and inner models is undertaken. Circular relationships within the structural model are strictly avoided, aligning with the guidelines set forth by Hair et al. (2014). Figure 6 provides a visual representation of the study's model, detailing the routes of both inner and outer models.

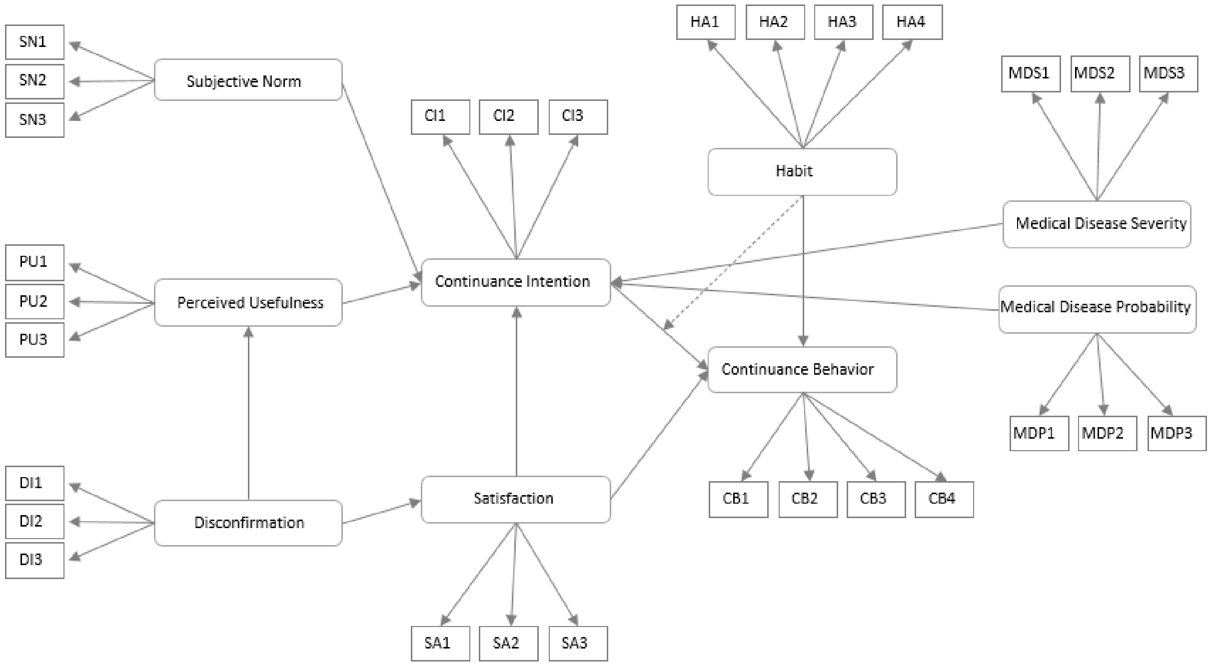

Figure 6. *PLS-SEM model for the current study.*

The empirical study laid the groundwork for future research into user motivations and behaviors by shedding light on important facets of smart wearable adoption in the context of preventive healthcare.

4. RESULTS

The results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) study, conducted SmartPLS4, provide important new and valuable insights about the variables affecting Finnish university students' ongoing adoption of smart wearables. A thorough survey spanning a wide range of variables was used in the study. These constructs included continuance behavior, perceived usefulness, continuance intention, disconfirmation, satisfaction, subjective norm, habit, medical disease severity, and medical disease probability.

4.1 Demographic Characteristics

The participants' demographic profile is essential to comprehending the study's contextual subtleties. The survey gathered a wide variety of demographic data, providing insight into the traits of the participants.

The gender of each participant was asked to be indicated. Male, female, non-binary, or prefer not to say were the available possibilities. Respondents were categorized into age groups. Please select the appropriate age range: 18-25, 26-35, 36-45, 46-55, 56-65, and over 65.

The participants were categorized according to their enrolment status. If you are a full-time, part-time, student with a job, taking a leave of absence from studies, and other. The respondents' educational backgrounds were noted. Please select an option from the following: primary education, vocational education, student/high school, college, university, and postgraduate education.

It was requested of the participants to estimate their yearly income. Kindly choose the income band based on your current financial situation: I don’t want/can’t say, under €9,999, €10,000 - €19,999, €20,000 - €39,999, €40,000 - €69,999, €70,000 - €99,999, €100,000 - €150,000, and more than €150,000.

4.2 Hypothesis Testing

In the current study on continuance intention of smart wearables with focus on perceived benefit of preventing future health conditions, following hypotheses for the constructs were developed:

1. Perceived Usefulness (PU) and Continuance Intention (CI)
   - H0: There is no significant relationship between Perceived Usefulness and Continuance Intention.
   - H1: Perceived Usefulness positively influences Continuance Intention
2. Medical Disease Severity (MDS) and Continuance Intention (CI)
   - H0: There is no significant relationship between Medical Disease Severity and Continuance Intention.
   - H1: Medical Disease Severity positively influences Continuance Intention.
3. Medical Disease Probability (MDP) and Continuance Intention (CI)
   - H0: There is no significant relationship between Medical Disease Probability and Continuance Intention.
   - H1: Medical Disease Probability positively influences Continuance Intention.
4. Satisfaction (SA) and Continuance Intention (CI)
   - H0: There is no significant relationship between Satisfaction and Continuance Intention.
   - H1: Satisfaction positively influences Continuance Intention.
5. Subjective Norm (SN) and Continuance Intention (CI)
   - H0: There is no significant relationship between Subjective Norm and Continuance Intention.
   - H1: Subjective Norm positively influences Continuance Intention.
6. Habit (HA) x Continuance Intention (CI) and Continuance Behavior (CB)
   - H0: There is no significant relationship between Habit x Continuance Intention and Continuance Behavior.
   - H1: Habit x Continuance Intention positively influences Continuance Behavior.

7. Satisfaction (SA) and Continuance Behavior (CB)
    - H0: There is no significant relationship between Satisfaction and Continuance Behavior.
    - H1: Satisfaction positively influences Continuance Behavior.
8. Continuance Intention (CI) and Continuance Behavior (CB)
    - H0: There is no significant relationship between Continuance Intention and Continuance Behavior.
    - H1: Continuance Intention positively influences Continuance Behavior.
9. Disconfirmation (DI) and Perceived Usefulness (PU)
    - H0: There is no significant relationship between Disconfirmation and Perceived Usefulness.
    - H1: Disconfirmation positively influences Perceived Usefulness.
10. Disconfirmation (DI) and Satisfaction (SA)
    - H0: There is no significant relationship between Disconfirmation and Satisfaction.
    - H1: Disconfirmation positively influences Satisfaction.
11. Habit (HA) and Continuance Behavior (CB)
    - H0: There is no significant relationship between Habit and Continuance Behavior.
    - H1: Habit positively influences Continuance Behavior.

Here, H0 is null hypothesis and H1 is alternative hypothesis.

4.3 PLS-SEM Model

Partial Least Squares Structural Equation Modeling (PLS-SEM) serves as an effective statistical technique for modeling intricate relationships between observed variables and latent constructs. This method is favored in many domains, including business, social sciences, and health research, because it works especially well for studies with small sample sizes and intricate, multidimensional models. PLS-SEM takes a component-based approach, focusing more on dependent variable prediction than covariance pattern explanation, in contrast to conventional covariance-based SEM.

Key characteristics of PLS-SEM are: predictive focus, flexibility, and its two-step approach. When it comes to predictive modeling, PLS-SEM works well. It places a strong emphasis on relationship estimation and works especially well when the main objective is to predict the dependent variables. Because of its great flexibility, PLS-SEM can be used with models that have intricate structures, irregular data distributions, and smaller sample sizes. It is appropriate for theory development and exploratory research because of its flexibility. The measurement model assessment and the structural model evaluation are the two main steps in a PLS-SEM analysis. While the structural model evaluates the connections between latent constructs, the measurement model looks at the validity and reliability of reflective and formative constructs.

In this research, by calculating the outer loadings for the items, the relationship between latent constructs and their indicators was first investigated in order to confirm the validity and reliability of the measurement model. The constancy of the relationship between the indicators and the related construct is measured by the item reliability, also known as indicator reliability. The internal consistency of items assessing the same latent construct is reflected in inter-item reliability, also referred to as composite reliability (CR). Cronbach's alpha is not as preferred by PLS-SEM as CR, with a CR value greater than 0.7 being regarded as a credible indicator of construct measurement. All item reliabilities in this investigation were higher than the 0.708 ensuring solid findings.

The structural model was then subjected to an internal consistency study using Cronbach's alpha, composite reliability ρc, and composite reliability ρa calculations. While item reliability examines the dependability of specific things, internal consistency evaluates the reliability of structures. According to Hair et al. (2019), in order to avoid redundancy and preserve construct validity, values should be limited to 0.70 to 0.90. Values beyond 0.95 should be avoided. Bootstrapping was used, as advised when values noticeably exceed 0.70, and this investigation revealed no problems.

The average variance extracted (AVE) was used to evaluate convergent validity, which measures how well a construct explains the variance of its elements. The model met Hair et al. (2019)'s set criterion of 0.50, indicating effective satisfaction of the criteria.

Lastly, the heterotrait-monotrait (HTMT) ratio was used to assess discriminant validity, which emphasizes the empirical difference across constructs. Henseler et al. (2015) recommended a threshold value of 0.90 for structural models, which was followed to guarantee a distinct separation of components in the study.

4.3.1 Measurement Model (Outer Model)

In Partial Least Squares Structural Modelling (PLS-SEM), measurement model forms the basis to evaluate the validity and reliability of the latent constructs. The type of underlying constructs in this research are reflective in nature. For reflective constructs, there are two aspects of the measurement model that must be evaluated: convergent validity, and the discriminant validity.

Convergent validity is examined assessing the reliability and validity of each latent constructs by examining the indicator loadings. In order to show that the observed variables accurately measure their respective constructs, these loadings should ideally be significant. The reliability of internal consistency is then assessed, which is commonly gauged using Cronbach's α and composite reliability (CR). When a construct's items are consistent and work well together to measure it, the construct is said to have a high level of internal consistency reliability. The Average Variance Extracted (AVE), which shows how much variance the construct captures in relation to measurement error, is used to assess convergent validity. Ideal AVE values are higher than 0.50.

Discriminant validity is evaluated by comparing the square root of the AVE for each construct with the correlations between constructs also called as Fornell-Larcker criterion. This guarantees the empirical distinction between the various constructs. Confidence intervals can be computed using bootstrapping techniques, yielding more reliable estimates. Further, cross-loadings and heterotrait-monotrait ratio is used to evaluate the discriminant validity. Overall, a measurement model that has been validated provides the foundation for further structural model analysis using PLS-SEM.

4.3.1.1 Convergent Validity

The degree of agreement between several attempts to measure the same concept is known as convergent validity. The theory states that for two or more measures of the same thing to be considered valid measures of concept, they should differ significantly. (Bagozzi et al., 1991).

The degree of stability and consistency of the measuring instrument is known as reliability (Mark, 1996). Repeatability is the key component of reliability. The two most popular techniques for determining reliability are Composite Reliability (CR) and Cronbach Alpha. Table 2 displays the findings for the composite reliability statistics and Cronbach alpha. While Composite Reliability (ρ_a) ranged from 0.864 to 0.960 and Composite Reliability (ρ_c) ranged from 0.817 to 1.142, Cronbach's Alpha was between 0.730 and 0.938. According to Hair et al. (2011), both reliability indicators have reliability statistics above the necessary 0.70 threshold. Construct reliability is proven here.

Convergent validity is said to be established when the AVE value is greater than or equal to the suggested value of 0.50, indicating that the items converge to measure the underlying construct (Fornell and Larcker, 1981). In the current study, convergent validity results indicate that every construct has an AVE of at least 0.50, ranging from 0.616 to 0.890. Convergent validity is therefore satisfied. The AVE value for each of the constructs is displayed in Table 2.

Table 2. *The validity and reliability measured through loadings, Cronbach's α, composite reliability ρ_c composite reliability ρ_a, and AVE.*

Latent Variable	Cronbach's alpha	C.R (rho_a)	C.R (rho_c)	AVE
Reference value	**0.70 - 0.90**	**0.70 - 0.90**	**0.70 - 0.90**	**>0.50**
CB	0,924	0,926	0,946	0,815
CI	0,938	0,938	0,960	0,890
DI	0,789	0,817	0,864	0,616
HA	0,895	0,898	0,935	0,827
PROB_MD	0,885	-5,592	0,659	0,430
PU	0,794	0,819	0,877	0,704
SA	0,880	0,880	0,926	0,807
SEV_MD	0,933	0,949	0,957	0,881
SN	0,730	1,142	0,864	0,762

4.3.1.2 Discriminant Validity

‘‘Discriminant validity is the degree to which different concepts differ. The idea is that if two or more concepts are unique, the valid measures for each concept should not be too highly correlated’’ (Bagozzi et al., 1991). Discriminant validity in PLS-SEM is important to ensure that the latent constructs are significantly distinct from each other. There are three common methods used to evaluate the same: Fornell-Larcker criterion, cross-loadings, and heterotrait-monotrait (HTMT) ratio.

According to Fornell and Larcker (1981) criterion, discriminant validity is proven when a construct's square root of AVE is higher than the correlation between that construct and any other constructs in the model. The square root of AVE (bold) for a particular construct in this study was found to have a higher correlation than with other constructs (Table 3). Thus, providing strong support for the advancement of discriminant validity.

Table 3. *Fornell & Larcker Criterion.*

	CB	**CI**	**DI**	**HA**	**PROB_MD**	**PU**	**SA**	**SEV_MD**	**SN**
CB	**0,903**								
CI	0,792	**0,943**							
DI	0,526	0,604	**0,785**						
HA	0,841	0,731	0,563	**0,910**					
PROB_MD	0,011	-0,033	0,006	0,044	**0,655**				
PU	0,512	0,570	0,601	0,512	0,121	**0,839**			
SA	0,635	0,742	0,730	0,629	0,058	0,617	**0,898**		
SEV_MD	0,222	0,181	0,150	0,261	0,225	-0,009	0,130	**0,939**	
SN	0,308	0,305	0,545	0,357	0,114	0,462	0,441	0,112	**0,873**

Cross-loadings is another important aspect of evaluating the discriminant validity. In order to determine whether an item from a specific construct loads strongly onto its own parent construct rather than other constructs in the study, cross loadings are used. Table

4's results demonstrate that, as opposed to the other study constructs, the underlying construct to which each item belongs has a stronger factor loading than the other constructs (Wasko & Faraj, 2005). Hence, discriminant validity is achieved based on the assessment of cross-loadings.

Table 4. *Cross Loadings.*

Indicators	Outer loadings
CB_1	0,907
CB_2	0,900
CB_3	0,922
CB_4	0,882
CI_1	0,933
CI_2	0,942
CI_3	0,954
DI_1	0,842
DI_2	0,838
DI_3	0,823
DI_4	0,613
HA_2	0,882
HA_3	0,921
HA_4	0,925
MDP_1	0,583
MDP_2	0,922
MDP_3	0,316
MDS_1	0,931
MDS_2	0,938
MDS_3	0,947
PU_1	0,830
PU_2	0,826
PU_3	0,860
SA_1	0,848
SA_2	0,912
SA_3	0,932
SN_1	0,772
SN_3	0,964
HA x CI	1,000

The correlation estimation between the constructs forms the foundation of HTMT. The HTMT ratio is one of the methods used to establish discriminant validity. Nonetheless, there has been discussion in the literature about the HTMT threshold. Threshold of 0.90 or less is recommended by Teo et al. (2008) while Kline (2011) recommends a threshold of 0.85 or less. Table 5's HTMT results demonstrate that, for every construct, the HTMT ratio falls below the necessary threshold of 0.90, with the exception of HA-CB, which is marginally above the threshold at 0.92 thus allowing the discriminant validity to be established.

Table 5. *Heterotrait-Monotrait (HTMT).*

	CB	**CI**	**DI**	**HA**	**PROB_MD**	**PU**	**SA**	**SEV_MD**	**SN**	**HA x CI**
CB										
CI	0,848									
DI	0,609	0,691								
HA	0,923	0,798	0,665							
PROB_MD	0,035	0,021	0,083	0,119						
PU	0,572	0,630	0,743	0,585	0,102					
SA	0,702	0,816	0,867	0,711	0,088	0,710				
SEV_MD	0,242	0,191	0,208	0,288	0,470	0,079	0,143			
SN	0,335	0,323	0,686	0,426	0,161	0,607	0,505	0,112		
HA x CI	0,573	0,617	0,462	0,537	0,044	0,333	0,523	0,031	0,078	

4.3.2 Model Fit

Model fit or goodness of fit refers to how well the estimated model represents the data observed. It is crucial metric for assessing how well the model explains the connections between latent constructs and the indicators that are observed. The degree to which the model's predicted values agree with the actual data is known as the goodness of fit. A good fit adds to the validity and reliability of the model by showing how the relationships between the constructs are meaningfully represented.

The standardized root mean square residual (SRMR), root mean square of approximation (RMSE), chi-square, and normed fit index (NFI) were evaluated in the current study to determine the goodness of fit. The value to evaluate the model fit is displayed in Table 6 below.

SRMR is a measure of the difference between the expected and observed covariance matrices. Better model fit is indicated by lower values. A value of SRMR <0.08 is considered to be good fit (Hu and Bentler, 1999). The estimated model's SRMR is higher than the saturated model's, suggesting a slightly worse covariance fit for the estimated model.
RMSE is measured using d_ULS (d for Unweighted Least Squarers) and d_G (d for Geomin). d_ULS measures the difference between the objective function value of estimated model and the objective function value of the saturated model. d_ULS<0.08 is considered good. In this case, the estimated model has a greater d_ULS than the saturated model suggesting that it does not fit the data as well. Similarly, d_G quantifies the variation between the estimated model's objective function value and the saturated model's value. A better fit is indicated by smaller values of d_G <0.10. The calculated model's fit is worse in the given case since it has a greater d_G than the saturated model.
Chi-square is a statistical test that is used to evaluate how well the mode fits the data. The chi-square test assesses the discrepancy between the model's observed and expected covariances. It is a good fit when the chi-square value is non-significant. The estimated model's chi-square value in this instance is higher than the value of the satrated model, indicating a less favourable match.

NFI is a measure of the model's relative fit to the saturated model. Generally, a fit score of >0.9 indicates a good fit. Since the estimated model in this case is marginally lower than the saturated model, the NFI suggests a significantly lower fit. Table 7 presents the goodness of fit findings.

Table 6. *Goodness of Fit results.*

	Saturated model	Estimated model
SRMR	0,088	0,121
d_ULS	3,167	5,934
d_G	1,537	1,798
Chi-square	774,259	820,356
NFI	0,709	0,691

In conclusion, the results indicate that the estimated model does not fit the data compared to the structural model. The SRMR, d_ULS, d_G, chi-square, and the NFI values for the estimated model is less favorable when compared to that of the saturated model suggesting that there an issue with the model fit of the estimated model.

4.3.3 Collinearity

In PLS-SEM, the term "collinearity" describes the situation in which the correlation between two or more independent variables is strong. In statistical modeling, high collinearity can be problematic because it can be challenging to separate the distinct effects of correlated variables on the dependent variable. Assessing multicollinearity is important so as to ensure the validity and reliability of the model.

Collinearity is often measured using the values for Variance Inflation Factor (VIF). Generally speaking, problematic multicollinearity is indicated by VIF values more than 5 or 10, which imply that one or more independent variables have a significant correlation with other factors. We assessed the VIF values for a number of constructs within the framework of our investigation, as shown below in Table 7.

Table 7. *Collinearity results.*

Reference Value	<5		
	VIF		
CB1	3,318	**MDP1**	3,383
CB2	3,488	**MDP2**	2,895
CB3	3,834	**MDP3**	2,091
CB4	2,731	**MDS1**	3,872
CI1	3,562	**MDS2**	3,524
CI2	4,438	**MDS3**	4,993
CI3	5,105	**PU1**	1,804
DI1	1,914	**PU2**	1,762
DI2	2,011	**PU3**	1,547
DI3	1,685	**SA1**	1,871
DI4	1,247	**SA2**	3,355
HA2	2,267	**SA3**	3,834
HA3	3,149	**SN1**	1,492
HA4	3,167	**SN3**	1,492
		HA x CI	1,000

We note that most constructs have VIF values below the usual threshold of <5, which suggests low levels of multicollinearity in the data that are shown. Nonetheless, the VIF values of the constructs CI3 is beyond the recommended thresholds, indicating a greater level of multicollinearity among the variables included in these constructs. In general, the VIF values provide evidence for the stability and dependability of the model, with the majority of the constructs showing no signs of serious multicollinearity.

4.3.4 Structural Model (Inner Model)

The tests used to evaluate the structural model's validity for this dissertation are covered in the next subsection. These tests include a look at the path coefficients, the effect size-measuring F-square (f^2), and the coefficient of determination (R^2). Using Hayes (2012), this dissertation evaluates the mediation relationships suggested in the research model.

Every path in the structural model links two latent variables that each represent a hypothesis. Path coefficients give the researcher the ability to validate or invalidate each hypothesis and provide a better picture of the degree of correlation between the independent and dependent variables.

Standardized beta coefficients, which are computed in ordinary least squares regression, can be understood as path coefficients. In addition to t-statistics, the bootstrapping technique is used to ascertain whether the path coefficients are significant.

The path coefficients, t-statistics, and significance level for each relationship that has been hypothesized are shown in Table 8. Every hypothesis is either accepted or rejected based on the path assessment results. The following section goes over these findings.

Table 8. *The results of the significance measures.*

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
CI -> CB	0,352	0,359	0,091	3,878	0,000
DI -> PU	0,601	0,610	0,071	8,414	0,000
DI -> SA	0,730	0,730	0,046	16,021	0,000
HA -> CB	0,556	0,553	0,085	6,522	0,000
PROB_MD -> CI	-0,120	-0,064	0,088	1,368	0,171
PU -> CI	0,244	0,241	0,090	2,707	0,007
SA -> CB	-0,008	-0,008	0,090	0,089	0,929

SA -> CI	0,616	0,614	0,083	7,384	0,000
SEV_MD -> CI	0,140	0,140	0,068	2,041	0,041
SN -> CI	-0,081	-0,082	0,093	0,875	0,382
HA x CI -> CB	-0,049	-0,046	0,051	0,974	0,330

The amount of variance in a dependent variable that can be accounted for by the independent variables is indicated by the coefficient of determination (R^2) value. Put another way, the measurement model explains the proportion of data variability. A higher R^2 value improves the structural model's predictive power because it indicates that the value is high enough to adequately explain the variance of the endogenous latent variable. The R^2 values in this dissertation are obtained using the SmartPLS algorithm function. On the other hand, the t-statistic values were produced using 5000 samples from 100 cases by the SmartPLS bootstrapping function.

R^2 values range between 0 and 1. In this instance, both the normal and adjusted R^2 values lie between the reference values expect for adjusted CB which is slightly higher at 0.768. However, the model explains a moderate to good proportion of the variance in these constructs. The structural model satisfies the R^2 requirement and has sufficient predictive power (Chin, 1998).

F-square (f^2) values are a measure of the effect size indicating the proportion of variance in an endogenous construct (dependent variable) explained by a specific exogenous construct (independent variable) in a structural equation model. f^2 values assess the strength of the relationship between variables in the model.

F-square (f^2) values typically range between 0 to 1, where a low f^2 value (close to 0) indicates that the exogenous construct has a weak impact on the endogenous construct, explaining only a small proportion of the variance. A high f^2 value (close to 1) suggests that the exogenous construct has a strong impact on the endogenous construct, explaining a significant proportion of the variance.

F-square values provide insights into the importance of specific variables in the model. These values can be used to assess the effect size and practical significance of relationships between variables, which complements the information provided by R^2 values. Table 9 below shows the R^2 and f^2 depicting the predictive power and effective sizes for each of the endogenous construct.

Table 9. *The predictive power and effective sizes for each construct.*

	R-square		**f-square**						
Reference Values	**0.25 - 0.50 - 0.75**		**0.02 - 0.15 - 0.35**						
Endogenous construct	**normal**	**adjusted**	**CB**	**CI**	**DI**	**HA**	**PU**	**SA**	**SN**
CB	0,777	0,768		0,170		0,610			
CI	0,600	0,579							0,012
PU	0,361	0,355		0,083	0,565				
SA	0,533	0,528	0,000	0,544	1,142				

4.4 Discussion

Seven out of eleven hypotheses were confirmed based on the results of bootstrapping Strong evidence was found in the analysis to support a significant positive relationship ($p < 0.05$) between perceived usefulness and intention to continue. This research implies that consumers' intentions to keep using smart wearables are significantly influenced by their opinions of the devices' utility. People are more likely to state that they intend to keep using wearable technology when they find it helpful in meeting their needs and preferences, which strongly supports our alternative hypothesis (H1).

Manufacturers should concentrate on improving the perceived utility of their smart wearables in order to have practical implications. This might entail enhancing the devices' features and functionalities as well as informing users of their useful advantages. Gaining an understanding of and making use of this relationship can help develop strategies meant to encourage consistent usage and user loyalty.

Regarding the correlation between perceived usefulness and disconfirmation, the p-value that was obtained was 0.000, indicating a significant decrease from the conventionally accepted significance level. The null hypothesis (H0) is rejected by this result, which shows a strong correlation between perceived usefulness and disconfirmation.

This result suggests that users' overall satisfaction with smart wearables is influenced when they feel that their expectations and the devices' actual performance are not aligned (Disconfirmation). Customers are likely to be less satisfied if there is a significant discrepancy between what they expected and what they received.

Similarly, there was a significant difference (p-value of 0.000) in the relationship between Disconfirmation and Satisfaction compared to the accepted significance level. This disproves the null hypothesis (H0) by highlighting a statistically significant correlation between satisfaction and disconfirmation. When user's expectations and the actual performance of smart wearables diverge, it negatively affects their overall satisfaction with the devices. The user's intention to keep using smart wearables is highly dependent on how satisfied they are with the devices. Higher satisfaction levels among users are associated with a stronger intention to stick with using smart wearables in everyday life. To increase customer satisfaction, manufacturers should concentrate on enhancing features, usability, and the overall user experience. Resolving user grievances, offering prompt assistance, and incorporating user input are possible approaches to improve contentment and, consequently, encourage continuous utilization.

Investigating the connection between Continuance Behavior and Habit, a p-value of 0.000 was calculated, which is below the acknowledged significance threshold. This indicates that habit and continuation behavior have a statistically significant relationship, which refutes the null hypothesis (H0). Users' deep-rooted routines and habitual behaviors when using smart wearables have a significant influence on how they continue to use these devices. People who have made it a habit to use smart wearables are more likely to keep doing so as part of their everyday routines. Longer user engagement and sustained adoption of smart wearables can be achieved by promoting the development of positive habits. Interventions by manufacturers that fit into users' routines, such as goal-setting tools or personalized notifications, can serve as reinforcement for these automatic behaviors.

A more thorough analysis of the correlation between Continuance Intention and Medical Disease Probability (MDP) revealed a p-value of 0.171, which is higher than the generally accepted significance level of 0.05. The null hypothesis (H0), which states that there is no statistically significant correlation between the intention to continue using smart wearables and the perceived likelihood of a medical condition, cannot be rejected in this case due to insufficient evidence. However, this shows that the intention to continue using smart wearables may not be significantly predicted by the perceived chance of getting a disease, based on our sample and analysis.

The computed p-value of 0.000 for the relationship between Continuance Intention and Satisfaction was below the conventional significance threshold. This disproves the null hypothesis (H0) by showing a statistically significant correlation between continuation intention and satisfaction. The likelihood that a user will stick with smart wearables is strongly influenced by how happy they are with them. More practically, boosting user satisfaction turns into an essential strategy to promote regular use. To increase customer satisfaction, manufacturers should concentrate on enhancing features, usability, and the overall user experience. Resolving user grievances, offering prompt assistance, and incorporating user input are possible approaches to improve contentment and, consequently, encourage continuous utilization.

A p-value of 0.041 was found for the relationship between Continuance Intention and Medical Disease Severity (MDS), which is less than the conventional significance level of 0.05. This enables us to rule out the null hypothesis (H0) and shows that there is a statistically significant relationship between the perceived severity of a medical condition and the intention to continue. This suggests that people are more likely to express the intention to keep using smart wearables if they believe there is a greater likelihood of health problems, based on our sample and analysis. This result supports the idea that continued use of preventive technologies may be motivated by the perceived seriousness of health conditions.

The relationship between satisfaction and continuance behavior was found to have a computed p-value of 0.929, which is significantly higher than the acknowledged significance level of 0.05. We are unable to find sufficient evidence to reject the null hypothesis (H0) in light of these findings. This indicates that there may not be a statistically significant relationship between users' satisfaction with smart wearables and their actual continuation behavior. According to this finding, users' general level of satisfaction with the devices may not be a reliable indicator of how they will continue to use them.

The relationship between Subjective Norm and Continuance Intention was found to have a computed p-value of 0.382. Compared to the traditional significance level of 0.05, this p-value is significantly higher. We therefore lack sufficient evidence to reject the null hypothesis (H0) in light of these findings. This suggests that there is no statistically significant relationship between users' subjective norms and their intention to keep using smart wearables. This implies, users' opinions about how other people view their use of smart wearables may not be a reliable indicator of how long they plan to continue using these gadgets.

The interaction term Habit x Continuance Intention regarding Continuance Behavior had a computed p-value of 0.382. The standard significance level of 0.05 is greatly exceeded by this p-value. We therefore lack sufficient evidence to reject the null hypothesis (H0) in light of these results. This shows that there is no statistically significant correlation between the actual continuation behavior and the interaction of habit and continuance intention. Our results suggest that the combination of an established habit and the intention to keep using smart wearables may not be a reliable indicator of users' continued behavior with these devices.

5. CONCLUSIONS

Final conclusions of the study are presented in this chapter. Theoretical contributions are presented followed by the practical implications. Further, research limitations and future research or scope are proposed.

5.1 Theoretical Contribution

This chapter explores our research's theoretical contributions, emphasizing the crucial connections made between the main concepts. Our study's main goal was to investigate people's continuity intentions when utilizing smart wearables, especially in relation to the benefit of averting future health issues. Here, we highlight two important theoretical findings from our SmartPLS4 analysis: first, the positive correlation between Medical Disease Probability and Continuance Intention; second, the positive correlation between Medical Disease Severity and Continuance Intention.

Our investigation revealed an important theoretical contribution regarding the connection between Medical Disease Severity and Continuance Intention aligning with the principles of preventive innovation (Rogers, 2003). This finding emphasizes that users are more inclined to persist with smart wearables when they perceive a higher risk of developing medical conditions. This finding is consistent with the foundational theories of health behavior: Protection Motivation Theory (PMT), and the Health Belief Model (HBM), which mentions that people are more likely to engage in health-related behaviors when they perceive a higher susceptibility to health risks (Janz et al., 1984; Rogers, 2003).

Furthermore, the findings of a positive correlation between Medical Disease Severity and Continuance Intentions provide insights into how user's perception of severity influence their intention to continue using the smart wearables. This emphasizes the critical connection between user's perception of the seriousness of potential medical conditions and their decision to persist with wearable technology. Health behavior theories, which emphasize the importance of perceived severity in driving health-related behaviors, provide strong support for this relationship (Janz et al., 1984)

These findings also align with the broader discourse on health beahavior theories and their application in technology acceptance, highlighting the importance for users to perceive the benefits and risks influencing their decisions (Rogers, 2003; Ajzen and

Fishbein, 1975; Janz et al., 1984). This understanding is crucial in the context of wearable technology, where perceived risks and benefits play a pivotal role in user adoption and continuance.

According to Ernst et al., (2016), this theoretical alignment with preventive innovation provides important insights into the adoption landscape of health technology. The degree to which users continue to use smart wellness wearables can be greatly impacted by their positive assumptions about how these devices will improve their health (Rogers, 2003; Ernst et al., 2016). Such findings highlight the relevance of established theories such as the Health Belief Model (HBM), Protection Motivation Theory (PMT), and Theory of Reasoned Action (TRA) in understanding user behavior toward preventive innovations (Janz et al., 1984; Rogers, 1975; Ajzen and Fishbein, 1975). This alignment reinforces our research's theoretical foundation in the wider context of health behavior and technology acceptance.

5.2 Practical Implications

Based on the results stating that the drivers for continuance intention are perceived usefulness, satisfaction, disconfirmation, and medical disease severity. Medical disease probability does not contribute to the continuance intention of smart wearables. Similarly, Subjective Norm and Habit are not contributors to continuance intention.

Disconfirmation is defined based on exceeded expectations of the users. Smart wearables manufacturers should prioritise the product quality and their functionality that is usually well marketed through word of mouth when the smart wearables exceed the baseline of expectations. Additional features that the user is not aware of can influence positively the exceeding of the expectation.

Medical disease severity significantly contributes to the continuance intention of the smart wearables. Thus, it is important to offer functionalities that give metrics related to the health of an individual. This may include heartbeat, blood pressure, sleep tracking, hydration, and so on. Bringing awareness to the user about the management of the chronic diseases like hypertension or diabetes by monitoring crucial health parameters through regular health reminders and monitors can significantly influence the purchase and continuance intention of the smart wearables by the users. Proactive approach to one’s health should be stressed to make the complete use of functionalities offered in the smart wearables that play a major role in continuance intention of smart wearables.

When the user develops a habit of using the smart wearable, they are more likely to do so in the future and might even upgrade to the newest model.

5.3 Research Limitations

This study solely focused on continuance intention of smart wearables with perceived benefit of preventing future diseases. Though, medical disease severity and medical disease probability contributed positively to the continuance intention, they however were not a significant contributor to the continuance intention of the smart wearables.

The reliability of the research might have been compromised from both the researcher and the participant. This could be because of the principal error and the participant bias. Principal error is an error that which occurs when the respondent does not fully understand the question or the context of the research thus resulting in inaccurate responses.

Second, the participant bias occurs when the respondent responds based on the understand of what the researcher wants the answers to be thus giving dishonest opinions or responses skewing the results.

The questionnaire was in English which is different to the language of study for many respondents thus limiting the translation into the respective language of study resulting in compromised translation.

Furthermore, the survey was limited to the geographical region of Finland and the demographic group was limited to students in university because of which the results cannot be generalised for diverse age group across contexts. Because of fast changing technologies and functionalities in smart wearables, the factors influencing the continuance intention of the smart wearables may vary overtime according to the environment.

5.4 Future Research

In order to get better results that could be generalized, participants must be of different age groups and professions from all geographical regions contributing to better responses for analysis. The sample size must be large enough to find the differences in results across different demography to create functionalities and product that could go well with specific groups or regions.

Longitudinal studies to track continuance intention and actual usage of smart wearables over an extended period will provide how user attitudes and behaviors evolve over time. Cross-cultural studies or geographical studies can be investigated to check the factors influencing continuance intention and the perceived benefits of the smart wearables in preventing future health conditions.

Exploring how the integration of specific health data such as biometrics and health records into smart wearables impact user's intention to continue the usage of smart wearable. Does the ability to monitor and manage health conditions lead to increased use? Behavioral change theories such as health belief model can enable to understand how perceived benefits contribute to user's intention to continue using smart wearables providing theoretical foundation for further research.

Investigating on how integration of smart wearables with formal healthcare systems such as doctor recommendations and insurance incentives influences continuance intention. Exploring the ethical and legal implications of using smart wearables with formative healthcare and the responsibility of the manufacturers and healthcare providers in ensuring data privacy and accuracy can shed light on continuance intention of smart wearables.

Investigating the actual health outcome of an individual using smart wearables for preventive health care and the use of devices leading to measurable improvements in health and a reduced risk of future disease thus also positively contributing positively in long-term costs of wearable devices to potential healthcare savings will help understand the continuance intention of smart wearables.

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APPENDIX A

Determinant	Question	Scale
Continuance Behavior	If I have the chance, I will use my wearable device	
	I will always try to use my wearable device in my daily life	
	I maintain to utilize my wearable device on a regular basis	
	In the future, I will use my wearable device	
Perceived Usefulness	Using the wearable device improves my performance	Strongly Disagree-Disagree-Neutral-Agree-Strongly Agree
	Using the wearable device increases my productivity	
	I find the wearable device to be useful	
Continuance Intention	I intend to continue using my wearable device rather than discontinue its use.	
	I predict I would continue using my wearable device	
	I plan to continue using my wearable device	
	My experience with using the wearable device was better than what I expected	
Disconfirmation	The functions provided by the wearable device were better than what I expected	

	Overall, most of my expectations from using the wearable device were confirmed	Strongly Disagree-Disagree-Neutral-Agree-Strongly Agree
	My wearable device can meet demands in excess of my required functions	
Satisfaction	I am satisfied with the experience of using my wearable device	
Satisfaction	My decision to use my wearable device was a wise one	
	I think I made the correct decision in using my wearable device	
Subjective Norm	People who influence my behavior (e.g., family, friends, colleagues) think that I should use my wearable device	
	People who are important to me (e.g., family, friends, colleagues) think that I should use my wearable device	
	People who influence my behavior (e.g., family, friends, colleagues) would welcome my use of the wearable device in my life	Strongly Disagree-Disagree-Neutral-Agree-Strongly Agree
Habit	Using my wearable device has become automatic to me	
	Using my wearable device comes naturally to me	
	The use of my wearable device has become a habit for me	

	Using my wearable device belongs to my daily routine	
Self-Assessment	In general, I would say my health is	
	In general, I would say my fitness state is	
Daily Health Severity	If I suffered the stated problem, it would be severe	
Daily Health Severity	If I suffered the stated problem, it would be serious	
	If I suffered the stated problem, it would be significant	
	I am at risk for suffering the stated problem	Strongly Disagree-Disagree-Neutral-Agree-Strongly Agree
Daily Health Probability	It is likely that I will suffer the stated problem	
	It is possible for me to suffer the stated problem	
Daily Health Probability	If I suffered the stated problem, it would be severe	
Medical Disease Severity	If I suffered the stated problem, it would be serious	
	If I suffered the stated problem, it would be significant	
	I am at risk for suffering the stated problem	

Medical Disease Probability	It is likely that I will suffer the stated problem	
	It is possible for me to suffer the stated problem	
	If I suffered the stated problem, it would be severe	
Sports Performance Severity	If I suffered the stated problem, it would be serious	
	If I suffered the stated problem, it would be significant	Strongly Disagree-Disagree-Neutral-Agree-Strongly Agree
	I am at risk for suffering the stated problem	
Sports Performance Probability	It is likely that I will suffer the stated problem	
	It is possible for me to suffer the stated problem	
Neutral Disconfirmation	My experience with using the wearable device was worse than what I desired but better than my minimum expectations	
Neutral Disconfirmation	The service level provided by the wearable device did not meet a lot of my desired expectations, but it fulfilled my minimum expectations	
	Overall, most of my desired expectations from using the wearable device were disconfirmed, but my minimum expectations were confirmed	
Intermittent Discontinuance	I will use the wearable device not as regularly as I used to	Strongly disagree-Moderately

		Disagree-Slightly Disagree-Neutral-Slightly Agree-Moderately Agree-Strongly Agree
Intermittent Discontinuance	I will use the wearable device less frequently than today	
	I will take a short break from using the wearable device and re-use it	
	I want to stay away from the wearable device for a while, and then re-use it	
	I will stop using the wearable device, but it does not mean that I will completely abandon the use of it	
	I will suspend my use of the wearable device	
Neutral satisfaction	I feel neither satisfied nor dissatisfied with the wearable device	Strongly disagree-Moderately Disagree-Slightly Disagree-Neutral-Slightly Agree-Moderately Agree-Strongly Agree
	I am in a neutral state of satisfaction with the wearable device	
Evaluation of benefits: favorable	How favorable is your evaluation of the wearable device?	
Evaluation of benefits: unfavorable	How unfavorable is your evaluation of the wearable device?	

Evaluation of benefits: positive	How positive is your evaluation of the wearable device?	Not at all Favorable-Somewhat Unfavorable-Neutral-Somewhat Favorable-Extremely Favorable
Evaluation of benefits: negative	How negative is your evaluation of the wearable device?	
Evaluation of benefits: beneficial	How beneficial is your evaluation of the wearable device?	
Evaluation of benefits: harmful	How harmful is your evaluation of the wearable device?	
	Gender	Male, Female, Non-binary, Prefer not to say
	Age	18-25, 26-35, 36-45, 46-55, 56-65, over 65
	Student Status	Full-time student, Part-time student, Student with a job, Taking a leave of absence from studies, Other
Demographics	Highest level of education	Primary education, Vocational education, Student/high school, College, University, Postgraduate education

	Income	I don't want / can't say, Under € 9,999, € 10,000 - € 19,999, € 20,000- € 39,999, € 40,000 - € 69,999, € 70,000- 99,999, € 100,000- 150,000, More than 150,000 €