**AN EVALUATION OF THE FACTORS AFFECTING CONSUMER RESISTANCE TO INNOVATION DIFFUSION OF E-CIGARETTES AMONG SOUTH AFRICAN UNIVERSITY STUDENTS**

By

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**DECLARATION**

I, Nastasje Johnson, hereby declare that the work presented in this dissertation entitled, 'An Evaluation of the Predictors of the Diffusion of Innovations on the Consumer Resistance toward e-Cigarettes among South African University Students', is my own work, whereby all resources used in completing this dissertation are acknowledged in the 'References'.

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Nastasje Johnson                                              Date

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## ABSTRACT

With an increase in the concern over the harmful effects of smoking traditional tobacco cigarettes, there has been an increase in the use of a smoking alternative considered to be a healthier option, namely the e-cigarette. Thus, it is of interest to understand certain factors surrounding the novelty, and this research has been conducted in terms of evaluating the predictors of the diffusion of innovations on consumer resistance towards the e-cigarette among South African university students, with the primary purpose being to research a gap in the South African e-cigarette market, and to utilise the results to better understand the overall market. The gap in prior research has been identified as what appears to be a lack of information regarding the South African e-cigarette market, and in particular, the predictors of consumer resistance, including relative advantage, compatibility, complexity, trialability, observability, and perceived risk. The study undertook a quantitative methodology in which 400 students from the University of the Witwatersrand were asked to complete a self-administered questionnaire. Data analysis was conducted using SPSS 22 and AMOS for structural equation modelling. The results indicate that three of the six hypotheses are supported. Thus, indicating that marketers should focus on applying relative advantage, complexity, and perceived risk to marketing strategies. This study contributes to existing literature and contextual knowledge regarding consumer resistance and the diffusion of innovation. The results further provide marketing practitioners with a better understanding on how to limit consumer resistance and how to improve product diffusion of the e-cigarette, subsequently improving the rate of adoption. However, future research is necessary for corroboration.

Keywords: *e-Cigarette, Consumer Resistance, Diffusion, Innovation.*

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| | |
|---|---|
| **AVE** | **Average variance extracted** |
| **CA** | **Compatibility** |
| **CE** | **Complexity** |
| **CFA** | **Confirmatory factor analysis** |
| **CFI** | **Comparative fit index** |
| **CMIN/DF** | **Chi-Square index** |
| **CR** | **Composite reliability** |
| **COR** | **Consumer resistance** |
| **ENDS** | **Electronic nicotine delivery system** |
| **FDA** | **Food and Drug Administration** |
| **FIR** | **Financial risk** |
| **FUR** | **Functional risk** |
| **GFI** | **Goodness-of-Fit Index** |
| **GMP** | **General manufacturing practice** |
| **IFI** | **Incremental Fit Index** |
| **NFI** | **Normed fit index** |
| **NRT** | **Nicotine replacement therapy** |
| **OB** | **Observability** |
| **PHR** | **Physical risk** |
| **PR** | **Perceived risk** |
| **PSR** | **Psychological risk** |
| **RA** | **Relative advantage** |
| **RMSEA** | **Root Mean Square Error of Approximation** |
| **S** | **Structural** |
| **SEM** | **Structural equation modelling** |
| **SOR** | **Social risk** |
| **SV** | **Highest shared variance** |
| **TAM** | **Technology Acceptance Model** |

**TLI**        **Tucker Lewis Index**

**TR**        **Trialability**

**TRA**        **Theory of Reasoned Action**

**WHO**        **World Health Organization**

# CHAPTER 1: OVERVIEW OF THE STUDY

## 1.1). Introduction and Background

Electronic cigarettes, or e-cigarettes, can be defined as hand-held, battery-powered nicotine delivery devices with the primary purpose of allowing the user to recreationally inhale vaporised nicotine (Barbeau, Burda & Siegel, 2013; Goniewicz, Lingas & Hajek, 2013; Schripp, Markewitz, Udhe & Salthammer, 2013; Sutfin, McCoy, Morrell, Hoeppner & Wolfson, 2013). Although, researchers have identified the e-cigarette as a potentially successful smoking reduction device that dually aids in smoking cessation, the e-cigarette is perceived as a controversial product as it releases an addictive substance known as nicotine, consequently stirring up non-ethical issues, since it has the potential to be used as a healthier alternative to smoking traditional tobacco cigarettes, yet continues to promote an unhealthy lifestyle (Dawkins, Turner, Roberts & Soar, 2013; Goniewicz & Zielinska-Danch, 2012; Peters Jr, Mashack, Lin, Hill & Abughosh, 2013; Siegel, Tanwar & Wood, 2011; Trtchounian, Williams, & Talbot, 2010).

Besides the ethical issues associated with the e-cigarette, the product imitates the sensory and behavioural experience of smoking conventional cigarettes, and for this reason, researchers have concluded that e-cigarettes may be more effective than nicotine replacement therapy (NRT) at reducing smoking and promoting smoking cessation, since it is both the psychological and physical attributes that contribute to the overall addiction associated with smoking (Abrams, 2014; Cahn & Siegel, 2011; Caponnetto, Polosa, Auditore, Russo & Campagna, 2011).

However, the primary concern regarding e-cigarettes is what by-products are created during the process of heating e-liquid into vapour to be inhaled? It is an important factor considered by consumers and health federations but there is still insufficient evidence to clarify in totality the chemical reactions that occur (Borland, 2011; Goniewicz, Knysak, Kosmider, Sobczak, Kurek, Prokopowiz, Jablonska-Czapla, Rosik-Dulewska, Havel, Jacob & Benowitz, 2013; Health New Zealand, 2009; Heavner, Dunworth, Bergen, Nissen & Phillips, 2009). Thus, based on these concerns, consumer resistance with relevance toward product diffusion against the e-cigarette can be said to exist and is a marketing phenomenon that requires further study to be fully understood (Claudy, O'Driscoll, Garcia & Mullen, 2010).

In order to study this phenomenon concerning consumer resistance against e-cigarettes, the Diffusion of Innovations Model theory was employed. Within the Diffusion of Innovations Model, there are five characteristics, constructs, or attributes, namely relative advantage, compatibility, complexity, trialability, and observability (Kleijnen, Lee & Wetzels, 2009). However, in later studies conducted by Rogers (2003) and other authors, it was found that perceived risk is in fact also a characteristic that should be included in the model since it has been observed to affect consumer adoption of innovations (Chinman, Lucksted, Gresen, Davis, Losonczy, Sussner & Martone, 2008). Therefore, within the study, all six characteristics have been adapted into a model that has been used to analyse the influence of consumer resistance on the diffusion of e-cigarettes in South Africa.

By using the adapted model employed within the research, the study has contributed toward existing literature on consumer resistance and product diffusion, all with respect to e-cigarettes inside the South African market, particularly that of Johannesburg university students. Thus, a new context and unique contribution to knowledge has been provided, as currently there appears to be no literature contained in a prior researcher's work that refers to all three constructs, namely e-cigarettes, consumer resistance, and product diffusion, contained in a prior researcher's work.

Therefore, enclosed in the present dissertation is research that was aimed at evaluating the influence of consumer resistance toward the diffusion of the e-cigarette among the students of the University of the Witwatersrand within Johannesburg, whereby the dissertation has been divided into eight chapters, namely: 'Overview of the Study', 'Literature Overview – Theoretical Framework', 'Literature Overview – Conceptual Framework', 'Conceptual Model and Hypotheses', Research Design and Methodology', 'Empirical Results', 'Discussion', and 'Conclusion and Recommendations'; each numbered one to eight, respectively. Each chapter contains sections that are applicable by providing an understanding of the research that is reported and its purpose, with the final aim of attaining a better understanding of the phenomenon at hand.

## 1.2). Problem Statement

Several prior studies have separately explored consumer resistance, product diffusion, and e-cigarettes, and thus, the area of knowledge surrounding consumer resistance has developed through works done over the years concerning exploration of the structure, origins, current

state of development, and future trends (Galvagno, 2010), the reconstruction by resistant consumers of attitude-behaviour practices and meanings (Moraes, Szmigin & Carrigan, 2008), Freeganism (Petina & Amos, 2010), Foucauldian interpretations (Shankar, Cherrier & Canniford, 2006), the impacts of perceived risk on consumer resistance (Abzakh, Ling & Alkilani, 2013), resisting green product innovation (Claudy, 2011; Claudy et al., 2010), advertising's role in consumer resistance (Kiesling, Günther, Stummer & Wakolbinger, 2012), the use of emotion toward resistance (Sandlin & Callahan, 2009), consumer vulnerability (Baker, Gentry & Rittenburg, 2005), and the psychology of overvaluing the old (Gourville, 2006).

Similarly, the knowledge area surrounding product diffusion has developed through works on understanding the determinants or factors influencing the adoption of or the intention to adopt a product (Chinman et al., 2008; Claudy, 2001; Demoulin & Zidda, 2009; Haghirian, Madlberger & Inoue, 2008; Kumar, Mukerji, Butt & Persaud, 2007; Lichtenstein & Williamson, 2006), the limits to innovation diffusion (MacVaugh & Schiavone, 2010), a systematic review of prior research on product diffusion (Bartells & Reinders, 2011), and green product innovation diffusion (Claudy, 2011).

The e-cigarette field of knowledge has also developed in a similar fashion through works that have investigated the awareness and contact routes of e-cigarettes (Cho, Shin & Moon, 2011; Regan, Promoff, Dube & Arrazola, 2013), commonalities among conventional smokers (Sutfin et al., 2013), safety reports (Health New Zealand, 2008), understanding e-cigarette users (Dawkins et al., 2010), perceived efficacy over nicotine replacement therapies (Barbeau et al., 2013), the effects on the desire to smoke, withdrawal, and cognition (Bullen, McRobbie, Thornley, Glover, Lin & Laugesen, 2010; Dawkins et al., 2012), the negative side-effects of e-cigarettes (Schripp et al., 2013; Vansickel, Cobb, Weaver & Eissenberg, 2010), use, perception, social norms, and beliefs of e-cigarettes (Goniewicz et al., 2013; Peters Jr et al., 2013; Trumbo & Harper, 2013), product diffusion (Yamin, Bitton & Bates, 2010), tobacco control (Borland, 2011), smoking reduction and cessation (Heavner et al., 2009; Odum, O'Dell & Schepers, 2012).

Despite these several studies, a research gap has been identified regarding the lack of information in the South African e-cigarette market, and in particular, the factors influencing consumer resistance and its effect on the diffusion of e-cigarettes among South African

university students. Therefore, according to the assumptions made by the researcher, there is insufficient information concerning the aforementioned gap, creating a problem for marketers of e-cigarettes regarding how to understand the influence of consumer resistance on the rate of adoption of the e-cigarette (Etter, 2010).

## 1.3). Research Gap and Justification for the Study

The research gap and justification for the study involves understanding the rationale behind conducting this research study.

### 1.3.1). Research Gap

As mentioned above, the identified research gap concerns the lack of information regarding the South African e-cigarette market, and in particular, the factors influencing consumer resistance and its effect on the diffusion of e-cigarettes among South African university students. Therefore, according to the assumptions made by the researcher, there is insufficient information concerning the aforementioned gap, creating a problem for marketers of e-cigarettes on how to understand the influence of consumer resistance on the rate of adoption of the e-cigarette (Etter, 2010). To resolve this problem, further research was required.

### 1.3.2). Justification for the Study

The importance of the current research is that it offers significance in the form of contributions and managerial implications that are considered to have a high utility among marketers of e-cigarettes within the South Africa e-cigarette market. The research will offer significance in terms of its unique contribution toward the body of knowledge of consumer resistance and diffusion, which allows for a more comprehensive understanding of how marketers can apply this knowledge to an advantageous point.

## 1.4). Purpose of the Study

The purpose of the study was to research the gap in the South African e-cigarette market and to utilise the results to better understand the overall market. A gap in prior research was identified as the apparent lack of information regarding the South African e-cigarette market, and in particular, consumer resistance and diffusion of e-cigarettes. Thus, to resolve this problem, further research was required, which is the primary purpose of the current dissertation.

**1.5). Research Objectives**

The primary objective of the research conveyed within this dissertation is to evaluate the predictors of the diffusion of innovations on consumer resistance toward e-cigarettes among South African university students.

**1.5.1). Theoretical Objectives**

- to evaluate literature on consumer resistance,
- to evaluate literature on relative advantage,
- to evaluate literature on compatibility,
- to evaluate literature on complexity,
- to evaluate literature on trialability,
- to evaluate literature on observability, and
- to evaluate literature on perceived risk.

**1.5.2). Empirical Objectives**

- to explore the relationship between consumer resistance and relative advantage,
- to explore the relationship between consumer resistance and compatibility,
- to explore the relationship between consumer resistance and complexity,
- to explore the relationship between consumer resistance and trialability,
- to explore the relationship between consumer resistance and observability, and
- to explore the relationship between consumer resistance and perceived risk.

**1.6). Research Questions**

The research questions contained within the current research are:

- Is there a relationship between relative advantage and consumer resistance?
- Is there a relationship between compatibility and consumer resistance?
- Is there a relationship between complexity and consumer resistance?
- Is there a relationship between trialability and consumer resistance?
- Is there a relationship between observability and consumer resistance?

- Is there a relationship between risk and consumer resistance?

## 1.7). Significance and Contribution of the Study

The significance and contribution of the study covers the contributions that will be made through the research and discussed within the current dissertation and the managerial implications, which support the significance of this research.

### 1.7.1). Contribution

The research will contribute towards existing literature on consumer resistance and product diffusion, all with respect to e-cigarettes within the South African market, particularly that of Johannesburg residents. The current study will also contribute towards contextual knowledge with regard to the constructs analysed within the current study, as well as contribute towards a better understanding within marketing with reference towards better understanding marketing strategies employed to enhance the South African e-cigarette market amongst consumers. The contribution will be discussed in greater detail in Chapter 8.

### 1.7.2). Managerial Implications

The research provides e-cigarette manufacturers and marketers with a new context to consider when implementing the new knowledge into new or improved product and marketing strategies, whereby manufacturers of e-cigarettes will be able to better understand how to limit consumer resistance and improve product diffusion of the e-cigarette among prospective customers, and subsequently improve the rate of adoption. Possibilities can include interventions that are proactively designed to target those consumers who are less inclined to adopt e-cigarettes (Regan et al., 2013). e-Cigarette marketers will be afforded the opportunity to create a climate where not only the technologically savvy will adopt an innovation, but so too will the majority (Kleijnen et al., 2009). The managerial implications will be discussed in greater detail in Chapter 8.

## 1.8). Theoretical Framework

The theoretical framework in the current dissertation covers both the theoretical foundations and the empirical literature concerning the constructs that comprise the conceptual model. These constructs are comprised of consumer resistance and the predictors of the Diffusion of Innovations Model.

**1.8.1). Diffusion of Innovations Model**

Briefly, the Diffusion of Innovations Model is a theory that relates adoption and behaviour to innovations, and explains how this process occurs over a period of time (Haghirian et al., 2008; Kumar et al., 2007). Within the Diffusion of Innovations Model, there are five constructs, namely relative advantage, compatibility, complexity, trialability, and observability (Dwivedi, 2005). Relative advantage has been defined in past studies as the superiority or added benefit that an innovation provides over the already existing product that supersedes it (Dwivedi, 2005; Claudy et al., 2010; Lichtenstein & Williamson, 2006). Compatibility refers to the consistency or how well the innovation fits within existing consumer routines, values, experiences, beliefs, behaviours, and the needs of the consumer it intends to target (Claudy, 2011; Lichtenstein & Williamson, 2006).

Complexity refers to the scale of difficulty associated with understanding and using a new innovation (Demoulin & Zidda, 2009). Trialability is the degree of opportunity awarded to try or experiment with a new innovative product, with the idea that it will aid a potential customer in deciding whether to adopt the product or not (Claudy et al., 2010; Lichtenstein & Williamson, 2006) and observability refers to the rate of visibility of successfully using an innovation in front of other individuals within a specific social group, as well as how communicable the innovation is in that group (Haghirian et al., 2008).

However, in later studies conducted by Rogers (2003) and other authors, it was found that perceived risk is in fact also a characteristic that should be included in the model since it has been observed to affect consumer adoption of innovations (Dwivedi, 2005). Perceived risk refers to the level of uncertainty surrounding an innovation, especially those innovations that are a context-based technology or are highly personalised (Kleijnen et al., 2009). Perceived risk and the other predictors of the Diffusion of Innovations Model are discussed in more depth in Chapter 3.

**1.8.2). Consumer Resistance**

Consumer resistance refers to consumer's efforts to reject a particular product or service, whether it is innovative in nature or not (Galvagno, 2010). Consumer resistance is thus a behaviour that is exhibited by consumers concerning a particular general motivation or group action and can include behaviours such as rejection, postponement, or opposition (Cova &

Dalli, 2008; Kleijnen et al., 2009). Consumer resistance is discussed in more detail with reference to its significance in the current study in Chapter 3.

**1.9). Conceptual Model and Hypotheses**

By way of a conceptual model it was possible to identify the various variables or constructs included in the current dissertation and to propose hypotheses regarding the relationships shared between each. As displayed in the figure below, the dependent variable within the research is consumer resistance, whereas the independent variables are relative advantage, compatibility, complexity, trialability, observability, and perceived risk. It is proposed that each of the independent variables share a relationship with consumer resistance in either a negative or positive manner, as detailed in the hypotheses below.

Figure 1.1: Conceptual Model
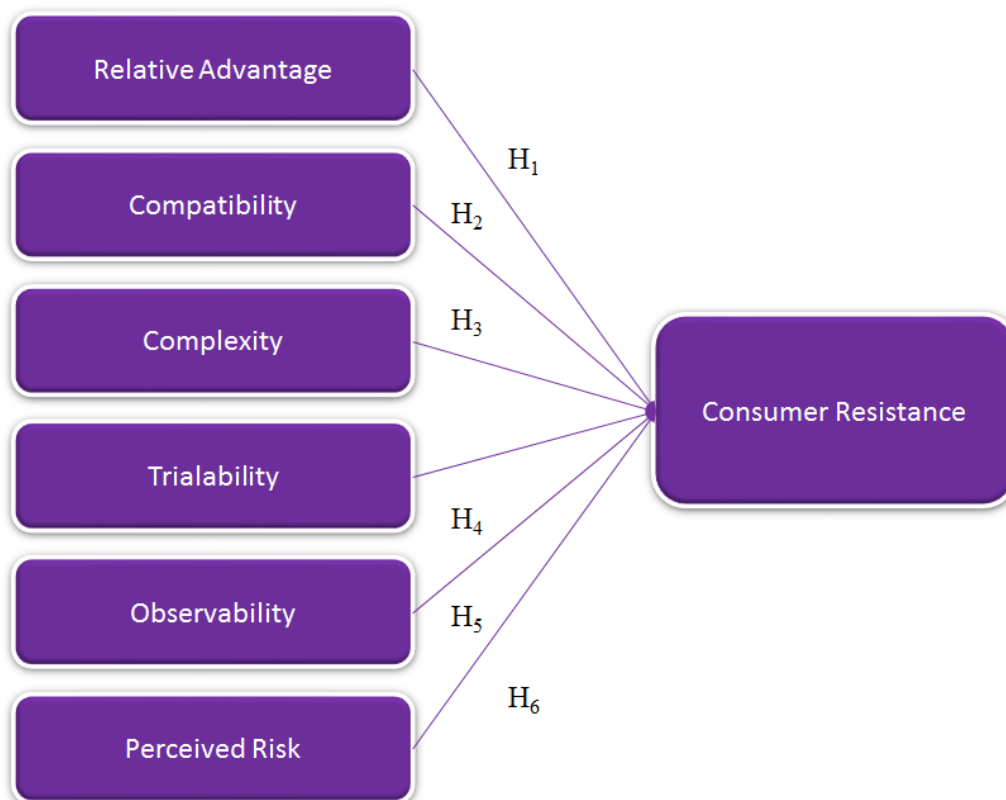
$H_1$: There is a negative relationship between relative advantage and consumer resistance.

$H_2$: There is a negative relationship between compatibility and consumer resistance.

$H_3$: There is a positive relationship between complexity and consumer resistance.

$H_4$: There is a negative relationship between trialability and consumer resistance.

$H_5$: There is a negative relationship between observability and consumer resistance.

$H_6$: There is a positive relationship between perceived risk and consumer resistance.

## 1.10). Research Design and Methodology

An overview of the research methodology and research design reveals that both primary and secondary research was conducted. The primary research followed a research philosophy that covers the research design, type, and methodology, and the secondary research comprised the information in the literature review and aided in narrowing the research gap. The research design is non-experimental since there is no manipulation of the independent variable, there is only one sample with no control group, and there is no randomisation (Creswell, 2014; Mackey & Gass, 2005; Murphy & Davidshofer, 2005). The research type is correlational as the study has attempted to examine the relationships between the variables or constructs (Heppner et al., 2008, Malhotra, 2010), and the research methodology is quantitative because the constructs are distinct variables that use systematic measures that are created before data collection can proceed (Biaxter, Hughes & Tight, 2010; Heppner et al., 2008; Murphy & Davidshofer, 2005).

The sample was made up of 400 university students from the University of the Witwatersrand between the age 25 and 30, by means of convenience non-probability sampling, whereby they were invited to complete a questionnaire with a 1-7 Likert-type scale that measured the various constructs included in the study and general information. The data was collected by means of distributing the questionnaire to students during lectures and in study centres. The research design and methodology is discussed in detail in Chapter 5.

## 1.11). Ethical Considerations

Ethics has been addressed in six areas, namely the principle of informed consent, protection and welfare of participants, use of deception, debriefing, the right to withdraw, and confidentiality and anonymity. Ethics in the research has been incorporated by including the

principle of informed consent in the form of a cover letter that clearly stated what the participant's obligations and responsibilities were and to inform the participant of any other factors that may have influenced the participant's final decision to take part in the research (Biaxter et al., 2010; Creswell, 2014). Protection and welfare of the participants was incorporated in the study since the participants were not subjected to any form of harm, danger, or stress when completing the research (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Saunders, Lewis & Thornhill, 2012).

The use of deception does not form part of the research in this case, since deception is not necessary. The researcher has acknowledged the participant's right to decline the invitation to participate in the study and has respected that decision. Finally, confidentiality and anonymity practices were incorporated into the study by not requesting the participants' names or student numbers (Creswell, 2014; Malhotra, 2010). The ethical considerations are discussed in detail in Chapter 5.

**1.12). Structure of the Study**

Included in this dissertation is research that is aimed at evaluating the influence of consumer resistance toward the diffusion of the e-cigarette among students of the University of the Witwatersrand in Johannesburg. The dissertation has been divided into eight chapters, namely: 'Overview of the Study', 'Literature Overview – Theoretical Framework', 'Literature Overview – Empirical Framework', 'Conceptual Model and Hypotheses', Research Design and Methodology', 'Empirical Results', 'Discussion', and 'Conclusion and Recommendations', each numbered one to eight, respectively. Each chapter contains sections that are applicable in providing an understanding of the research that is reported and its purpose, with the structure of each briefly discussed below.

Figure 1.2: Structure of the Dissertation
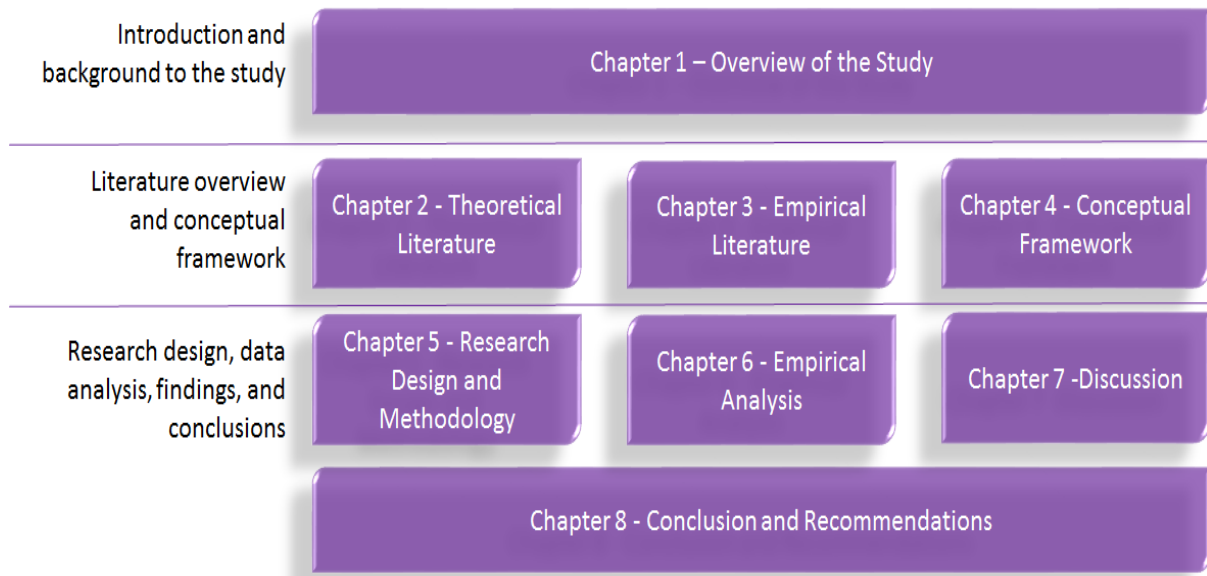


## 1.12.1). Chapter 1: Overview of the Study

Chapter 1, the overview of the study, contains a short descriptive title to the research and an introduction and background of the study. The introduction and background to the study is purposefully placed within the introduction to supply the reader with a more thorough understanding of what the research entails, and it allows for connections to be made within the literature. The first chapter also contains the problem statement allowing for the identification of the research problem in the e-cigarette field of research, as well as the research objectives that have been separated into theoretical and empirical objectives for clarity. The chapter then covers the contribution and the managerial implications of the study, wherein an explanation of why the research is relevant to today is justified. Lastly, Chapter 1 provides an outline of the study, allowing for a clear representation of the structural layout that the mini dissertation will follow.

## 1.12.2). Chapter 2: Research Context

Chapter 2, the research context, provides a contextualisation of the research by offering an in depth discussion of the e-cigarette, to facilitate understanding of the background to the research conducted. The chapter then briefly discusses the targeted audience that were used to complete the research presented within this dissertation.

### 1.12.3). Chapter 3: Theoretical Foundations and Empirical Literature

Chapter 3, theoretical foundations and empirical literature, consists of the literature overview covering the theoretical framework, which discusses the principal theories upon which the research has been constructed. Furthermore, from the previous literature that is to be analysed, certain overall trends, the development of the theory, some landmark findings, experts in the field, and conclusions of prior literature will be highlighted. The chapter also includes a review of the literature containing the variables of interest. The variables covered in the literature overview are that of consumer resistance, product diffusion, relative advantage, compatibility, complexity, trialability, observability, and perceived risk. Justification for why each of these constructs is included in the study will be provided. This will cover the empirical framework that has been gathered through the secondary research. The literature overview is thus a summary, interpretation, and critical evaluation of the existing literature available on the variables of interest to this study, and is vital in order to establish a current knowledge of the topic.

### 1.12.4). Chapter 4: Conceptual Model and Hypotheses

Chapter 4, the conceptual model and hypotheses, firstly presents a diagrammatic illustration of the conceptual model or framework that graphically represents what constructs affect each other and where each lies in relation to the other, therefore discerning directionality of causality. The second part of the chapter identifies the different variables included in the research and what role each played, whether as a dependent or an independent variable, a predictor or response variable, or as a moderator or mediator. Thirdly, a hypothesis statement is provided and states all hypotheses to be tested in the study. Finally, in Chapter 4, all variables included in the study have been assigned a role in the research through a hypothesis development.

### 1.12.5). Chapter 5: Research Design and Methodology

Chapter 5, research design and methodology, refers to a blueprint of the methodology undertaken that specifies the details for ensuring the correct attainment of the data needed to make the research presented a success. The chapter begins by clarifying the research design and the research type, and then follows with the research methodology, ethical considerations, sampling, and finally, the data gathering process. Each section in the chapter has been carefully considered so as to gather data that is valid, reliable, and ethical, therefore

providing a strong dissertation that can contribute to existing knowledge in the field of e-cigarettes, consumer resistance, and diffusion.

### 1.12.6). Chapter 6: The Empirical Results

Chapter 6, the empirical results, is an analysis of the data that will be gathered, and will show how the data is standardised and coded, what statistical programming it will be entered into, the relevant statistical tests that need to be run, and the relevant results of those tests. The chapter then provides an interpretation of the results, which can either confirm the reliability and validity of the previously designed scales that will be used in the study, or not. If not, then it will identify where the problems or weaknesses lie in the data gathering or analysis process. These results are mostly in the form of tables and figures that summarise the large amount of output provided by the statistical programmes used.

### 1.12.7). Chapter 7: Discussion

Chapter 7 presents a discussion of the study's research findings and whether the findings corroborate or differ from the findings of prior studies done in the field of e-cigarettes with regard to consumer resistance and the predictors of the diffusion of innovations. The discussion also includes the meaning of each of the findings and the achievement of the study's objectives.

### 1.12.8). Chapter 8: Conclusions, Recommendations, and Contributions

Chapter 8 includes a conclusion to the research contained in this dissertation and elaborates on the importance of completing the research, namely: e-cigarettes in a South African context with reference to consumer resistance and the diffusion of innovations. The meaning behind what this research has to offer in the marketing field of study is identified, and the chapter continues by elaborating on the possible recommendations that can be made. Furthermore, the chapter includes a discussion of the marketing implications and contributions that the study will provide, as well as, the limitations or problems that were faced when either proposing the research, during the data gathering process, through the data analysis stage, or at any other stage when a problem may have occurred. Finally, the chapter concludes with future research stated.

In addition to the eight chapters, there are sections included in the dissertation, namely the abstract, a table of tables, and an appendix. The table of tables and the appendix have been

included to house supporting material, mostly in the form of empirical data and tables, or other items imperative to understanding the research. As a whole, the eight chapters and the additional sections provide a comprehensive dissertation on the influence of consumer resistance on the diffusion of e-cigarettes among the South African e-cigarette market.

# CHAPTER 2: RESEARCH CONTEXT

## 2.1). Introduction

Chapter 2, the research context, provides a contextualisation of the research by offering an in depth discussion of the e-cigarette, to facilitate the understanding of the background of the research conducted. The chapter then briefly discusses the targeted audience that was used to complete the research presented within the current dissertation.

## 2.2). Target Audience

The target audience for the research conducted in this dissertation is the South African university student population, whereby as discussed in detail within the research design and methodology, the choice to study such a target audience was based on the fact that it comprises young adults that are more susceptible to novelty changes (Sutfin et al., 2013; Trumbo & Harper, 2013). Therefore, since the e-cigarette is considered to be a novelty item, as mentioned below, this target was the perfect audience on which to test the hypotheses laid out in the research that is described in this dissertation (Sutfin et al., 2013; Trumbo & Harper, 2013).

## 2.3). e-Cigarettes

An in-depth discussion has been provided within the contextualisation of e-cigarettes. The section begins with a brief introduction to the tobacco industry, then moves on to a more descriptive discussion with an introduction and background to the e-cigarette, the World Health Organisation (WHO) and Food and Drug Administration (FDA) regulators, the South African e-cigarette industry, the consumer's beliefs regarding the e-cigarette, and finally, concerns regarding the use of the e-cigarette.

### 2.3.1). Tobacco Industry

Tobacco is a plant that is the defining ingredient of cigarettes; the use of tobacco is regarded as a global epidemic or health issue since it is considered to be the leading cause of preventable disease, surpassing that of HIV/AIDS (Dockrell, Morrison, Bauld & McNeill, 2013; Health New Zealand Ltd., 2008; Richardson, Ganz & Vallone, 2014). Smoking can affect the majority of the body's systems leading to various diseases, most of which can be fatal. According to Caponnetto, Russo, Bruno, Alamo, Amaradio, and Polosa (2013), such diseased states can include cardiovascular disease, respiratory diseases, stroke, and cancer. However, the probability of developing such diseases decreases exponentially with full

smoking cessation. Globally, it is estimated that six million people died prematurely in 2012 from smoking, and 8.6 million people suffer from severe illnesses occasioned by illness (Caponnetto et al., 2011; Lee, Kimm, Yun & Jee, 2011). Due to concern regarding the health of the world population there is a need for safer smoking alternatives (Polosa, Caponnetto, Morjaria, Papale, Campagna & Russo, 2011).

### 2.3.2). Introduction to and Background of the e-Cigarette

In 2003 a pharmacist by the name of Hon Lik, invented and patented such an alternative, called the e-cigarette, which can be used as a substitute for tobacco cigarettes (Odum et al., 2012). Electronic cigarettes, or e-cigarettes, can be defined as hand-held, battery-powered nicotine delivery devices with the primary purpose of allowing the user to recreationally inhale vaporised nicotine (Barbeau et al., 2013; Goniewicz et al., 2013; Schripp et al., 2013; Sutfin et al., 2013). Thus, the e-cigarette falls under the electronic nicotine delivery system (ENDS) product category and is accompanied by a nicotine inhaler (Bullen et al., 2010; Caponnetto et al., 2011; Cho et al., 2011; Trumbo & Harper, 2013).

Although e-cigarettes are classified as ENDS, researchers are currently in the process of concluding whether or not the e-cigarette will also be classified under the NRT product category as there is still insufficient evidence to support claims of smoking cessation. For the e-cigarette to be categorised as an NRT, the manufacturers' claims of the e-cigarette's therapeutic properties must be verified (Abrams, 2014; Pearson, Richardson, Niaura, Vallone & Abrams, 2012; Regan et al., 2011). The first step in ascertaining the aforementioned verification is to clarify the internal workings and ingredients of the e-cigarette. This clarification is included for the benefit of the reader, so as to understand the background of the e-cigarette and to obtain a better grasp of the topic.

The e-cigarette consists of a rechargeable battery, a mouth piece, an airflow sensor, a vaporiser or atomiser, and a nicotine cartridge, all of which fits into a cigarette-like container (Caponnetto et al., 2013; Etter, 2010; Lee et al., 2011; Yamin et al., 2010). The e-cigarette design differs slightly among different manufacturers, namely in the variation in size, appearance, flavours, and handling capability. However, the internal and external components serve the same functionality of delivering nicotine to the lungs (Odum et al., 2012; Sutfin et al., 2013). e-Cigarettes achieve this functionality when air is drawn in through the mouth piece or by pressing a small button, activating the airflow sensor. The atomiser or vaporiser

then heats the e-liquid in the nicotine cartridge, converting the fluid into a vapour that the user inhales. The aforementioned process is known as 'vaping'. (Chen, 2013; Dockrell et al., 2013; Vansickel et al., 2010).

The e-liquid found in the refillable cartridge contains a solution comprising a mixture of varying amounts of nicotine, propylene glycol, and flavourants (Cahn & Siegel, 2010; Corey, Wang, Johnson, Apelberg, Husten, King, McAfee, Bunnell, Arrazola & Dube, 2013; Etter, 2010). Nicotine is derived from the tobacco plant and has addictive properties, providing one of the reasons why smokers are addicted to traditional cigarettes, but with the e-cigarette, a safe dosage is delivered to the e-cigarette smoker, which further protects them from unwanted nicotine due to the incorporated filters (Health New Zealand Ltd., 2008). However, in order for successful intake of nicotine in e-cigarettes, propylene glycol is needed. Propylene glycol is a safe compound commonly found in food that allows for the chemical change of nicotine from an e-liquid to a vapour (Cahn & Siegel, 2011).

Variety is offered to the e-cigarette consumer in the form of different flavours. The flavours that are offered range from classic tobacco, cherry, peach, strawberry, mint, chocolate, café mocha, and pina colada. The traditional tobacco flavour has proven to be the most popular; however, females have a preference for the fruity or chocolate flavours (Corey et al., 2013; Dawkins et al., 2013; Etter, Bullen, Flouris, Laugesen, & Eissenberg, 2011). e-Cigarette manufacturers have extended the flavour range offered by incorporating a homeopathic e-liquid. The homeopathic flavours are healthier in that no nicotine is included in the solution. The appeal of the various flavours to the youth has been observed as a reason for concern. Researchers have expressed this concern because the appeal of e-cigarettes may become a starter product that kick-starts the smoking of traditional tobacco cigarettes, but these concerns have not been confirmed (Bullen et al., 2010; Regan et al., 2011; Wagener, Siegel & Borrelli, 2012).

The e-cigarette imitates the sensory and behavioural experience of smoking conventional cigarettes. For this reason, researchers have concluded that e-cigarettes may be more effective than NRTs at reducing smoking and promoting smoking cessation, since it is not only the nicotine that smokers are addicted to but also the oral fixation, which other NRTs do not take into consideration (Abrams, 2014; Cahn & Siegel, 2011; Caponnetto et al., 2011). Other NRT products such as nicotine patches, lozenges, gum, nasal sprays, bupropion, and varenicline

have experienced an 80-93% relapse in smokers aiming for smoking cessation. Therefore, e-cigarettes have had higher success rates due to the combination of both the neuropharmacology and bio-behavioural aspects (Barbeau et al., 2013; Farsalinos, Romagna, Tsiapras, Kyrzopoulos & Voudris, 2013).

### 2.3.3). WHO and FDA Regulators

The WHO and the US FDA do not support statistics indicating that e-cigarettes have higher success rates since there is still evidence lacking on certain aspects of the e-cigarette's health and efficacy (Abrams, 2014; Etter, 2010; Pearson et al., 2012; Sutfin et al., 2013). The WHO has banned manufacturers from making claims of smoking cessation until further evidence is furnished regarding therapeutic probability, and the FDA is currently writing regulations for the e-cigarette, however it has proven difficult since the e-cigarette does not fall under the tobacco industry or the NRT category (Goniewicz, 2013; Lee et al., 2011).

### 2.3.4). South African e-Cigarette Industry

In South Africa the FDA has no jurisdiction over regulations on food and drugs, and e-cigarettes are still available for sale under regulations defined by general manufacturing practice (GMP) pharmaceuticals (SGS, 2014). Furthermore, these regulations are conveyed by the SGS SA, formerly known as Société Générale de Surveillance, who offer testing, verification, certification, and inspection services (SGS, 2014). Other countries including Canada, Australia, Brazil, Panama, Singapore, China, Uruguay, Denmark, Switzerland, and Thailand have heeded the FDA and the WHO's concerns and as a consequence have banned the e-cigarette (Heavner et al., 2009; Lee et al., 2011; Yamin et al., 2010).

Regardless of the restrictions on the e-cigarette, there are around 400 e-cigarette brands on the global market, some of which are tobacco cigarette companies' attempts to increase profits since traditional tobacco cigarettes have decreased in the quantities sold over the past few years. The most common brands that have been included in past research are Blu eCigs and Ruyan (Chen, 2013; Kim, Lee, Shafer, Nonnemaker & Makarenko, 2013; Sutfin et al., 2013). These brands are not available in South Africa. There are only a few brands visible in the South African e-cigarette market, namely Twisp, Green Smoke, and Vape (Twisp, 2014; Green Smoke, 2014; Vape, 2014). According to the Mail & Guardian (2015), Twisp holds approximately 95% of the market share within the South African e-cigarette market, where

Nathan Smith (Twisp's marketing director) has noted a stable increase of 10 000 new consumers per month.

As with the rest of the world, South Africa has experienced a rapid popularity increase in e-cigarettes. The popularity of e-cigarettes can be corroborated by the amount of searches on the internet for e-cigarettes and other smoking alternatives by a growth of approximately five thousand percent (Ayers, Ribisl & Brownstein, 2011; Yamin et al., 2010). The popularity is accredited to many factors including variety, cost, health, smoking cessation, reduction possibility, vanity, and public freedom (Etter et al., 2011; Odum et al., 2013; Wagener et al., 2012).

Variety is offered through the different e-liquid flavours and the different designs of the e-cigarette container. Cost has been calculated to be cheaper than tobacco cigarettes in the long-run and e-cigarettes are not burdened by heavy sin taxation (Sutfin et al., 2013). The fact that there is no combustion of tobacco, no carbon monoxide, and fewer toxicants and carcinogens, the e-cigarette smokers are not susceptible to the same risks of disease that tobacco cigarettes incur, contributing to the health factor (Barbeau et al., 2013; Lee et al., 2011; Peters Jr et al., 2013; Sutfin et al., 2013). The high probability of e-cigarettes aiding in smoking cessation and reduction is the factor that holds the most weight since it is this element that turns potential consumers onto e-cigarettes. Vanity is observed due to the fact that no foul smells settle into hair and clothing or on the breath, and teeth do not yellow. The other factor, is that people have the freedom to smoke e-cigarettes in indoor public areas such as restaurants, bars, or cinemas as the vapour released from the e-cigarette does not contaminate the air around it (McAuley, Hopke, Zhao & Babaian, 2012; Siegel et al., 2011; Quinn, Majtaba & Cavico, 2011; Vansickel, 2010; Wagener et al., 2012).

### 2.3.5). Consumer's e-Cigarette Beliefs

Perceptions voiced by the public have revealed that consumers believe the e-cigarette to be healthier than tobacco cigarettes, due to the fact that the e-cigarette does not contain tobacco and does not require combustion (Goniewicz & Zielinska-Danch, 2012; Heavner et al., 2009; Peters Jr et al., 2013; Schripp et al., 2013). Thousands of carcinogens and toxicants are released in the chemical reactions that take place during the combustion of tobacco. Therefore, because e-cigarettes are free from these reactions, the surrounding atmosphere is 'cleaner'. However, there are still toxic compounds that are released when smoking the e-

cigarette, but this is a small fraction of the damage caused by traditional tobacco cigarettes, and e-cigarettes are estimated to be between 100 to 1000 times safer than traditional tobacco cigarettes (Sutfin et al., 2013; Yamin et al., 2010). Additionally, the air is not contaminated since 98% of the nicotine is absorbed through the mucosa, leaving a remainder of water vapour (Goniewicz et al., 2013; Health New Zealand Ltd., 2009).

### 2.3.6). e-Cigarette Concerns

Overall, e-cigarettes are considered controversial products that are relatively new to the market (Dawkins et al., 2013). The product is perceived as controversial because it has the potential to be used as a healthier alternative to traditional tobacco cigarettes, yet it still releases an addictive substance, provoking the consideration of some non-ethical issues (Dawkins et al., 2013; Goniewicz & Zielinska-Danch, 2012; Peters Jr et al., 2013; Trtchounian et al., 2010). Researchers have identified the e-cigarette as a potentially successful smoking reduction device that dually aids in smoking cessation (Siegel et al., 2011). However, there is concern regarding what by-products are created during the process of heating e-liquid into vapour to be inhaled because there is still insufficient evidence to clarify all the chemical reactions that occur (Borland, 2011; Goniewicz et al., 2013; Health New Zealand, 2009; Heavner et al., 2009).

There is also concern amongst some researchers that the product can be used as a starter product for the youth or others who did not originally smoke tobacco because e-cigarettes have attractive properties such as the variety in appearance and the appeal of flavours (Chen, 2013; Corey et al., 2013; Dawkins et al., 2013; Kim et al., 2013; Regan et al., 2011; Sutfin et al., 2013). Nevertheless, the main concern is that nicotine is the key ingredient in the e-liquid and it is highly addictive, and this raises an ethical concern of creating nicotine addicts (Barbeau et al., 2013; Cahn & Siegel, 2011; Etter, 2010; Heavner et al., 2009). On the other hand, there are consumers that believe the e-cigarette to be a successful smoking reduction and cessation device, and if the product is to be banned, there is further concern that the consumer will resort to smoking tobacco, which is significantly worse for the consumer's health. Such a ban would remove a viable option for those consumers who want, and in some severe cases, need to quit (Etter & Bullen, 2011; Farsalinos et al., 2013; Siegel et al., 2011).

In the event that e-cigarettes are banned, consumers will be left NRTs (Abrams, 2014; Cahn & Siegel, 2011). However, consumers and researchers consider NRTs to be less effective in

countering traditional tobacco cigarette withdrawal symptoms and cravings when reducing or ceasing the use of the tobacco cigarette (Caponnetto, 2011; Odum et al., 2012). The main reason behind researchers and consumers believing that the e-cigarette is more successful than NRTs is due to the consideration and incorporation of the oral fixation into the e-cigarette design (Barbeau et al., 2013; Bullen et al., 2010; Health New Zealand, 2008). This means that through mimicking the actions of smoking traditional cigarettes, e-cigarettes have eliminated the need to bring objects toward the mouth (Farsalinos et al., 2013; Polosa et al., 2011). The oral fixation that accompanies the e-cigarette can be supported by a theory developed by Sigmund Freud, which is highly recognised in the psychoanalytical field of study (Friedman & Schustack, 2012; Watts, Cockcraft & Duncan, 2009).

## 2.4). Conclusion

To conclude, in Chapter 2 the research context was discussed and provided a contextualisation of the research by an in depth discussion of the e-cigarette, so as to understand the background of the research conducted. The chapter also briefly discussed the targeted audience that was used to complete the research presented in this dissertation.

# CHAPTER 3: THEORETICAL FOUNDATION AND EMPIRICAL LITERATURE

## 3.1). Introduction

Chapter 3, theoretical foundation and empirical literature, is the literature overview covering the theoretical framework, and discusses the principal theories upon which the research has been constructed. Furthermore, from the previous literature that is to be analysed, certain overall trends, the development of the theory, some landmark findings, experts in the field, and conclusions of prior literature will be highlighted. The chapter also includes a review of the literature containing the variables of interest. The variables covered in the literature overview are that of consumer resistance, product diffusion, relative advantage, compatibility, complexity, trialability, observability, and perceived risk. Justification for why each of these constructs is included in the study will be provided. This will cover the empirical framework that has been gathered through the secondary research. The literature overview is thus a summary, interpretation, and critical evaluation of the existing literature available on the variables of interest to this study, and is vital in order to establish a current knowledge of the topic.

## 3.2). Theory One: Diffusion of Innovations Model

The Diffusion of Innovations Model is a theory that relates adoption and behaviour to innovations, and explains how this process occurs over a period of time (Haghirian et al., 2008; Kumar et al., 2007). Within the Diffusion of Innovations Model, adoption behaviour is observed to be affected by a consumer's perception of an innovation (Demoulin & Zidda, 2009). Marketers find this model useful in explaining the adoption or non-adoption of innovations by consumers, hence why this model has been included in the current study (MacVaugh & Schiavone, 2010). An assumption is made that the consumer undergoes a series of mental processes from the initial awareness of an innovation to the final stage of adoption (Claudy, 2011). Thus, the diffusion of innovations, within the current study, is defined as the rate of adoption of an innovative product (Demoulin & Zidda, 2009).

Figure 2.1: The Diffusion of Innovations Model
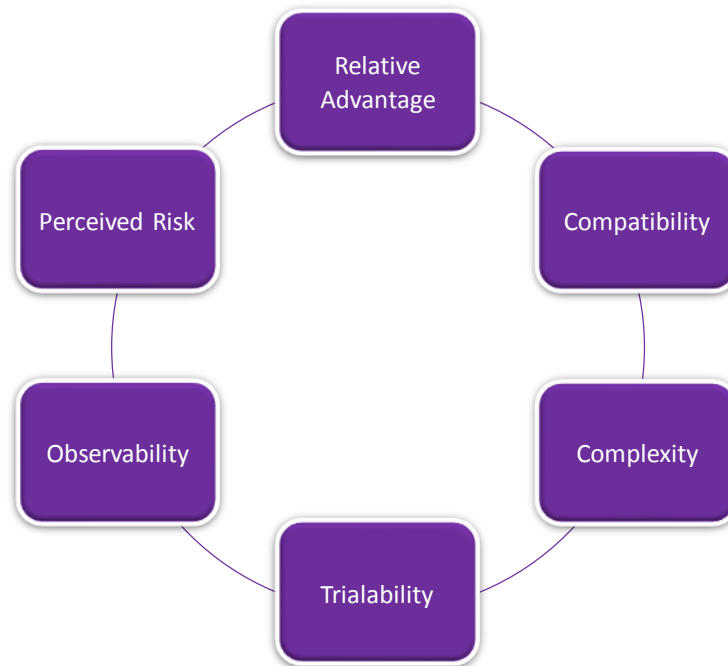


Within the Diffusion of Innovations Model there are five characteristics, constructs, or attributes, namely relative advantage, compatibility, complexity, trialability, and observability (Kleijnen et al., 2009). However, in later studies conducted by Rogers (2003) and other authors, it was found that perceived risk is in fact also a characteristic that should be included in the model since it has been observed to affect consumer adoption of innovations (Kleijnen et al., 2009).

**3.2.1). Relative Advantage**

As mentioned above, the first characteristic is relative advantage, which has been defined in past studies as the superiority or the added benefit that an innovation provides over the already existing product that supersedes it (Dwivedi, 2005; Claudy et al., 2010; Lichtenstein & Williamson, 2006). This would affect the consumer's decision to adopt the product, whereby the benefits should outweigh those of the existing product in order for there to be a rational or logical reason for the consumer to switch to the innovation (Chinman et al., 2008).

However, the superiority or added benefits of the innovation is highly subjective since it is based on the consumer's perception and not on factual evidence (Demoulin & Zidda, 2009).

### 3.2.2). Compatibility

The second characteristic, compatibility, refers to the consistency or how well the innovation fits into the existing consumer routines, values, experiences, beliefs, behaviours, and needs of the consumer whom it is intended to target (Claudy, 2011; Lichtenstein & Williamson, 2006). Familiarity with the features or any other attributes of the innovation is likely to affect how compatible the innovation is with the consumer (Kleijnen et al., 2009).

### 3.2.3). Complexity

The third characteristic, complexity, is observed to be the scale of difficulty associated with understanding and using a new innovation (Demoulin & Zidda, 2009). The more difficult an innovation is perceived to be in terms of understanding and use, the less likely the innovation will be adopted by a consumer (Claudy, 2011; MacVaugh & Schiavone, 2010).

### 3.2.4). Trialability

The fourth characteristic, trialability, is defined as the degree of opportunity awarded to try out or experiment with a new, innovative product with the idea that it will aid a potential customer in deciding whether or not to adopt the product (Claudy et al., 2010; Lichtenstein & Williamson, 2006). Trials typically span over a limited amount of time before adoption takes place and are used as mechanisms to reduce the consumer's perceived risk of adopting the innovation (Chinman et al., 2008).

### 3.2.5). Observability

The fifth characteristic, observability, refers to the rate of visibility of successfully using an innovation in front of other individuals within a specific social group, and how communicable the innovation is among that group (Kleijnen et al., 2009). When there is low visibility of successful use of an innovation, the rate of adoption slows (Lichtenstein & Williamson, 2006).

### 3.2.6). Perceived Risk

The sixth characteristic, perceived risk, has been described as the level of uncertainty surrounding an innovation, especially those innovations that are a context-based technology or are highly personalised (Kleijnen et al., 2009). Perceived risk has been divided into five

types of risk, namely physical, psychological, social, financial, and functional risk (Kleijnen et al., 2009). Consumers will search for information regarding the innovation's attributes that could possibly be beneficial in order to reduce the perceived level of risk associated with adopting an innovation (Dwivedi, 2005). However, certain consumers would rather purchase and pay a higher fee for a product that carries familiarity, and therefore experience less uncertainty (Talke, Saloma, Weiringa, & Lutz, 2009).

Overall, each of the six characteristics aids in the understanding of the Diffusion of Innovations Model, whereby each contributes uniquely towards relating adoption and behaviour to innovations, and explaining how this process occurs over a period of time, thus defining the rate of adoption of an innovative product (Demoulin & Zidda, 2009; Haghirian et al., 2008; Kumar et al., 2007). Therefore, the theory has been applied to the current study in terms of constructing the conceptual model and forming the independent constructs that are the foundation of the research.

### 3.3). Theory Two: The Technology Acceptance Model

The Technology Acceptance Model (TAM) is considered to be based on or is an adaptation of the Theory of Reasoned Action (TRA) and was proposed by Davis in 1989 (Claudy, 2011; Dwivedi, 2005). The TAM combines both perceived usefulness and perceived ease of use to determine the adoption outcome of technologies with regard to the consumer's attitudes towards those technologies (Dwivedi, 2005; Kumar et al., 2007). The TAMS's main objective is to explain and predict the acceptance of technology before the consumer has the chance to experience the technology, so as to facilitate any design changes that need to occur (Jung, Chan-Olmsted, Park & Kim, 2012).

Figure 2.2: The Technology Acceptance Model
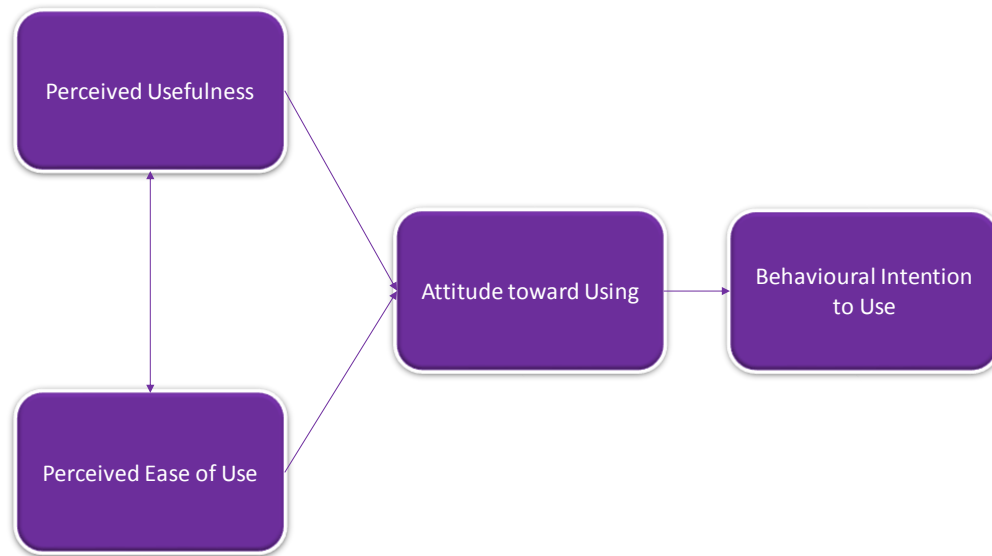


### 3.3.1). Perceived Usefulness

Perceived usefulness refers to how a consumer views a particular technological product's ability to improve or enhance the effectiveness of the performance of a particular job or activity (Claudy, 2011). Perceived usefulness can also be viewed as how well a need or requirement is satisfied through a particular technology and this is interpreted via the user's differing perspectives (Kleijnen et al., 2009).

### 3.3.2). Perceived Ease of Use

Perceived ease of use differs from perceived usefulness in that it no longer looks at the effectiveness of the technology, but instead, focuses on the efficiency of the technology (Claudy, 2011). In other words, perceived ease of use focuses on how much effort is considered to be associated in using the technology (Dwivedi, 2005; Kleijnen et al., 2009).

Both perceived usefulness and perceived ease of use make significant contributions toward the understanding of diffusion among consumers, which is why marketers generally find the TAM a useful theory in determining the intention of adopting a technology and the subsequent use thereof, and thus the reason for the TAM's inclusion within this study (Dwivedi, 2005; Haghirian et al., 2008). Therefore, the application of the theory has been applied to the current study in terms of gathering a deeper understanding of the constructs that make significant contributions toward diffusion and has not been included in constructing the model. However, exploring both the Diffusion of Innovations Model and the

TAM needs to be placed into context within the current research study. A comprehensive literature overview is presented hereunder in order to provide a panoramic view of the topic under study.

### 3.4). Consumer Resistance

Consumer resistance has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance in this study.

#### a). Importance of Consumer Resistance

The contemporary consumer has become more cognisant of the terms surrounding consumption and the expertise that each consumer has in this respect (Galvagno, 2010). Today's consumer displays more dominance over the choice to consume and the ability to resist marketing efforts, such as ignoring or adapting even the most lustrous marketing campaigns, hence the expression, consumer resistance (Abzakh, Ling, & Alkilani, 2013; Moraes et al., 2008). Consumer resistance has been attributed to initiating transformative power by co-creating new market principles, new forms of interchange, and innovative goods and services (Denegri-Knott, Zwick, & Schroeder, 2006). Depending on the ingenuity of marketers, it is possible to convert, control, and exploit these transformative powers (Galvagno, 2010). When marketers are successful in achieving this, then consumers can be liberated from market communication because legitimate power is handed over to the consumer, ultimately resulting in market evolution and development (Dengri-Knott et al., 2006; Shankar et al., 2006).

#### b). Definition of Consumer Resistance

Consumer resistance refers to a consumer's efforts to reject a particular product or service, whether it is innovative in nature or not (Galvagno, 2010). Thus, consumer resistance is a behaviour that is exhibited by consumers concerning a particular, general motivation or group action and can include behaviours such as rejection, postponement, or opposition (Cova & Dalli, 2008; Kleijnen et al., 2009).

#### c). Previous Research on Consumer Resistance

According to Galvagno's (2010) research, a paper that discusses past consumer resistance research, the most influential authors contributing to the existing literature on consumer

resistance, based purely on the number of citations ranging between six and 10 citations, are (in order of most to least influential) Thompson, Firat, Penaloza, Belk, Focault, Kozinetz, Holt, Herrmann, and Bourdieu. Other previous research referred to within the dissertation includes an exploration of consumer power by Denegri-Knott et al. (2006), the freegan phenomenon by Pentina and Amos (2010), the Faucauldian interpretation of empowerment by Shankar et al. (2006), perceived risk on consumer resistance regarding generic drugs by Abzakh et al. (2013), consumer experiences with market resistance by Close and Zinkhan (2007), and green innovation resistance by Claudy et al. (2010).

### d). Conceptualisation of Consumer Resistance

The measurement scale concerning consumer resistance within this study is an adaptation of the scale provided by the research conducted by Abzakh et al. (2013) and Claudy (2011), and the scale has been modified to incorporate e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Abzakh et al. (2013) and Claudy (2011), where the reliability of these scales ranges from 0.862 and 0.764, respectively.

### e). Relevance to the Current Study

Consumer resistance is an important construct within the current study as it is the dependent variable to the Diffusion of Innovations Model, which is the primary theory this research study is based upon (Claudy et al., 2010; Demoulin & Zidda, 2009). Consumer resistance then provides a clearer understanding into studying the diffusion of e-cigarettes, providing a heuristic overview of the base elements of the research contained in this dissertation (Gourville, 2006).

## 3.5). Relative Advantage

Relative advantage has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance toward the current study.

### a). Importance of Relative Advantage

Importance of the construct of relative advantage, within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of Innovations Model (Chinman et al., 2008; Choudhury & Karahanna, 2008). Diffusion or

the rate of adoption is dependent on the perceived relative advantage that an innovation possesses into other closely competing products (Lichtenstein & Williamson, 2006; Tanakinjal et al., 2010). By understanding what consumers find advantageous, marketers can market a future product innovation in the most appropriate fashion, whereby the most beneficial aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

### b). Definition of Relevant Advantage

Relative advantage has been defined in past studies as the superiority or the added benefit that an innovation provides over the already existing product that supersedes it (Dwivedi, 2005; Claudy et al., 2010; Lichtenstein & Williamson, 2006). This would affect the consumer's decision to adopt the product, since the benefits should outweigh those of the existing product in order for there to be a rational or logical reason for the consumer to switch to the innovation (Chinman et al. 2008). However, the superiority or added benefits of the innovation is highly subjective since they are based on the consumer's perception and not on factual evidence (Demoulin & Zidda, 2009).

### c). Previous Research on Relative Advantage

Prior research regarding relative advantage mostly includes work covering the Diffusion of Innovations Model, since it is one of the theory's characteristics. Lichtenstein and Williamson (2006), and Laukkanen, Sinkkonen, Kivijarvi, and Laukkanen (2007) make reference to the construct in terms of the adoption of and the resistance of electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009) reference relative advantage through the drivers of adopting grocery retail market loyalty cards. Lastly, Gourville (2006) focuses on relative advantage from the perspective of the psychology behind adoption.

### d). Conceptualisation of Relative Advantage

The measurement scale concerning relative advantage has been adapted from the prior work of Forsythe, Liu, Shannon, and Gardner (2006) and Jung et al., (2011), and the scale has been modified to include e-cigarettes in place of electronic shopping and e-books. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained

by Forsythe et al. (2006) and Jung et al. (2011), where the reliability of the characteristic was measured at 0.898 and 0.86, respectively.

*e). Relevance to the Current Study*

Relative advantage is an important construct within this research study since it is one of the characteristics that comprises the Diffusion of Innovations Model, which is the primary theory that the research in this dissertation is based on (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing a clearer understanding into studying the diffusion of e-cigarettes, relative advantage is also closely related to consumer resistance, thus providing a heuristic overview of the base elements of the research contained in the present dissertation (Gourville, 2006).

**3.6). Compatibility**

Compatibility has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance to the current study.

*a). Importance of Compatibility*

The importance of the construct of compatibility, within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of Innovations Model (Claudy, 2011; Lichtenstein & Williamson, 2006; Schiffman & Kanuk, 2010). Diffusion or the rate of adoption is dependent on the perceived compatibility that an innovation possesses in contrast to other closely competitive products (Lichtenstein & Williamson, 2006). By understanding what consumers find compatible, marketers can market a future product innovation in the most appropriate fashion, whereby the most familiar and compatible aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Kleijnen et al., 2009).

*b). Definition of Compatibility*

Compatibility, refers to the consistency or how well the innovation fits within the existing consumer routines, values, experiences, beliefs, behaviours, and needs of the consumer whom it is intended to target (Claudy, 2011; Lichtenstein & Williamson, 2006; Schiffman & Kanuk,

2010). Familiarity with the features or any other attributes of the innovation is likely to affect how compatible the innovation is with the consumer (Kleijnen et al., 2009).

### c). Previous Research on Compatibility

Prior research regarding compatibility mostly includes work covering the Diffusion of Innovations Model, since it is one of the theory's characteristics. Lichtenstein and Williamson (2006), and Laukkanen et al. (2007) make reference to the construct in terms of the adoption of and the resistance of electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009) reference compatibility through the drivers of adopting grocery retail market loyalty cards. Lastly, Gourville (2006) focuses on compatibility from the perspective of the psychology behind adoption.

### d). Conceptualisation of Compatibility

The measurement scale concerning compatibility has been adapted from the prior workings of Wu and Wang (2005) and Jung et al. (2011), and the scale has been modified to include e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Wu and Wang (2005) and Jung et al. (2011), where the composite reliability for the characteristic was measured at 0.93 and 0.84, respectively.

### e). Relevance to the Current Study

Compatibility is an important construct within the current study since it is one of the characteristics that comprises the Diffusion of Innovations Model, which is the primary theory that this research study is based on (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing a clearer understanding into studying the diffusion of e-cigarettes, compatibility is also closely related to consumer resistance, thus providing a heuristic overview of the base elements of the research contained in this dissertation (Gourville, 2006).

## 3.7). Complexity

Complexity has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance toward the current study.

### a). Importance of Complexity

Importance of the construct of complexity within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of

Innovations Model (Chinman et al., 2008; Choudhury & Karahanna, 2008). Diffusion or the rate of adoption is dependent on the perceived complexity that an innovation possesses in contrast to other closely competitive products (Lichtenstein & Williamson, 2006; Tanakinjal et al., 2010). By understanding what consumers find complex, marketers can market a future product innovation in the most appropriate fashion, whereby the most user-friendly aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Tanakinjal et al., 2010).

### b). Definition of Complexity

Complexity is observed to be the scale of difficulty associated with understanding and using a new innovation (Demoulin & Zidda, 2009; Kleijnen et al., 2009). The more difficult an innovation is perceived to be in terms of understanding and using it, the less likely a consumer is to adopt the innovation (Claudy, 2011; MacVaugh & Schiavone, 2010).

### c). Previous Research on Complexity

Prior research regarding complexity mostly includes work covering the Diffusion of Innovations Model, since it is one of the characteristics that comprises the theory. Lichtenstein and Williamson (2006), and Laukkanen et al. (2007) make reference to the construct in terms of the adoption of and resistance to adoption of and resistance to adoption of and resistance to electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009) reference complexity through the drivers of adopting grocery retail market loyalty cards. Talke et al. (2009) refer to complexity within design newness. Lastly, Gourville (2006) focuses on complexity from the directive of the psychology behind adoption.

### d). Conceptualisation of Complexity

The measurement scale concerning complexity has been adapted from the prior research by Schreier, Oberhauser, and Prugl (2006), and the scale has been modified to include e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Scheier, Oberhauser, and Prugl (2006), where the reliability was calculated at 0.72.

*e). Relevance to the Current Study*

Complexity is an important construct within the current study since it is one of the characteristics that comprises the Diffusion of Innovations Model, which is the primary theory that the research in this dissertation is based upon (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing a clearer understanding into studying the diffusion of e-cigarettes, complexity is also closely related to consumer resistance, thus providing a heuristic overview of the research's base elements contained in this dissertation (Gourville, 2006).

**3.8). Trialability**

Trialability has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance to the current study.

*a). Importance of Trialability*

The importance of the construct of trialability within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of Innovations Model (Chinman et al., 2008; Choudhury & Karahanna, 2008). Diffusion or the rate of adoption is dependent on the perceived trialability that an innovation possesses in contrast to other closely competing products (Lichtenstein & Williamson, 2006; Tanakinjal et al., 2010). By understanding what consumers find testable, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer is given the opportunity to try the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

*b). Definition of Trialability*

Trialability is defined as the degree of opportunity awarded to try or experiment with a new innovative product with the idea that it will aid a potential customer in deciding whether or not to adopt the product (Claudy et al., 2010; Lichtenstein & Williamson, 2006). Trials typically span a limited amount of time before adoption takes place, and they are used as mechanisms to reduce the consumer's perceived risk of adopting the innovation (Chinman et al., 2008).

*c). Previous Research on Trialability*

Prior research regarding trialability mostly includes work covering the Diffusion of Innovations Model, since it is one of the theory's characteristics. Lichtenstein and Williamson (2006), and Laukkanen et al. (2007) make reference to the construct in terms of the adoption of and resistance to adoption of and resistance to electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009) reference trialability through the drivers of adopting grocery retail market loyalty cards. Lastly, Gourville (2006) focuses on trialability from the perspective of the psychology behind adoption.

*d). Conceptualisation of Trialability*

The measurement scale concerning trialability has been adapted from Jung et al.'s (2011) work, and the scale has been modified to include e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Jung et al. (2011), where the reliability is calculated at 0.88.

*e). Relevance to the Current Study*

Trialability is an important construct within the current study since it is one of the Diffusion of Innovations Model's characteristics, which is the primary theory that the research in this dissertation is based on (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing a clearer understanding into studying the diffusion of e-cigarettes, trialability is also closely related to consumer resistance, thus providing a heuristic overview of the base elements of the research contained in this dissertation (Gourville, 2006).

**3.9). Observability**

Observability has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance in the current study.

*a). Importance of Observability*

The importance of the construct of observability within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of Innovations Model (Chinman et al., 2008; Choudhury & Karahanna, 2008). Diffusion or the rate of adoption is dependent on the perceived observability that an innovation possesses in contrast to other closely competing products (Lichtenstein & Williamson, 2006; Tanakinjal

et al., 2010). By understanding what consumers find to be social status markers, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer will be able to observe other more socially stable consumers using the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

### b). Definition of Observability

Observability refers to the rate of visibility of successfully using an innovation in front of other individuals within a specific social group, and how communicable the innovation is in that group (Kleijnen et al., 2009). When there is low visibility of successful use of an innovation, the rate of adoption slows (Lichtenstein & Williamson, 2006).

### c). Previous Research on Observability

Prior research regarding observability mostly includes work covering the Diffusion of Innovations Model, since it is one of the theory's characteristics. Lichtenstein and Williamson (2006), and Laukkanen et al. (2007) make reference to the construct in terms of the adoption of and resistance to adoption of and resistance to electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009), reference observability through the drivers of adopting grocery retail market loyalty cards. Lastly, Gourville (2006) focuses on observability from the perspective of the psychology behind adoption.

### d). Conceptualisation of Observability

The measurement scale concerning observability has been adapted from the prior research of Fetscherin and Lattemann (2008) and Jung et al. (2011), and the scale has been modified to include e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Fetscherin and Lattemann (2008) and Jung et al. (2011), where the reliability is calculated at 0.67 and 0.84 respectively.

### e). Relevance to the Current Study

Observability is an important construct within the current study since it is one of the Diffusion of Innovations Model's characteristics, which is the primary theory that the research in this dissertation is based upon (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing a clearer understanding into studying the diffusion of e-cigarettes, observability is also closely related to consumer resistance, thus providing a heuristic overview of the base elements of the research contained in this dissertation (Gourville, 2006).

### 3.10). Perceived Risk

Perceived risk has been discussed in terms of its importance within the marketing field, the definition of the construct, previous research conducted, the conceptualisation of the construct, and its relevance to the current study.

#### a). Importance of Perceived Risk

Importance of the construct of perceived risk within the field of marketing can be conveyed through its significance among diffusion theories, especially that of the Diffusion of Innovations Model (Chinman et al., 2008; Choudhury & Karahanna, 2008). Diffusion or the rate of adoption is dependent on the perceived risk that an innovation possesses in contrast to other closely competing products (Lichtenstein & Williamson, 2006; Tanakinjal et al., 2010). By understanding what consumers find risky, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer can reduce uncertainty concerning the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

#### b). Definition of Perceived Risk

Perceived risk has been described as the level of uncertainty surrounding an innovation, especially those innovations that are a context-based technology or are highly personalised (Kleijnen et al., 2009). Perceived risk has been divided into five types of risk, namely physical, psychological, social, financial, and functional risk (Claudy et al., 2010). Consumers will search for information regarding the attributes of an innovation that could possibly be beneficial in order to reduce the perceived level of risk associated with adopting an innovation (Dwivedi, 2005). However, certain consumers would rather purchase and pay a higher fee for a product that carries familiarity (Talke et al., 2009).

#### c). Previous Research on Perceived Risk

Prior research regarding perceived risk mostly includes work covering the Diffusion of Innovations Model, since it is one of the theory's characteristics. Lichtenstein and Williamson (2006), and Laukkanen et al. (2007) make reference to the construct in terms of the adoption of and resistance to electronic banking and the relevant technologies. On the other hand, Demoulin and Zidda (2009) reference perceived risk through the drivers of adopting grocery retail market loyalty cards. Talke et al. (2009) refer to perceived risk within

design newness. Lastly, Gourville (2006) focuses on perceived risk from the perspective of the psychology behind adoption.

### d). Conceptualisation of Perceived Risk

The measurement scale concerning trialability has been adapted from the prior workings of Abzakh et al.'s (2013) work, and the scale has been modified to include e-cigarettes. The measurement scale is expected to be highly reliable based on the Cronbach's alpha obtained by Abzakh et al. (2013), where the reliability ranges between 0.753 and 0.877.

### e). Relevance to the Current Study

Perceived risk is an important construct within the current study since it is one of the Diffusion of Innovations Model's characteristics, which is the primary theory that the research in this dissertation is based on (Claudy et al., 2010; Demoulin & Zidda, 2009). Besides providing clearer insight into studying the diffusion of e-cigarettes, perceived risk is also closely related to consumer resistance, thus providing a heuristic overview of the base elements of the research contained in this dissertation (Gourville, 2006).

### 3.11). Conclusion

Chapter 3, theoretical groundings and empirical literature, has discussed the literature overview covering the theoretical framework, which has elaborated on the principal theories upon which the research has been constructed. Furthermore, from the previous literature that has been analysed, certain overall trends, the development of the theory, some landmark findings, experts in the field, and conclusions of prior literature have been highlighted. The chapter has also included a review of the literature containing the variables of interest. The variables covered in the literature overview are that of consumer resistance, product diffusion, relative advantage, compatibility, complexity, trialability, observability, and perceived risk. Justification for why each of these constructs is included in the study has been discussed. This covered the empirical framework that has been gathered through the secondary research. Therefore, the literature overview was a summary, interpretation, and critical evaluation of the existing literature available on the variables of interest in this study, and was vital in establishing a current knowledge of the topic.

# CHAPTER 4: CONCEPTUAL FRAMEWORK DEVELOPMENT AND HYPOTHESES

## 4.1). Introduction

The conceptual model development and hypotheses firstly presents a diagrammatic illustration of the conceptual model or framework that graphically represents which constructs effect each other and where each lies in relation to the other, therefore illustrating the direction of causality. Secondly, the different variables included in the research and the role that each plays are identified, whether they are dependent or independent variables, predictors or response variables, or moderators or mediators. Thirdly, a hypothesis statement is provided via logical development and states all the hypotheses that were tested in the study. Finally, a detailed hypothesis development is provided, explaining all variables that are assigned roles in the research.

## 4.2). Conceptual Model

Figure 4.1: Conceptual Model
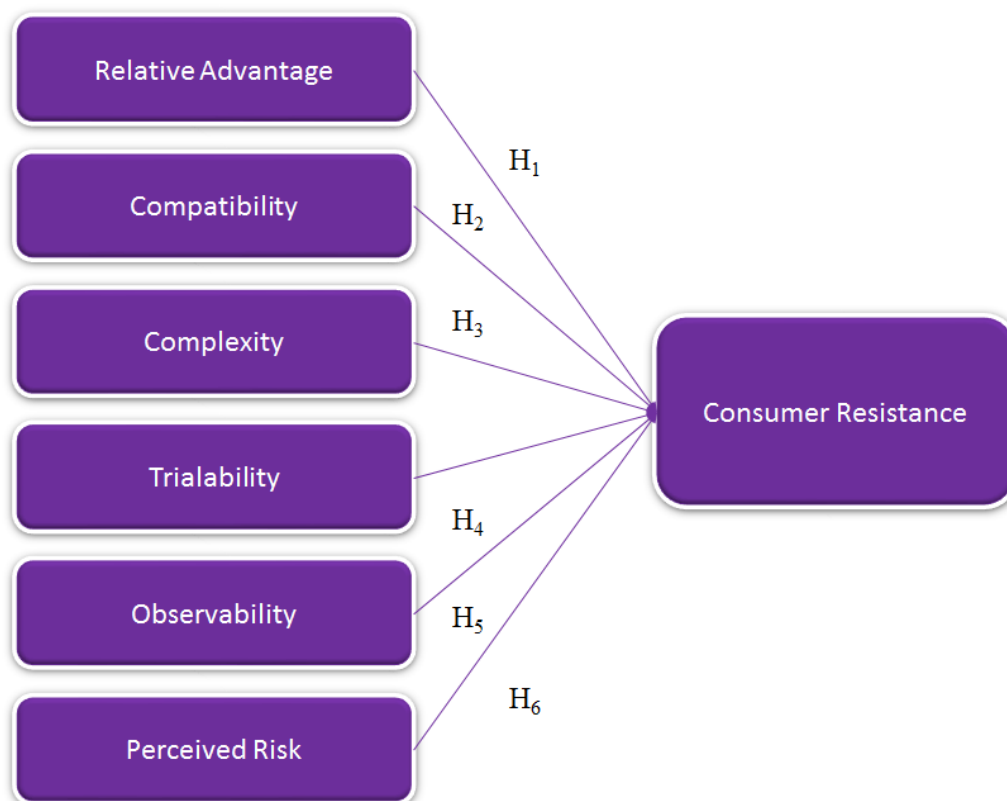
### 4.3). Identification of Variables

The model presented in this research (Figure 4.1) indicates that the independent variables are relative advantage, compatibility, complexity, trialability, observability, and perceived risk. These are defined as the independent variables because the variables are perceived to have an effect on or predict other variables (the hypothesised X), whereas the dependent variable in the study is consumer resistance. Consumer resistance is defined as a dependent variable because the variable is perceived to be affected or predicted by other variables (the hypothesised Y). Therefore, consumer resistance is dependent upon relative advantage, compatibility, complexity, trialability, observability, and perceived risk, and can result in either a positive or negative relationship, as defined in the hypothesis statement.

### 4.4). Hypothesis Statement

$H_1$: There is a negative relationship between relative advantage and consumer resistance.

$H_2$: There is a negative relationship between compatibility and consumer resistance.

$H_3$: There is a positive relationship between complexity and consumer resistance.

$H_4$: There is a negative relationship between trialability and consumer resistance.

$H_5$: There is a negative relationship between observability and consumer resistance.

$H_6$: There is a positive relationship between perceived risk and consumer resistance.

### 4.5). Hypothesis Development

Each construct has undergone a literature review in order to develop the hypotheses surrounding each construct. The literature review included exploring past research to understand the relationships previously proposed and what the results of those propositions were in order to formulate the proposed hypotheses in this study. Therefore, each construct has been examined in relation to each other in order to create a hypothesis development.

### 4.5.1). Relative Advantage

Past studies have defined relative advantage as the superiority or the added benefit that an innovation provides over the already existing product that supersedes it (Claudy et al., 2010; Lichtenstein & Williamson, 2006). Relative advantage is considered to be an important characteristic in affecting a consumer's decision to adopt the product, whereby the benefits should outweigh those of the existing product in order for there to be a rational or logical

reason for the consumer to switch to the innovation (Chinman et al. 2008). By understanding what consumers find advantageous, marketers can promote a future product innovation in the most appropriate fashion, whereby the most beneficial aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

**4.5.1.1). Relative Advantage and Consumer Resistance: Hypothesis One**

The majority of prior research explores the relationship between relative advantage and adoption, however in this study, it is the relationship between relative advantage and consumer resistance that is important, therefore based on the theory postulated in this study, if a consumer adopts a product innovation there should not be resistance present in order for that consumer to have adopted the product innovation. Therefore, the relationship between relative advantage and consumer resistance has built on previous research regarding the relationship between relative advantage and adoption surrounding resistance, such research includes Claudy (2011), Schwarz and Ernst (2008), Lichtenstein and Williamson (2006), Al-Jabir and Sohail (2012), Arts et al. (2011), and Jung et al. (2012).

Schwarz and Ernst's (2008) research was confirmed by Claudy's (2011) research regarding the theory that consumers associate more with innovations when there is a high relative advantage related to that particular innovation. Furthermore, Lichtenstein and Williamson (2006) found that relative advantage was an important consideration in the adoption of internet banking. Al-Jabri and Sohail's (2012) research noted that there was a definite positive impact on adoption in mobile banking. Arts et al. (2011) proposed that relative advantage is a strong driver behind purchase behaviour, and Jung et al. (2012) discovered that high relative advantage is attributed to high diffusion of innovations, and this relates to the consumer's resistance, in that the higher the level of diffusion, the less resistant consumers should be.

Dwivedi (2005) stated that relative advantage when considered an innovation characteristic in the Diffusion of Innovations Model has been used in research studies numerous times and is easily integrated into other theorised models, and therefore the characteristic is an appropriate construct to use in this study. Therefore, the relationships between relative advantage and consumer resistance that is apparent in prior research holds sway in this study since it

provides insight into how consumers will be less resistant to the innovation when the consumer perceives the innovation to hold a higher relative advantage over other products.

From prior research's findings it is evident that there is a negative relationship between relative advantage and consumer resistance in that a high perception of relative advantage of e-cigarettes will result in a less resistant consumer (Dwivedi, 2005). Thus, it is proposed that that a negative relationship exists between the variable relative advantage and consumer resistance.

*$H_1$: There is a negative relationship between relative advantage and consumer resistance.*

Figure 4.2: Relative Advantage and Consumer Resistance
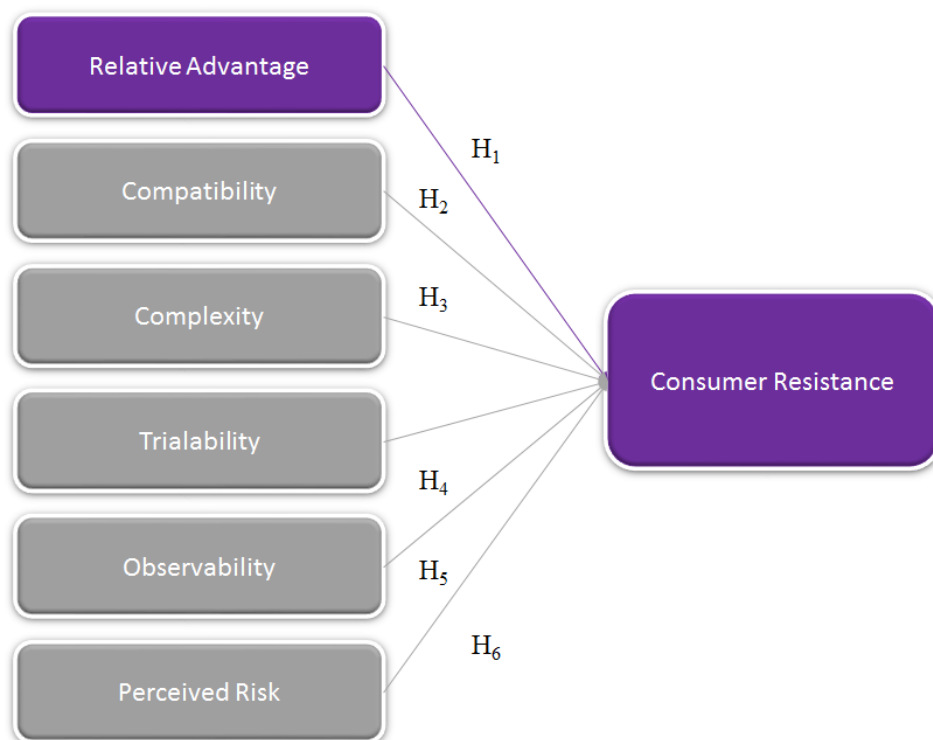


### 4.5.2). Compatibility

Compatibility refers to the consistency or how well the innovation fits into the existing consumer routines, values, experiences, beliefs, behaviours, and needs of the consumer that it intends to target (Claudy, 2011; Lichtenstein & Williamson, 2006; Schiffman & Kanuk, 2010). By understanding what consumers find compatible, marketers can market a future product innovation in the most appropriate fashion, whereby the most familiar and

compatible aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Kleijnen et al., 2009).

### 4.5.2.1). Compatibility and Consumer Resistance: Hypothesis Two

The direct relationship between compatibility and consumer resistance is limited to Kleijnen et al.'s (2009) study, whereby through a meta-analysis of resistance drivers observed that low compatibility leads to the postponement of innovations, and therefore consumer resistance. Therefore, as with relative advantage, this relationship will add to prior studies covering the relationship between compatibility and adoption via the supposition that if a consumer adopts a product innovation there should be no resistance present in order for that consumer to have adopted the product innovation. Therefore, Claudy (2011), Claudy et al. (2010), Schwarz and Ernst (2008), Dwivedi (2005), Arts et al. (2011), Jung et al. (2012), Korhonen and Kaarela, and Al-Jabri and Sohail's (2012) research will be analysed in order to develop the relationship between compatibility and consumer resistance.

While studying consumer resistance toward green innovations, Claudy (2011) found that consumers associate more with the overall compatibility of an innovation, and Claudy et al. (2010) noted that low compatibility in regard to consumers' daily routines and habits equated to a higher consumer resistance. When researching water-saving devices, Schwarz and Ernst (2008) found that compatibility has a significant impact on the adoption of innovations. While studying the adoption of broadband in UK households, Dwivedi (2005) acknowledged that compatibility needs to be expanded in order to facilitate the use and adoption of innovations.

While conducting a meta-analysis of the drivers of intention to use, Arts et al. (2011) found that compatibility is a strong driver of purchase behaviour, noting a higher adoption rate when there is a greater level of compatibility. Jung et al. (2012), found that a greater compatibility resulted in a rapid adoption rate among e-book readers. Korhanen and Kaarela (2011) and Al-Jabir and Sohail (2012) also noted that compatibility has a significant impact upon the adoption of innovations, and therefore resistance should be low when considering the intention to adopt. Therefore, prior research proposes that the relationships between compatibility and consumer resistance holds sway in this study because it provides insight

into how consumers will be less resistant to an innovation when the consumer perceives such innovation to hold a higher compatibility over other products.

It is evident from prior research and conclusions made that there seems to be a relationship between compatibility and consumer resistance, whereby familiarity with the features or any other attributes of the innovation is likely to affect how compatible the innovation is with the consumer (Kleijnen et al., 2009). Therefore, it is proposed that there is a negative relationship between compatibility and consumer resistance.

*$H_2$: There is a negative relationship between compatibility and consumer resistance.*

Figure 4.3: Compatibility and Consumer Resistance
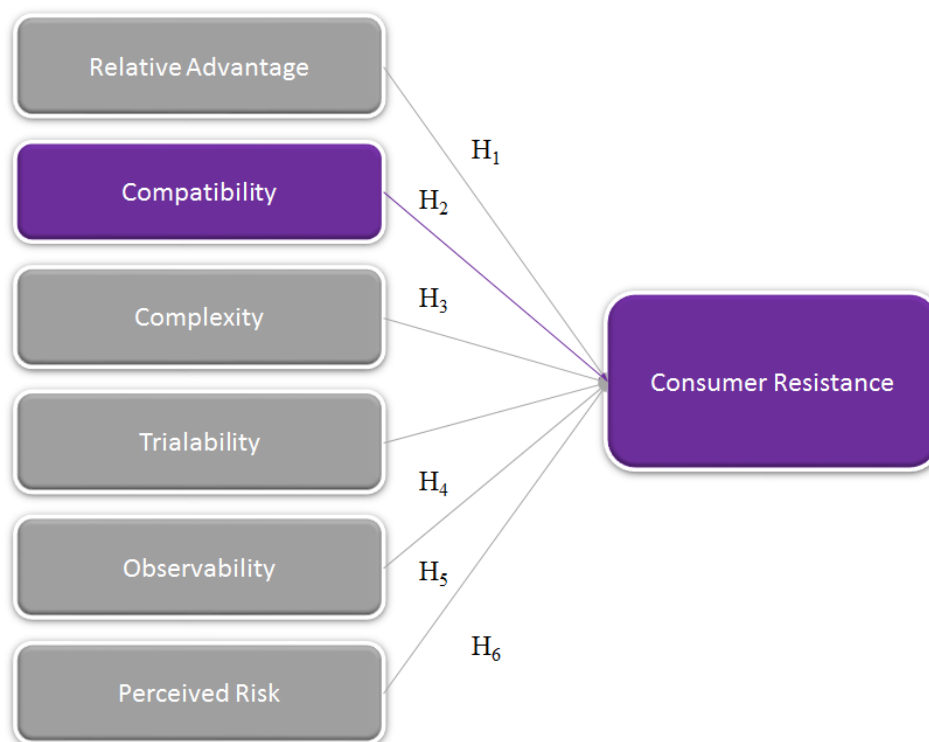


### 4.5.3). Complexity

Complexity is observed to be the scale of difficulty associated with understanding and using a new innovation (Demoulin & Zidda, 2009). By understanding what consumers find complex, marketers can market a future product innovation in the most appropriate fashion, whereby the most user-friendly aspects or attributes of the product will be highlighted and conveyed to the potential consumer, thus resulting in the desired final consumer behaviour of purchase (Tanakinjal et al., 2010).

**4.5.3.1). Complexity and Consumer Resistance: Hypothesis Three**

Claudy et al.'s (2010) study of green innovations states that complexity is one of the reasons behind the many antecedents of consumer resistance and they also found that complexity is related to resistance. Korhonen and Kaarela's (2011) study noted that complexity is related to resistance when exploring industrial services. These two studies attest to the direct relationship between complexity and consumer resistance, which is limited. Therefore, as with relative advantage and compatibility, the following theory has been applied, namely that if a consumer has adopted an innovation, there should be a low resistance presented by that consumer, which means that the relationship between complexity and consumer resistance is built on the relationship between complexity and adoption.

Thus, the relationship between complexity and consumer resistance has been explored previously in research conducted by Claudy (2011), whereby the research proposed that a lower complexity results in a higher association with the consumer when studying resistance toward green product innovations. In a research study on the intention to use e-books, Jung et al. (2012) noted that a low level of complexity is related with a higher rate of adoption. However, when researching mobile banking, Al-Jabir and Sohail (2012) found that complexity does not share a significant effect with adoption. Overall, it is shown that with a low complexity, there is a higher adoption and therefore less resistance is met from the consumer. Therefore, the relationships found between complexity and consumer resistance in prior research holds sway in this study since it provides insight into how consumers will be less resistant to the innovation when the consumer perceives the innovation to hold a lower complexity than that of other products.

As is evident from the above-mentioned previous research, there seems to be a relationship between complexity and consumer resistance, where the more difficult an innovation is perceived to be in terms of understanding and usage, the less likely it is that the innovation will be adopted by the consumer (Claudy, 2011; MacVaugh & Schiavone, 2010). Thus, it is posited that there is a positive relationship between complexity and consumer resistance.

*$H_3$: There is a positive relationship between complexity and consumer resistance.*

Figure 4.4: Complexity and Consumer Resistance
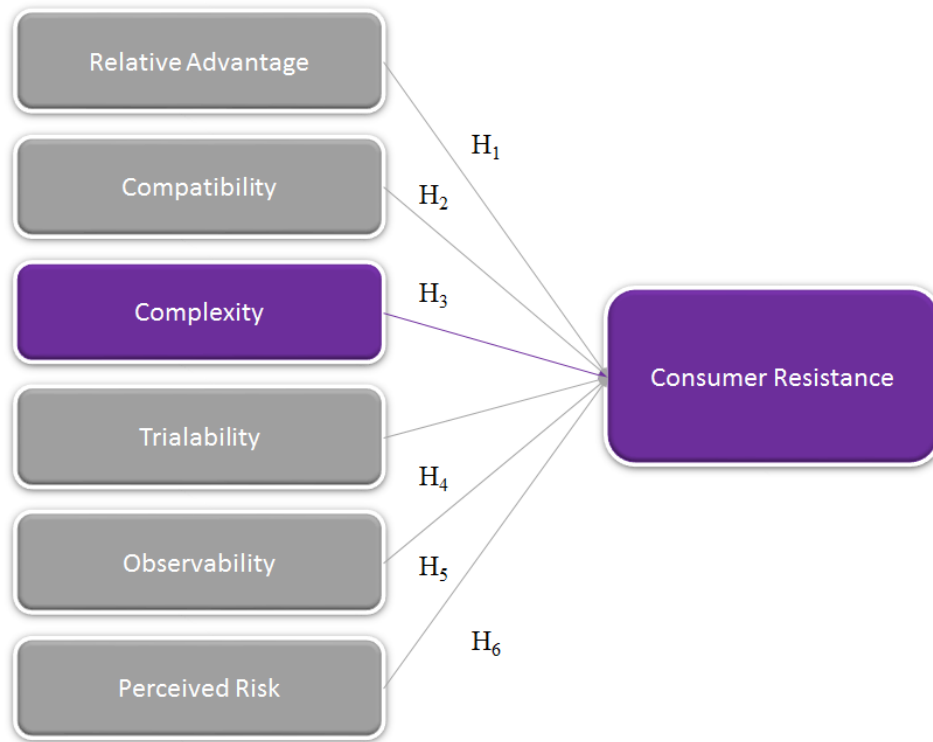


### 4.5.4). Trialability

Trialability is defined as the degree of opportunity granted to try or to experiment with an innovative product, with the idea that it will aid a potential customer in deciding whether or not to adopt the product (Claudy et al., 2010; Lichtenstein & Williamson, 2006). By understanding what consumers find testable, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer is afforded the opportunity to try the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

### 4.5.4.1). Trialability and Consumer Resistance: Hypothesis Four

The relationship between trialability and consumer resistance has been previously explored through research conducted by Demoulin and Zidda (2009), Schwarz and Ernst (2008), Claudy et al. (2010), Arts et al. (2011), Al-Jabir and Sohail (2012), and Jung et al. (2012). However, these studies, excluding Demoulin and Zidda (2009) and Claudy (2011), do not

display a direct relationship between trialability and consumer resistance, and rather represent the relationship between trialability and adoption. These studies have been used to develop the relationship between trialability and consumer resistance by theorising that there should be a low resistance when a consumer has adopted an innovation.

Demoulin and Zidda (2009) found that trialability relates to consumer resistance through the drivers affecting the adoption of grocery retail market loyalty cards. Claudy et al. (2010) postulated that trialability has a negative on consumer resistance, and this was found to be justified. When studying water-saving devices, Schwarz and Ernst (2008) observed that there was a positive relationship between trialability and adoption. A small significant positive effect between trialability and intention to adopt was found in Arts et al.'s (2011) research. However, Al-Jabir and Sohail (2012) noted that there was no significant effect on adoption in the mobile banking industry.

On the other hand, Jung et al. (2012) noted that rapid adoption is equated to an increased trialability among the intention to use e-books, thus it can generally be concluded that the greater the intention to use or adopt an innovation, the less resistance the consumer should exert. Therefore, the relationships between trialability and consumer resistance found in prior research holds sway in this study since it provides insight into how consumers will then be less resistant to an innovation when the consumer perceives such innovation to hold a higher trialability over other products.

Evident from the conclusions reached in prior research studies, there seems to be a relationship between trialability and consumer resistance in that the more opportunity that a consumer has to try a product the less resistant that consumer will be when deciding on whether or not to adopt the product (Chinman et al., 2008). It is thus proposed that there is a negative relationship between trialability and consumer resistance.

*H₄: There is a negative relationship between trialability and consumer resistance.*

Figure 4.5: Trialability and Consumer Resistance
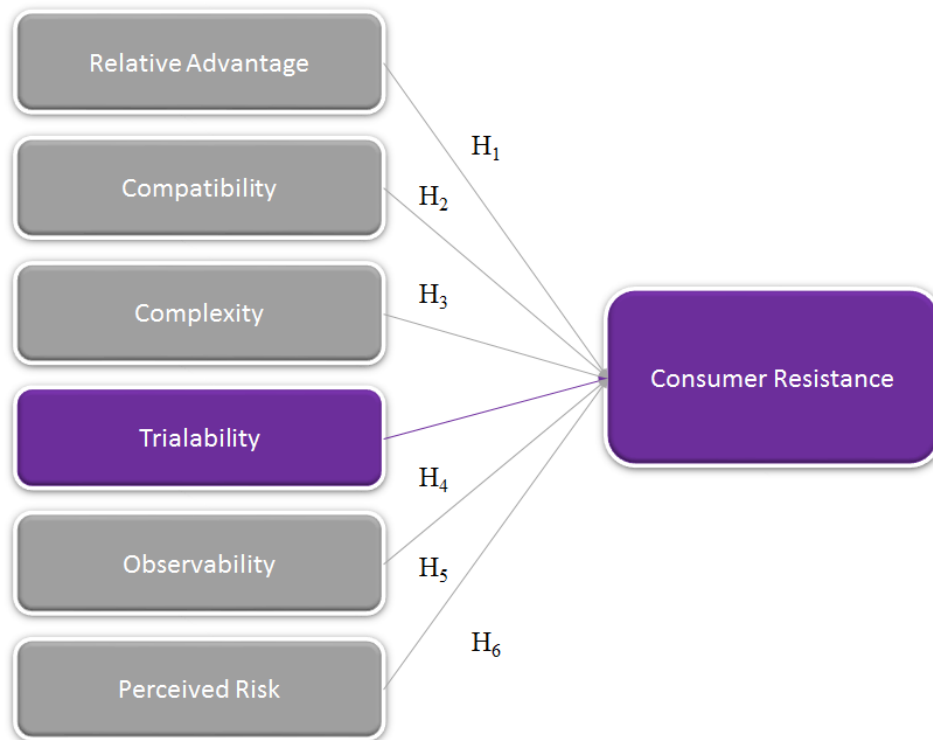


### 4.5.5). Observability

Observability refers to the rate of visibility of successfully using an innovation in front of other individuals in a specific social group, as well as how communicable such innovation is among that group (Kleijnen et al. 2009). By understanding what consumers find to be social status markers, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer will be able to observe other more socially stable consumers using the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

### 4.5.5.1). Observability and Consumer Resistance: Hypothesis Five

There is a limited amount of research that directly conveys the relationship between observability and consumer resistance, therefore based on the theory postulated in this study, if a consumer adopts a product innovation there should not be resistance present in order for that consumer to have adopted the product innovation, in this way the relationship between observability and adoption can be used to develop the relationship between observability and

consumer resistance, as is evident in Fetscherin and Lattemann (2008) and Jung et al.'s (2012) research.

The relationship between observability and consumer resistance has previously been explored in Fetscherin and Lattemann's (2008) research, which concluded that observability affects user intention and acceptance in Virtual Worlds. Observability can also be represented as a negatively related variable to consumer resistance due to the fact that it has been established that teens are more likely not to resist adopting e-cigarettes when the product has been observed in a favourable setting through the use or positive discussion by peers, friends, or family (Mail & Guardian, 2015).

Jung et al. (2012) observed that a greater observability relates to a more rapid adoption of an innovation among users of e-books, thus the consumer should be less resistant toward a product when there is an increased intention to adopt that product. Therefore, the relationships between observability and consumer resistance found in prior research holds sway in this study since it provides insight into how consumers will then be less resistant to the innovation when the consumer perceives the innovation to hold a higher observability over other products.

As is evident in prior research, there seems to be a negative relationship between observability and consumer resistance, in that when there is low visibility of the successful use of an innovation, the rate of adoption slows (Lichtenstein & Williamson, 2006). Therefore, it is posited that there will be a negative relationship present between observability and consumer resistance among e-cigarettes when there is low positive visibility of the social and visual stimuli by the prospective consumer.

*H$_5$: There is a negative relationship between observability and consumer resistance.*

Figure 4.6: Observability and Consumer Resistance
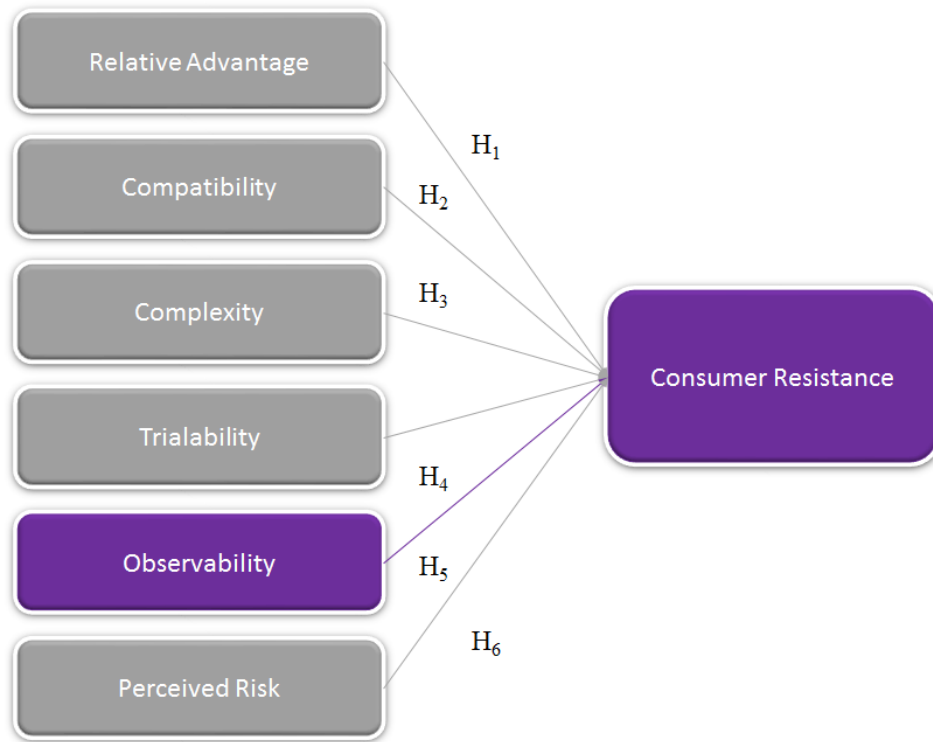


### 4.5.6). Perceived Risk

Perceived risk has been described as the level of uncertainty regarding an innovation, especially those innovations that are a context-based technology or are highly personalised (Kleijnen et al., 2009). By understanding what consumers find risky, marketers can market a future product innovation in the most appropriate fashion, whereby the potential consumer can reduce uncertainty regarding the product, thus resulting in the desired final consumer behaviour of purchase (Arts et al., 2011).

### 4.5.6.1). Perceived Risk and Consumer Resistance: Hypothesis Six

The relationship between perceived risk and consumer resistance has previously been explored in research conducted by Abzakh et al. (2013), Schwarz and Ernst (2008), and Kleijnen et al. (2009). Abzakh et al. (2013) identified that perceived risk is a factor that influences potential consumers' consumer resistance when they studied consumer resistance towards the use of generic drugs. Schwarz and Ernst (2008) found that there was a significant

impact on the adoption of innovations concerning perceived risk, especially functional risk, thus showing that with an increased intention there should be less resistance toward an innovation. The use of such as study, which conveys the relationship between perceived risk and adoption, has been used to develop the relationship between perceived risk and consumer resistance by adopting the theory that if a consumer has adopted an innovation, then there should be less resistance presented from that consumer.

When conducting a meta-analysis of the drivers of resistance, Kleijnen et al. (2009) noted that perceived risk, especially functional risk, leads to postponement in consumers. Perceived risk is positively related to consumer resistance was evidenced in a study that showed that teens are more resistant toward e-cigarettes when they understood that there are possible health risks attached to the use of the product (Mail & Guardian, 2015). Therefore, the relationships between perceived risk and consumer resistance found in prior research holds sway in this study since it provides insight into how consumers will be less resistant to the innovation when they perceive the innovation to hold a lower perceived risk in comparison other products.

Evident from the research conclusions mentioned above, it seems that there is a relationship between perceived risk and consumer resistance, whereby the higher the perceived risk is of adopting a product, the more resistant consumers will be toward that product (Talke et al., 2009). It is posited that there is thus a positive relationship between perceived risk and consumer resistance.

*$H_6$: There is a positive relationship between perceived risk and consumer resistance.*

Figure 4.7: Perceived Risk and Consumer Resistance
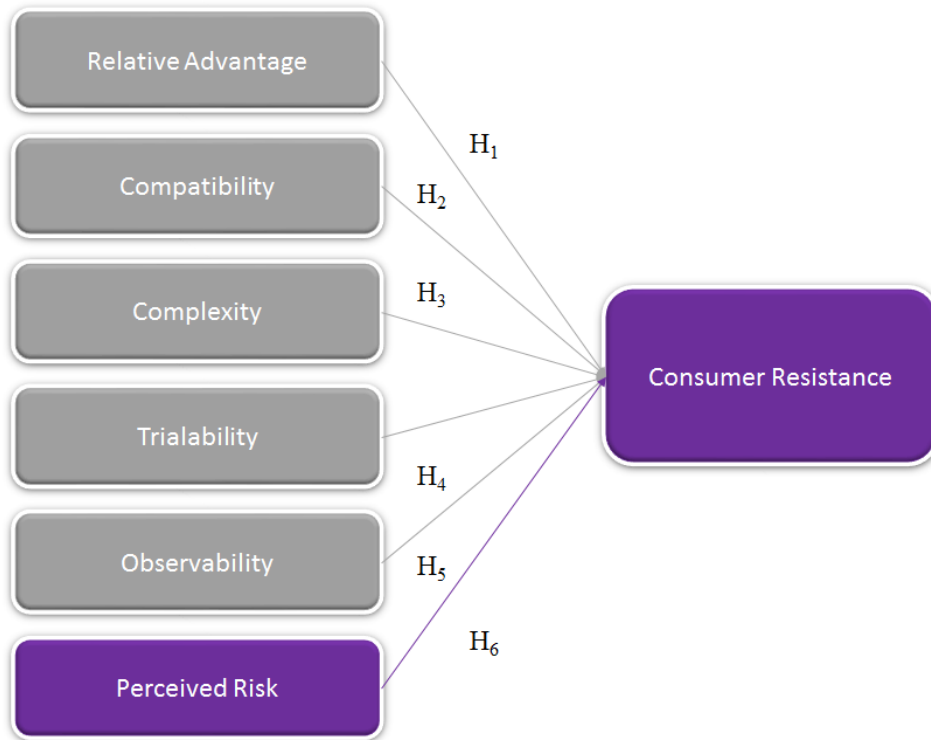


## 4.6). Conclusion

The conceptual model development and hypotheses firstly presented a diagrammatic illustration of the conceptual model or framework, which graphically represented what constructs effect each other and where each lies in relation to the other, therefore displaying the direction of causality. Secondly, the different variables included in the research and what role each of them played was identified, whether they are dependent or independent variables, predictors or response variables, or as moderators or mediators. Thirdly, through a logical development, a hypothesis statement was provided and states all the hypotheses that were tested in this study. Finally, the hypothesis development was detailed, and explained all variables that were assigned roles in this research.

**CHAPTER 5: RESEARCH DESIGN AND METHODOLOGY**

**5.1). Introduction**

This research study has attempted to identify the South African e-cigarette market in terms of understanding a part of the aforementioned gap that was stated in the problem statement. Both primary and secondary research has been conducted to achieve the objectives of this research study. In this section of the report, the study has been divided into sections to explain the study's research design and methodology. This will include looking at the secondary research, and then looking at the primary research, which was separated into research design, type of research, research methodology, and ethics concerning methodology, sample, data gathering, and data analysis.

**5.2). Secondary Research**

Secondary research has been conducted by means of a comprehensive literature search so as to identify prior research conducted on the topic under study. This literature search included journal articles, periodicals, and academic books. The sources mentioned were found in the library of the University of the Witwatersrand and in electronic databases specifically that of Google Scholar since it is linked to the majority of the academic journals found on the internet. Other databases that were searched are JSTOR, ELSEVIER, SABINET, and EBSCO Host.

The secondary research has reviewed literature on consumer resistance, diffusion, and e-cigarettes. Prior research on these constructs has narrowed the scope of the gap that has been researched, as this has indicated which areas have been covered in excess, and has possibly identified other gaps on the topic for future study and improvement. The prior research has also aided in identifying as many factors as possible that could have lessened the research's success. From what can be ascertained, no other similar research study has previously been undertaken in South Africa.

**5.3). Research Philosophy**

The research philosophy in this study considers the research design, research typology, and research methodology, and discusses each separately below. The research philosophy and

design was compiled into Figure 5.1 for diagrammatical reference of the overall research design and methodology utilised in this research study.

Figure 5.1: Research Design Adopted for this Study
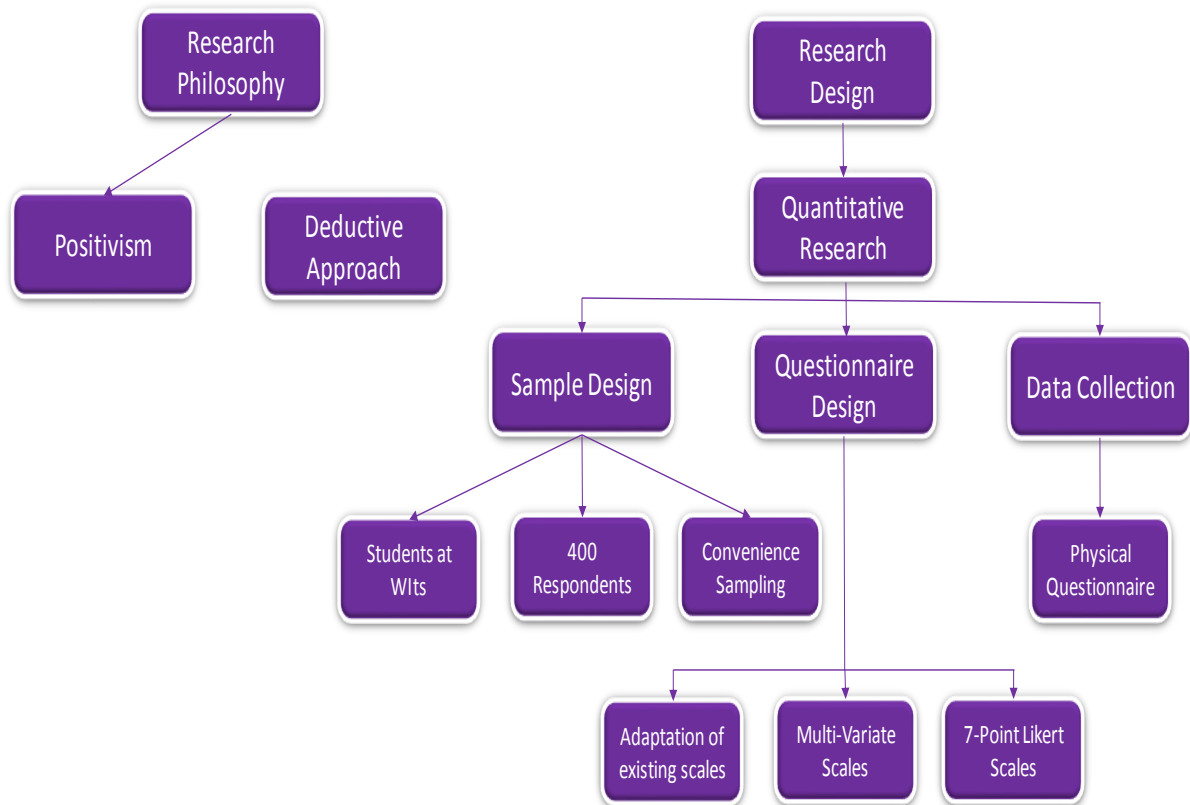


### 5.3.1). Research Design

The research design that has been employed in this research is non-experimental since there is no manipulation of the independent variable, there is only one sample with no control group, and there is no randomisation (Creswell, 2014; Mackey & Gass, 2005; Murphy & Davidshofer, 2005). This type of research design was selected because it is easy to implement, and it is cost and time efficient (Saunders et al., 2012). However, there are limitations to having no control group since only associations between variables can be established, having no manipulation of the independent variable means that there will be no/weak directionality established, and finally, having no randomisation threatens the internal validity, and non-spuriousness, or rival hypotheses, cannot be established (Mackey & Gass, 2005; Murphy & Davidshofer, 2005; Saunders et al., 2012).

One of the issues with this research design is that it does not allow for causality, which is present when there is covariation, temporal precedence, and non-spuriousness (Creswell, 2014; Ghauri & Grønhaug, 2010). Covariation refers to whether or not the X and Y variable covary or are mutually related. In other words, is the presence or absence of the causal variable actually correlated to the presence or absence of the effect variable (Creswell, 2014)? Temporal precedence refers to the Y (effect) variable only occurring after the X (cause) variable. Therefore, the independent variable (X) should occur before the dependent variable (Y), and this usually indicates manipulation of the independent variable, which is not present in this study (Malhotra, 2010). Finally, non-spuriousness refers to ruling out rival hypotheses, which means that other variables not involved in the research are not responsible for the hypothesis test results. Usually, randomisation is used to cater for this uncertainty, but as stated above, the design does not include randomisation (Ghauri & Grønhaug, 2010).

### 5.3.2). Research Type

The type of research used in the study is that of correlational research since the study has attempted to examine the relationships between the variables or constructs (Heppner et al., 2008, Malhotra, 2010). In this case, the constructs that have been examined to test for the presence of a relationship are consumer resistance and the characteristics of the Diffusion of Innovations Model. Furthermore, this type of research resulted in a correlational design specifically that of a cross-sectional research design, because the research took place over a short time period since time is not a variable in the research (Ghauri & Grønhaug, 2010; Malhotra, 2010).

### 5.3.3). Research Methodology

The research has followed a quantitative methodology. Quantitative methodology makes a more precise measurement since the data is in numerical form that can be statistically analysed because the constructs are distinct variables that use systematic measures that are created before data collection can proceed (Biaxter et al., 2010; Heppner et al., 2008; Murphy & Davidshofer, 2005). Using a quantitative methodology means that the research has followed a positivistic paradigm, which implies that the study followed a stable reality, investigated through a scientific method such as hypothesis testing, and the researcher remained objective throughout the study (Creswell, 2014; Mackey & Gass, 2005).

The research design, research type, and methodology that have been previously discussed, and the sample, data gathering, and data analysis techniques that will be discussed later were chosen by following a critical pragmatist approach, since the methods or approaches were specifically chosen to assist the researcher to obtain answers to questions raised in the research (Heppner et al., 2008; Biaxter et al., 2010).

## 5.4). Ethical Considerations

Ethics has been addressed in six areas, namely the principle of informed consent, protection and welfare of participants, use of deception, debriefing, the right to withdraw, confidentiality, and anonymity.

### 5.4.1). Principle of Informed Consent

Ethics has been incorporated in the research by including the principle of informed consent in the form of a cover letter that clearly stated what the participant's obligations and responsibilities were, and informed the participant of any other factors that may have influenced their decision to participate in the research (Biaxter et al., 2010; Creswell, 2014). The responsibility of including the principle of informed consent is the researcher's responsibility, and this must take place before the research is administered to the participants (Biaxter et al., 2010; Creswell, 2014).

### 5.4.2). Protection and Welfare of Participants

Protection and welfare of the participants was incorporated in the study since the participants were not subjected to any form of harm, danger, or stress when completing the research (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Saunders et al., 2012). Again it is the researcher's responsibility to assess the degree of risk that the study could potentially expose, and in this case there is no such risk, either indirect or direct (Saunders et al., 2012). The researcher has also provided contact channels to the participants as part of incorporating welfare practices, whereby communication can take place, if so desired (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Saunders et al., 2012).

### 5.4.3). Deception

The use of deception does not form a part of the research in this case, since deception is not necessary. It is common practice to include a debriefing when deception is involved in a study, which is not the case here, however a debriefing was still provided for those

participants who wished to ask any further questions regarding the study (Mackey & Gass, 2005; Murphy & Davidshofer, 2005). The debriefing attempted to provide the participants with an experience that resulted in learning or some other benefit (Mackey & Gass, 2005; Murphy & Davidshofer, 2005).

### 5.4.4). Refusal or Withdrawal from the Study

The participant reserves the right to refuse or withdraw from the study at any time without penalty (Biaxter et al., 2010; Malhotra, 2010; Saunders et al., 2012). The researcher has acknowledged the participant's right to decline the invitation to participate in the study and has respected that decision. The participant has been notified of the right to decline and the right to withdraw from the study at any time, and any decline or withdrawal would not result in a penalty. This has been done by means of stating such in the questionnaire's cover sheet.

### 5.4.5). Confidentiality and Anonymity

Confidentiality and anonymity practices were incorporated into the study by not asking participants for their names or student numbers (Creswell, 2014; Malhotra, 2010). The completed questionnaires have been locked away and only authorised personnel will have access to the questionnaires. The participants were also informed of the confidentiality and anonymity practices on the questionnaire's cover sheet since it is yet again the researcher's responsibility to acknowledge and enforce such practices (Creswell, 2014; Malhotra, 2010). All of the above only took place once, the University of the Witwatersrand's Human Research Ethics Committees was approached and issued an ethics clearance certificate.

### 5.5). Sample

Target population, sampling frame, sample size, and sample method will all be discussed below in order to understand the decision to select the target sample and the sample size needed to complete the research discussed in this dissertation.

### 5.5.1). Target Population

External validity is a factor that needs to be considered when identifying and choosing the necessary sample for research, and it is divided into population validity and ecological validity (Mackey & Gass, 2005; Malhotra, 2010). Population validity refers to how representative the sample is of the population, and this can be adhered to by ensuring that the sample's characteristics are the same as those of the population (Mackey & Gass, 2005;

Malhotra, 2010). This was adhered to by including a large enough sample with similar characteristics, so as to be representative of the sample, which is university students in Johannesburg, between the ages of 18 and 30. Ecological validity is the degree of appropriateness of generalising from one context to another and can include geographic changes, or in a highly controlled laboratory experiment it can be used to infer to a naturalistic environment (Malhotra, 2010). This is why only university students were included and no younger or older participants, and why only students in Johannesburg were included and not those in another province, country, or continent.

### 5.5.2). Sampling Frame

University students are predominantly aged between 18 and 30, and therefore the sample is classified as young adults. University students were chosen as the sample since it has been concluded that this age group is renowned for initiating change, especially with novelty items, such as the e-cigarette (Sutfin, 2013; Trumbo & Harper, 2013). The second reason for choosing this sample was because it was convenient for the researcher and is advised for the Masters research level.

### 5.5.3). Sample Size

The amount of participants for the sample is 400 university students at the University of the Witwatersrand who are non-smokers or smoke either tobacco cigarettes or the e-cigarette, and the sample has been inferred to the overall university student population in South Africa. Therefore, a sample is necessary because the amount of university students that smoke in Johannesburg is too vast to question, and sample also needed to cater for those who did not wish to participate in the study. Although the ideal sample target would be smokers, non-smokers were included to gather accurate information on the diffusion of the e-cigarette.

### 5.5.4). Sample Method

The sample used for the research is non-probability sampling. This type of sampling was chosen because it conforms to the objectives of the study, and it is convenient and economical (Biaxter et al., 2010; Creswell, 2014). However, the limitations are that there is no way of ensuring that every element has an equal chance of inclusion in the sample (Biaxter et al., 2010; Creswell, 2014). To further clarify, the type of non-probability sampling used is convenience sampling, whereby the only criteria for selection to participate in the study is to be available and willing to participate (Biaxter et al., 2010; Creswell, 2014).

Therefore, this involves volunteer sampling since the sample was determined by university students attending the University of the Witwatersrand who volunteered to take part in the study (Biaxter et al., 2010; Creswell, 2014).

**5.6). Data Collection**

With regard to this research's data collection discussed here, questionnaire design, respondent's general information, measurement instrument scale, and the data collection approach are relevant topics to be discussed below.

**5.6.1). Questionnaire Design**

The data was gathered by the researcher through the completion of a questionnaire targeted specifically at university students who smoke either traditional tobacco cigarettes or the e-cigarette, or are non-smokers who may provide insight into consumer resistance. A questionnaire was chosen as the method of data-gathering due to its many advantages, namely that it can be administered to large amounts of people, it is time-efficient and cost-efficient, it provides a type of anonymity, and it can yield valuable descriptive information about trends (Saunders et al., 2012). There are also limitations to using a questionnaire that need to be addressed, and those include the inability of application from one population or demographic to another, low questionnaire return rate, ambiguous replies, and a reliance on the participant's truthfulness (Saunders et al., 2012).

The questionnaires took approximately 10 to 15 minutes to complete with the constructs of the model operationalised through the use of preapproved marketing scales. Therefore, it is a multi-item scaled questionnaire, consisting of Likert-type scale questions, with the range of 1-strongly disagree to 7-strongly agree. This means that the questions are close-ended (Malhotra, 2010). The questionnaire cannot be overly long because this increases the occurrence of ethical issues since it overburdens the respondent (Malhotra, 2010; Saunders et al., 2012). Each item included in the questionnaire is an adaptation of a marketing measurement scale used in a past studies, including Jung et al. (2011), Forsythe et al. (2006), Wu and Wang (2005), Fetscherin and Lattemann's (2008), Abzakh et al. (2013) and Claudy's (2011) measurement scales.

### 5.6.2). Respondents General Information

The respondents' general information included an item to indicate gender, age category, highest academic level, and smoking status. No personal information that would conflict with the ethical concern of maintaining anonymity was included.

### 5.6.3). Measurement Instrument Scale

The measurement scales include an adaptation of prior researchers' work, including a relative advantage scale that is a combination of Jung et al. (2011) and Forsythe et al. (2006) scales. The second measurement scale included is that of compatibility, which has been adapted from scales previously used by Jung et al. (2011) and Wu and Wang (2005). The third scale measures complexity via a modified version of Scheier et al.'s (2006) scale. The fourth measurement scale concerns trialability using Jung et al.'s (2011) measurement scale. The fifth measurement scale refers to observability modified from Jung et al. (2011), and Fetscherin and Lattemann's (2008) measurement scale. The sixth measurement scale concerns perceived risk as a modified version of Abzakh et al.'s (2013) scale. The seventh scale refers to consumer resistance, a modified version of Abzakh et al. (2013) and Claudy's (2011) measurement scales.

### 5.6.3.1). Relative Advantage Measurement Scale

The measurement scales that were adapted to suit the purpose of this research study regarding relative advantage were observed in works by Jung et al. (2011) and Forsythe et al. (2006). For the purpose of the current research, the scale was adapted to support an e-cigarette subject and a 7-point Likert scale, where 1 – strongly disagree and 7 – strongly agree.

Table 5.1: Relative Advantage Measurement Scale

| RA1 | e-Cigarettes have an advantage over other smoking products because they are less expensive |
|-----|-----|
| RA2 | e-Cigarettes have an advantage over other smoking products because they are perceived as healthier |
| RA3 | e-Cigarettes have an advantage over other smoking products because they have a wider variety of flavours available |
| RA4 | e-Cigarettes have an advantage over other smoking products because they are non-disposable |
| RA5 | e-Cigarettes have an advantage over other smoking products because they are more convenient to use |

*Note: RA – Relative Advantage.

## 5.6.3.2). Compatibility Measurement Scale

The compatibility measurement scale used in this research was an adaptation from the scales used in Jung et al. (2011) and Wu and Wang's (2005) research. The scale was adapted to include e-cigarettes as the subject of the items, and to adjust for a 7-point Likert scale where strongly disagree was rated as 1 and strongly agree was rated as 7.

Table 5.2: Compatibility Measurement Scale

| CA1 | Using an e-cigarette suits my person |
|-----|-----|
| CA2 | Using an e-cigarette requires few adaptations in my personal life |
| CA3 | Using an e-cigarette yields few problems for me |
| CA4 | If I were to adopt e-cigarettes, it would be compatible with my smoking lifestyle |
| CA5 | If I were to adopt the e-cigarette, the quality of my smoking experience would improve |

*Note: CA - Compatibility.

### 5.6.3.3). Complexity Measurement Scale

Measurement scales from Scheier et al.'s (2006) study was adjusted to suit the needs of the current study, and this meant adjusting both the subject to include e-cigarettes and the 7-point Likert scale, where 1 represented strongly disagree and 7 represented strongly agree.

Table 5.3: Complexity Measurement Scale

| CE1 | e-Cigarettes are complex |
|-----|--------------------------|
| CE2 | It is hard to find e-cigarette products (i.e. e-liquid, chargers, etc.) |
| CE3 | It is difficult to order e-cigarette products |
| CE4 | It is difficult to compare e-cigarettes and e-cigarette products |
| CE5 | Learning to use an e-cigarette would be easy for me |

*Note: CE – Complexity.

### 5.6.3.4). Trialability Measurement Scale

The trialability measurement scale was adapted to support a 7-point Likert scale where 7 indicated strongly agree and 1 indicated strongly disagree, and to support an e-cigarette topic. The scale that was originally adapted was from a study conducted by Jung et al. (2011).

Table 5.4: Trialability Measurement Scale

| TR1 | Before adopting the e-cigarette, I would be able to use it on a trial basis |
|-----|--------------------------|
| TR2 | Before adopting the e-cigarette, I would be able to test the suitability of the product |
| TR3 | I believe that being able to test the e-cigarette would help me to better decide on whether or not to adopt the product |
| TR4 | By being able to test the e-cigarette, I would feel more confident in the product's claims |
| TR5 | Testing the e-cigarette would not allow for me to evaluate the suitability of the product |

*Note: TR – Trialability.

### 5.6.3.5). Observability Measurement Scale

The measurement scales that were adapted to suit the purpose of this research study regarding observability were observed in works by Jung et al. (2011) and Fetscherin and Lattemann (2008). For the purpose of the current research, the scale was adapted to support an e-cigarette subject and a 7-point Likert scale, where 1 – strongly disagree and 7 – strongly agree.

Table 5.5: Observability Measurement Scale

| OB1 | I would have greater confidence in using e-cigarettes when observing others also doing so |
|-----|------------------------------------------------------------------------------------------|
| OB2 | I have observed people using the e-cigarette before |
| OB3 | Seeing my friends using the e-cigarette would make me more open to considering adopting the product |
| OB4 | I would not consider using the e-cigarette, even if the "cool kids" were all smoking them |
| OB5 | I feel that the use of an e-cigarette is a social status marker |

*Note: OB – Observability.

### 5.6.3.6). Perceived Risk Measurement Scale

The perceived risk measurement scale used in this research was an adaptation from the scales used in Abzakh et al.'s (2013) research. The scale was adapted to include e-cigarettes as the subject of the items, and to adjust for a 7-point Likert scale where strongly disagree was rated 1 and strongly agree was rated 7.

Table 5.6: Perceived Risk Measurement Scale

| PR1 | I can spend my money in a better way rather than buying an e-cigarette |
|-----|----------------------------------------------------------------------|
| PR2 | I would be concerned that I would not get my money's worth from the e-cigarette |
| PR3 | I find that use of e-cigarettes are a waste of money |
| PR4 | The thought of purchasing an e-cigarette causes me to experience unnecessary tension |

| PR5 | The thought of purchasing an e-cigarette makes me feel psychologically uncomfortable |
|------|---------------------------------------------------------------|
| PR6 | The thought of purchasing an e-cigarette makes me feel worried |
| PR7 | I would not know where I could purchase e-cigarettes |
| PR8 | The number of available stores, etc. for selling e-cigarettes is not satisfactory |
| PR9 | As I consider the purchase of e-cigarettes, I worry whether or not it will really perform as well as it is supposed to. |
| PR10 | I am concerned that the e-cigarette will not provide the level of benefits that I would expect it to |
| PR11 | One concern I have about purchasing an e-cigarette is that the risk of endangering my health might be high |
| PR12 | I am concerned about potential physical risks associated with the use of e-cigarettes |
| PR13 | I have confidence concerns regarding smoking e-cigarettes |
| PR14 | The purchase of an e-cigarette would cause some people whose opinions I value to perceive me in a negative way |
| PR15 | My friends would think I was just being foolish if I bought an e-cigarette |
| PR16 | I worry over what others will think of me if I were to use an e-cigarette |

*Note: PR – Perceived Risk.

### 5.6.3.7). Consumer Resistance Measurement Scale

The consumer resistance measurement scale was adapted to support a 7-point Likert scale, where 7 indicated strongly agree and 1 indicated strongly disagree, and to support an e-cigarette topic. The scale that was originally adapted was from a study conducted by Abzakh et al. (2013) and Claudy (2011).

| COR1 | I would be making a mistake by purchasing an e-cigarette |
|------|----------------------------------------------------------|
| COR2 | In the near future, the purchase of e-cigarettes would be connected with too many uncertainties |
| COR3 | In sum, the purchase of an e-cigarette would cause problems that I don't need |
| COR4 | I am resistant towards the use of e-cigarettes |
| COR5 | I have no negative feelings towards the use of the e-cigarette |

*Note: COR – Consumer Resistance.

### 5.6.4). Data Collection Approach

The data collection approach was divided into two phases. The first phase included collecting data to conduct a pilot study, which consisted of 10% of the total 400 respondents needed for the study, and then the remainder was collected in the second phase once the purpose of the pilot study was completed. The researcher administered the questionnaire to university students at the beginning or at the end of lectures or during lecture break, with the permission of the lecturer. The amount of lectures that had to be attended to gather the data was determined by how many volunteers were in each lecture. Questionnaires were also handed out to students in the FNB Study Centre, where participants were informed of the content of the questionnaire before proceeding.

Reliability is important to the research because it establishes whether or not the test actually assesses anything meaningful to the study (Heppner et al., 2008). To comply with ethical considerations, only measurement scales of a high reliability coefficient were selected, and only those that were relevant to the data were captured (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Malhotra, 2010).

Once reliability has been established, validity must be considered. Validity establishes whether or not the test actually tests what it claims to measure (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Malhotra, 2010). The types of internal validity relevant to the research are face, content, and construct (convergent and discriminant) validity. Face validity refers to the degree of appropriateness and subject reactivity of the questionnaire (Ghauri &

Grønhaug, 2010; Heppner et al., 2008; Malhotra, 2010). Content validity refers to the degree that the items in the questionnaire represent the broader construct (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Malhotra, 2010). Construct validity refers to the expected, convergent, or unexpected, divergent relationships between the questionnaire and the constructs tested (Ghauri & Grønhaug, 2010; Heppner et al., 2008; Malhotra, 2010). Each scale was carefully selected in order to comply with the internal validity requirements where the constructs were considered appropriate and relevant to the measurements required and is related to one another, either in a positive or negative manner/relationship.

Potential threats to internal validity regarding the study can include Hawthorne effects, whereby distortions in behaviour occur because of the awareness of participation by the respondents (Biaxter et al., 2010; Murphy & Davidshofer, 2005). In such cases, participants may not provide answers that convey an accurate representation of their behaviour, but a representation of how one would like to be viewed (Biaxter et al., 2010; Murphy & Davidshofer, 2005). There could be a threat from the halo effect or faking bad. The halo effect refers to the possibility that participants will distort responses in order to be perceived as pleasing to the researcher or of a socially acceptable standard. Faking bad is the possibility that participants wish to spite the researcher or appear worse than reality (Biaxter et al., 2010; Murphy & Davidshofer, 2005).

### 5.7). Statistical Modelling

Statistical modelling in this research study includes utilising descriptive statistical measures, reliability and validity measures, and structural equation modelling and path modelling. Each is defined below.

### 5.7.1). Descriptive Statistics

Descriptive statistics are used to describe or summarise the basic characteristics identified within data collected in research, particularly research of a quantitative methodology (Biaxter et al., 2010). In this study, descriptive statistics were analysed on the basis of the demographic measures ascertained, and through the testing that provided the mean and standard deviation identified for each construct. These descriptive statistics were used to analyse the data in a more meaningful way, such as allowing for the identification of patterns to enable a more informed analysis of the results (Murphy & Davidshofer, 2005).

### 5.7.2). Measurement Model

The measurement model is inclusive of Cronbach's coefficient alpha, the average variance extracted, and composite reliability, which are all measures that indicate the reliability and validity of the data captured within the research. Each is explained hereunder.

### 5.7.2.1). Cronbach's Coefficient Alpha

Cronbach's coefficient alpha is a measure that classifies whether or not data possesses internal consistency reliability (Malhotra, 2010). According to Cronbach's coefficient alpha, the internal consistency reliability of data is measured through the splitting of scale items, whereby the average of all the split-half coefficients determines the result (Ghauri & Grønhaug, 2010). For there to be satisfactory internal consistency reliability, the coefficient needs to be above 0.6 on a scale that ranges between 0 and 1.

### 5.7.2.2). Average Variance Extracted

The average variance extracted (AVE) is used to measure the convergent and discriminant validity within the data, which identifies whether or not the data is actually measuring what it claims to be measuring (Heppner et al., 2008). AVE has a variance of 0 to 1, where results that is greater than 0.5 represent the existence of a satisfactory convergent validity among the variables (Malhotra, 2010). This represents that the variance appropriate to measurement error is less than the variance measured for each construct, therefore indicating validity present within the data (Murphy & Davidshofer, 2005).

### 5.7.2.3). Composite Reliability

Like Cronbach's coefficient alpha, composite reliability (CR) is used to measure the level of reliability within the data (Ghauri & Grønhaug, 2010). However, CR concerns the total amount of true score variance in relation to the total score variance (Murphy & Davidshofer, 2005). CR is also measured on a scale of 0 to 1, where estimates above 0.6 are considered to be acceptable, and a measure greater than 0.7 is considered good (Malhotra, 2010).

### 5.7.3). Structural Equation Modelling and Path Modelling

The data gathered was analysed using a standardised editing and coding procedure that easily converted the data Excel data spread sheet, which is the requirement when using the SPSS statistical programme since the data from Excel is imported into SPSS, and the programme

runs the necessary tests. Once the data was run through SPSS, it was then imported into the AMOS statistical programme, which is used to conduct structural equation modelling (SEM).

SEM was chosen as the relevant statistical technique because can test latent or unobservable constructs that are defined conceptually, yet cannot be measured without error (Biaxter et al., 2010; Malhotra, 2010). A construct can also be referred to as a factor that requires multiple indicators or observed variables to be measured. Hence, SEM is the more appropriate statistical technique regarding this research since the situation involves six independent variables leading to one dependent variable, with those six variables in fact measuring one theory. SEM was also chosen because it is used more as a confirmatory technique, whereby validity of the model, based on theory, is checked. Therefore, the technique confirms the validity and reliability of the preapproved scales, which is called confirmatory factor analysis (CFA) (Murphy & Davidshofer, 2005).

However, CFA is only one half of the SEM model because the model consists of two models in itself, namely the measurement model, which uses CFA, and then the structural model (Murphy & Davidshofer, 2005). The measurement model uses CFA to test whether a relationship exists between the observed and latent constructs or factors, and confirms that the number of loadings on those factors corresponds to the theory it is based on (Biaxter et al., 2010; Malhotra, 2010). However, the structural model specifically identifies whether or not the constructs are interrelated and whether or not a relationship in fact exists (Ghauri & Grønhaug, 2010; Heppner et al., 2008).

As already stated SEM and path modelling comprises a confirmatory factor analysis, however it also consists of both absolute and incremental fit indices. Absolute fit indices include the chi-square, goodness-of-fit (GFI) index, and root mean square error of approximation (RMSEA), where each index is analysed independently of other probable models and directly measures the model's ability to replicate the data (Heppner et al., 2008). On the other hand, the incremental fit indices analyse the data in relation to a baseline model to evaluate how the sample data fits, and this includes the normed fit index (NFI), comparative fit index (CFI), and the Tucker Lewis index (TLI) (Ghauri & Grønhaug, 2010). Each of these is discussed in further detail in their respective sections below.

### 5.7.3.1). Confirmatory Factor Analysis

Confirmatory factor analysis basically tests hypotheses proposed by the researcher that are based on theory, by confirming whether or not the factor loadings or estimates and the number of constructs observed fall in line with what is expected, based on the knowledge of the theory it is based upon (Malhotra, 2010). Overall, CFA can be used to observe variable correlations for identifying underlying factors that explain the estimates obtained (Heppner et al., 2008).

### 5.7.3.2). Chi-Square Index

In terms of SEM, chi-square difference statistic ($x^2$) is used when comparing competing nested SEM models, and is a skewed distribution that is dependent on the degrees of freedom, whereby as the degrees of freedom increase, the more symmetrical distribution becomes (Murphy & Davidshofer, 2005). Overall, the test measures the difference in the covariance matrices, and for there to be a good model fit the chi-square result needs to be less than 3 (Ghauri & Grønhaug, 2010). Criticism of the measure has been noted in the bias that is introduced into the results when the number of variables and sample size increase, as this too increases the measure, however this is the only fit measure that is statistically based (Malhotra, 2010).

### 5.7.3.3). Comparative Fit Index

The CFI varies on a scale of 0 to 1, where measures greater than 0.9 are considered to convey good incremental model fit (Malhotra, 2010). The CFI represents incremental fit by comparing a null model, where constructs are believed to be uncorrelated, with a specified model (Heppner et al., 2008). Overall, the measure is based on chi-squared values and degrees of freedom (Murphy & Davidshofer, 2005).

### 5.7.3.4). Goodness-of-Fit Index

The GFI index is in essence a measure of the absolute fit of a particular model presented (Heppner et al., 2008). As with CFI, the GFI index needs to be greater than 0.9 to be considered a good fit (Malhotra, 2010). However, GFI also attracts criticism in terms of how limited it is, since it is affected by the sample size, which means that even poorly specified models can have a good model fit (Heppner et al., 2008).

### 5.7.3.5). Normed Fit Index

The (NFI is very similar to CFI in that it also represents incremental fit by comparing a null model, where constructs are believed to be uncorrelated, with a specified model, and is also very similar in that it is a measure concerning chi-squared values and degrees of freedom (Heppner et al., 2008). Good fit is assessed through this measure when the test results in a value that is greater than 0.9 (Ghauri & Grønhaug, 2010).

### 5.7.3.6). Tucker Lewis Index

In terms of the TLI, the measure can range on a scale greater or smaller than 0 to 1 since the measured is not normed, therefore for the measure to be considered a good fit, the resulting value needs to be as close to 1 as possible (Malhotra, 2010). The TLI along with NFI and CFI are measures that aid in determining incremental model fit (Heppner et al., 2008).

### 5.7.3.7). Root Mean Square Error of Approximation

The RMSEA analyses the variation between the actual and predicted covariances obtained for a specific model (Heppner et al., 2008). The RMSEA is obtained by factoring in the degrees of freedom and sample size to adjust the chi-square value (Ghauri & Grønhaug, 2010).). A result that is less than 0.08 is considered to be marginally acceptable, and a result that is less than 0.06 is considered acceptable, therefore lower values indicate better model fit (Ghauri & Grønhaug, 2010).

### 5.8). Conclusion

This research study has attempted to identify the South African e-cigarette market in terms of understanding a part of the aforementioned gap that was stated in the problem statement. Both primary and secondary research has been conducted to achieve the objectives of this research study. In this section of the report, the study was divided into sections that have explained the research design and methodology used. This included examining at the secondary research obtained, and then looking at the primary research, which was separated into research design, type of research, research methodology, ethics concerning methodology, sample, data gathering, and data analysis.

**CHAPTER 6: DATA ANALYSIS**

**6.1). Introduction**

Chapter 6, the empirical results, is an analysis of the data that was gathered, showing how the data is standardised and coded, what statistical programming it was entered into, the relevant statistical tests that needed to be run, and the relevant results of those tests. The chapter then provides an interpretation of the results, which can either confirm the reliability and validity of the previously designed scales that have been used in the study, or not. If not, then it will identify where the problems or weaknesses lie in the data gathering or analysis process. These results are mostly in the form of tables and figures that summarise the large amount of output provided by the statistical programmes used.

**6.2). Data Analysis Software**

The data gathered was analysed using a standardised editing and coding procedure that converts the data easily into an Excel data spread sheet, which is the requirement when using the SPSS statistical programme. The data from Excel was imported into SPSS, whereby the programme ran the necessary tests. Once the data was run through SPSS, it was then imported into AMOS Version 22 statistical software, which was used to conduct SEM.

**6.3). Descriptive Statistics**

The descriptive statistics focused on in this research dissertation include the demographics of the respondents and an assessment of the measurement instruments, which involves the testing of reliability and validity.

**6.3.1). Demographics of the Respondents**

Respondents were asked demographic related questions including gender, age category, academic level, and smoking status. Each of which is indicated in the respective sections below.

**6.3.1.1). Gender**

The results obtained regarding gender captured through the respondent's general information section in the questionnaire are displayed in Figure 6.1 below.

Figure 6.1: Respondents' Gender
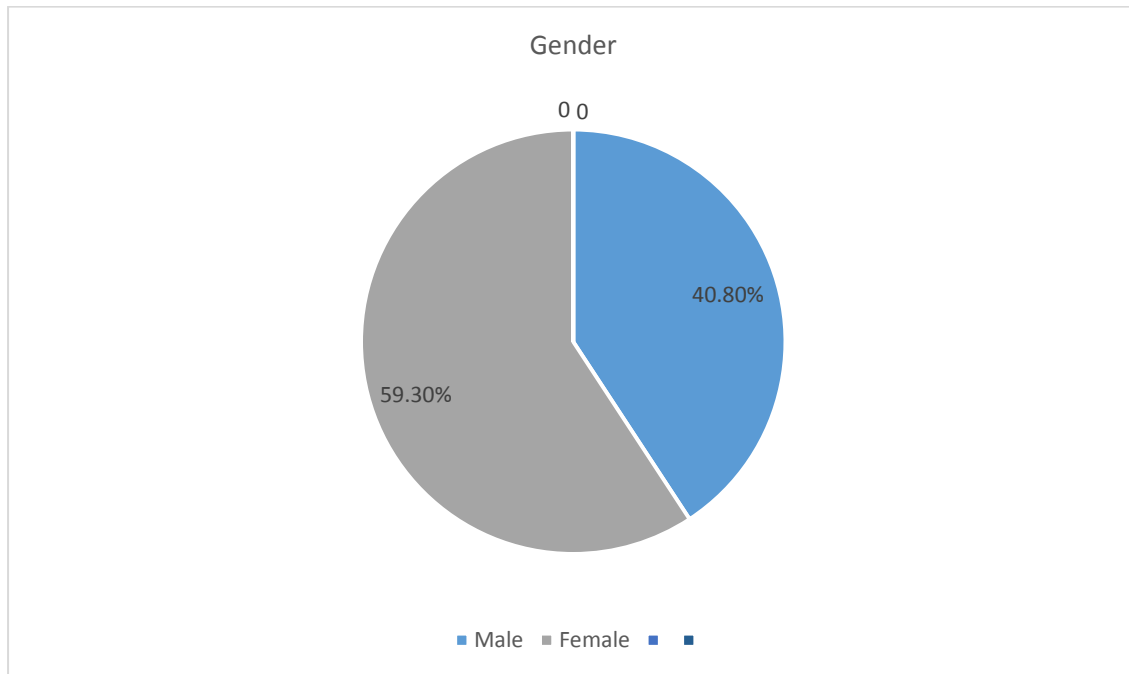


Respondents were only given two options regarding gender: male or female. From the data analysed, it is clear that there is a frequency of 40.8% of respondents (163 males) and 59.3% of respondents (237 females). Therefore, the majority of the respondents for the current research were female.

**6.3.1.2). Age Category**

The results for age category obtained from the respondents the general information section of the questionnaire is displayed in Figure 6.2 below.

Figure 6.2: Respondents' Age Category
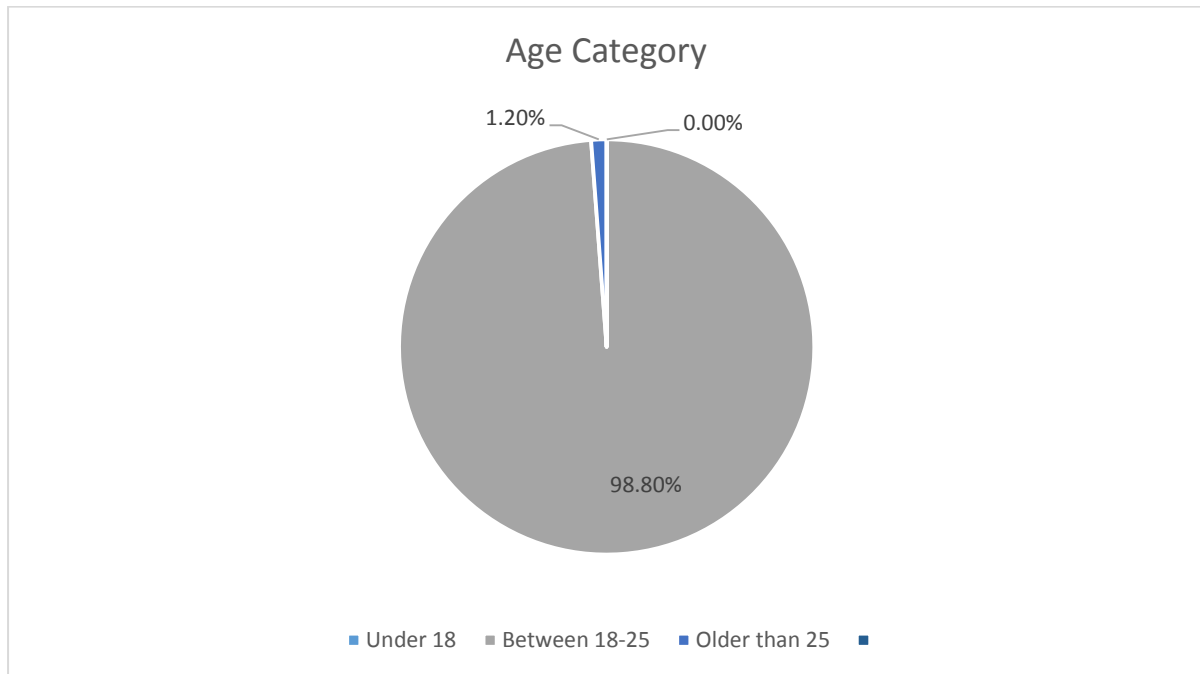


Respondents were given three options in the age category, namely: 'Under 18', 'Between 18 and 25', and 'Older than 25'. There were no respondents under the age of 18, as this would have incorporated ethical issues that were not catered for in this research. The majority of the respondents were aged between 18 and 25 years with a frequency of 395 respondents, which equates to 98.8%. The remaining 1.2% of the respondents were over the age of 25, however none were older than 30 since this would have disqualified those respondents from the research.

**6.3.1.3). Academic Level**

The respondents' indication of highest academic level achieved is represented below in Figure 6.3.

Figure 6.3: Respondents' Academic Level
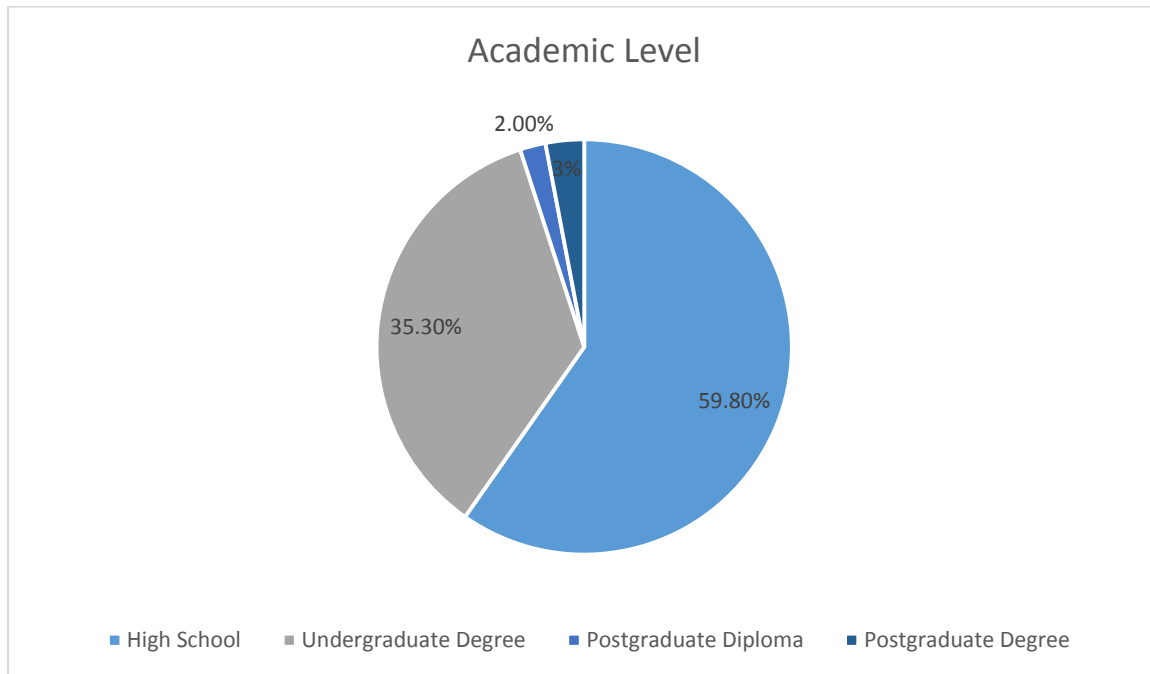


Respondents were given four options to choose from, namely: 'High School', 'Undergraduate Degree', 'Postgraduate Diploma', and 'Postgraduate Degree'. Respondents mostly chose 'High School' as the highest academic level attained at 59.8%, which represented 239 of the total respondents. 'Undergraduate Degree' came in at the second highest option chosen with 35.3% (141 respondents). Twelve respondents selected 'Postgraduate Degree' (3%) and eight selected 'Postgraduate Diploma' (2%). Therefore, it is clear that the majority of the respondents are currently completing an undergraduate degree at the University of the Witwatersrand.

**6.3.1.4). Smoking Status**

The results obtained from the respondents regarding smoking status are represented in Figure 6.4.

Figure 6.4: Respondents' Smoking Level
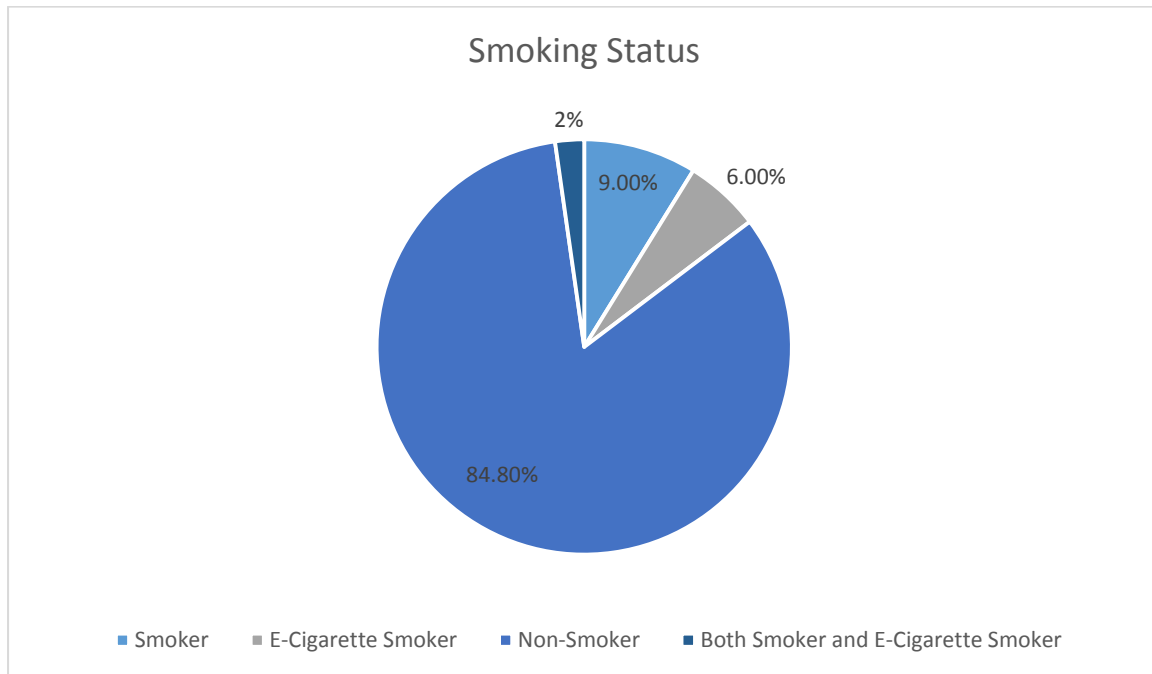


Respondents were allowed to select one of four options relating to smoking status, namely: 'Smoker', 'e-Cigarette Smoker', 'Non-Smoker', or 'Both Smoker and e-Cigarette Smoker'. Respondents mostly chose 'Non-Smoker' with a frequency of 339 respondents (84.8%). Nine percent of the respondents selected 'Smoker', which equates to 36 respondents, whereas 4% indicted 'e-Cigarette Smoker' (16 respondents). However, nine respondents indicated 'Both Smoker and e-Cigarette Smoker', representing a total of 2.3%.

## 6.3.2). Demographic Profile Summary

Table 6.1 below represents a summary of all the demographic measures that were asked of the respondents in the general information section of the questionnaire handed out, which include gender, age category, academic level, and smoking status.

Table 6.1: Demographics

| Gender | Frequency | Percentage |
|---|---|---|
| Male | 163 | 40.8 |
| Female | 237 | 59.3 |
| **Total** | **400** | **100** |
| **Age Category** | **Frequency** | **Percentage** |
| Under 18 | 0 | 0 |
| Between 18 and 25 | 395 | 98.8 |
| Older than 25 | 5 | 1.2 |
| **Total** | **400** | **100** |
| **Academic Level** | **Frequency** | **Percentage** |
| High School | 239 | 59.8 |
| Undergraduate Degree | 141 | 35.3 |
| Postgraduate Diploma | 8 | 2.0 |
| Postgraduate Degree | 12 | 3.0 |
| **Total** | **400** | **100** |
| **Smoking Status** | **Frequency** | **Percentage** |
| Smoker | 36 | 9.0 |
| e-Cigarette Smoker | 16 | 4.0 |

| | | |
|---|---|---|
| Non-Smoker | 339 | 84.8 |
| Smoker and e-Cigarette Smoker | 9 | 2.3 |
| **Total** | **400** | **100** |

In summary, the majority of the respondents are female (59.3%), between 18 and 25 years of age (98.8%), have at most a high school level education (59.8%), and are non-smokers (84.8%). Furthermore, this is generalised in the entire South African university student population, indicating that all South African students are predominantly female, between 18 and 25 years of age, have a high school level of education, and are non-smokers.

The results obtained regarding these demographic measures may be due firstly, to there being more female university students that are open to aiding in the accurate completion of questionnaires, as per the experience of the researcher while handing out the questionnaire. Secondly, the majority of the university student population is in the age range of 18 and 25 years old, hence the reason why the results captured reflect this fact. Thirdly, the amount of students that have high school as the highest level of education is high due to the fact that it is generally only after three years of studying that the student graduates with an undergraduate degree, and the amount of postgraduates is low since most students do not meet the requirements to gain entrance into postgraduate studies or are not interested in the prospect of further study. Lastly, the majority of the students do not smoke traditional cigarettes, and even less smoke e-cigarettes, possibly due to the fact that students do not have access to a large amount of disposable income, which limits purchasing action, and also because most consumers are more health conscious today and find smoking of all kinds to be hazardous to their health. However, this is merely an observation made through inferences in the descriptive statistics and cannot be accepted as fact.

### 6.4). Measurement Instrument Assessment

The assessment of the measurement instruments can be expressed in Table 6.2 below labelled the accuracy analysis statistics, whereby the mean, standard deviation, Cronbach's alpha,

composite reliability (CR), average variance extracted (AVE), and factor loadings are provided for each construct.

Table 6.2: Accuracy Analysis Statistics

| Research Construct | | Mean | Standard Deviation | Cronbach Alpha | CR | AVE | Highest Shared Variance | Factor Loadings |
|---|---|---|---|---|---|---|---|---|
| RA | RA2 | | | | | | | 0.694 |
| | RA3 | | | | | | | 0.849 |
| | RA4 | 4.332 | 1.521 | 0.826 | 0.809 | 0.698 | 0.091 | 0.643 |
| | RA5 | | | | | | | 0.674 |
| CA | CA1 | | | | | | | 0.716 |
| | CA2 | | | | | | | 0.615 |
| | CA3 | 3.198 | 1.670 | 0.851 | 0.849 | 0.658 | 0.198 | 0.547 |
| | CA4 | | | | | | | 0.887 |
| | CA5 | | | | | | | 0.841 |
| CE | CE1 | | | | | | | 0.534 |
| | CE2 | | | | | | | 0.919 |
| | CE3 | 3.719 | 1.280 | 0.835 | 0.851 | 0.711 | 0.062 | 0.863 |
| | CE4 | | | | | | | 0.715 |
| TR | TR1 | | | | | | | 0.675 |
| | TR2 | | | | | | | 0.731 |
| | TR3 | 4.019 | 1.476 | 0.896 | 0.858 | 0.786 | 0.228 | 0.916 |
| | TR4 | | | | | | | 0.941 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OB | OB1 | | | | | | | 0.751 |
| | OB3 | 3.483 | 1.619 | 0.721 | 0.706 | 0.676 | 0.228 | 0.726 |
| PR | PR1 | | | | | | | 0.55 |
| | PR3 | | | | | | | 0.629 |
| | PR4 | | | | | | | 0.436 |
| | PR5 | | | | | | | 0.521 |
| | PR6 | 4.474 | 1.373 | 0.838 | 0.792 | 0.396 | 0.062 | 0.492 |
| | PR11 | | | | | | | 0.578 |
| | PR12 | | | | | | | 0.635 |
| | PR14 | | | | | | | 0.461 |
| | PR15 | | | | | | | 0.589 |
| COR | COR1 | | | | | | | 0.830 |
| | COR2 | | | | | | | 0.701 |
| | COR3 | 4.645 | 1.688 | 0.895 | 0.888 | 0.666 | 0.490 | 0.828 |
| | COR4 | | | | | | | 0.894 |

*Note: RA – Relative Advantage; CA – Compatibility; CE – Complexity; TR – Trialability; OB – Observability; COR – Consumer Resistance; FIR – Financial Risk; PSR – Psychological Risk; FUR – Functional Risk; PHR – Physical Risk; SOR – Social Risk; CR – Composite Reliability; AVE – Average Variance Extracted.

Each of these measurements is further explained in the respective sections below under the following headings: testing for reliability and testing for validity.

### 6.4.1). Testing for Reliability

Reliability has been measured using the Cronbach's coefficient alpha, composite reliability (CR), and average variance extracted (AVE), each of which are explained in detail in the respective section below.

**6.4.1.1). Cronbach's Coefficient Alpha**

When referring to Table 6.2 above, it can be observed that consumer resistance, relative advantage, compatibility, complexity, trialability, observability, and perceived risk have a Cronbach's coefficient alpha of 0.895, 0.826, 0.851, 0.835, 0.896, 0.721, and 0.838, respectively. All of which have a high coefficient of internal consistency as the Cronbach's alpha results are all over 0.8. Therefore, since Cronbach's coefficient alpha is a measure of internal consistency, it can be inferred that the constructs are all highly reliable, meaning that similar results should be observed when applying the items to another study measuring those constructs (Biaxter, Hughes, & Tight, 2010).

**6.4.1.2). Composite Reliability**

Within Table 6.3, the composite reliability (CR) for all constructs is displayed, allowing for a better understanding and summarisation of the calculation behind the measure.

Table 6.3: Composite Reliability Estimates

| | | | | Composite Reliability (CR) | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Summation of Error Terms | | $CR\eta=(\Sigma\lambda yi)2/[(\Sigma\lambda yi)2+(\Sigma\varepsilon i)]$ |
| | | | | $(\Sigma\lambda yi)2$ | $\varepsilon i$ | $\Sigma\varepsilon i$ | CR |
| RA | <--- | RA2 | 0.694 | 8.180 | 0.518 | 1.930 | 0.809 |
| | <--- | RA3 | 0.849 | | 0.279 | | |
| | <--- | RA4 | 0.643 | | 0.587 | | |
| | <--- | RA5 | 0.674 | | 0.546 | | |
| CA | <--- | CA1 | 0.716 | 13.003 | 0.487 | 2.316 | 0.849 |
| | <--- | CA2 | 0.615 | | 0.622 | | |
| | <--- | CA3 | 0.547 | | 0.701 | | |
| | <--- | CA4 | 0.887 | | 0.213 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | <--- | CA5 | 0.841 | | 0.293 | | |
| CE | <--- | CE1 | 0.534 | | 0.715 | | |
| | <--- | CE2 | 0.919 | 9.187 | 0.155 | 1.614 | 0.851 |
| | <--- | CE3 | 0.863 | | 0.255 | | |
| | <--- | CE4 | 0.715 | | 0.489 | | |
| TR | <--- | TR1 | 0.675 | | 0.544 | | |
| | <--- | TR2 | 0.731 | 10.6472 | 0.466 | 1.756 | 0.858 |
| | <--- | TR3 | 0.916 | | 0.631 | | |
| | <--- | TR4 | 0.941 | | 0.115 | | |
| OB | <--- | OB1 | 0.751 | 2.1815 | 0.436 | 0.909 | 0.706 |
| | <--- | OB3 | 0.726 | | 0.473 | | |
| PR | <--- | PR1 | 0.55 | | 0.698 | | |
| | <--- | PR3 | 0.629 | | 0.604 | | |
| | <--- | PR4 | 0.436 | | 0.810 | | |
| | <--- | PR5 | 0.521 | | 0.729 | | |
| | <--- | PR6 | 0.492 | 23.9219 | 0.758 | 6.302 | 0.792 |
| | <--- | PR11 | 0.578 | | 0.666 | | |
| | <--- | PR12 | 0.635 | | 0.597 | | |
| | <--- | PR14 | 0.461 | | 0.787 | | |
| | <--- | PR15 | 0.589 | | 0.653 | | |
| COR | <--- | COR1 | 0.83 | 10.58201 | 0.311 | 1.335 | 0.888 |
| | <--- | COR2 | 0.701 | | 0.509 | | |

| | | | | | |
|---|---|---|---|---|---|
| <--- | COR3 | 0.828 | | 0.314 | |
| <--- | COR4 | 0.894 | | 0.279 | |

*Note: RA – Relative Advantage, CA – Compatibility, CE – Complexity, TR – Trialability, OB – Observability, PR – Perceived Risk, COR – Consumer Resistance.

Composite reliability, or CR, like the Cronbach's coefficient alpha, measures internal consistency of the measurement model (Biaxter, Hughes, & Tight, 2010). CR is measured using the following formula: $CR\eta = (\Sigma\lambda yi)^2/[(\Sigma\lambda yi)^2 + (\Sigma\varepsilon i)]$ which is the (square of the summation of the factor loadings) / [(square of the summation of the factor loadings) + (summation of error variances)], where the calculations for each construct have been detailed below for a better understanding of how the values were obtained. However, composite reliabilities need to be greater than 0.7 for it to be considered good in terms of how reliable it is (Saunders, Lewis, & Thornhill, 2012). The CR for each construct in this research is above 0.7 (represented in Table 6.3), indicating a corresponding outcome of that of the Cronbach's coefficient alpha, thus all constructs are inferred to be highly reliable. These reliability results can be due to the use of existing measurement scales with high reliability measures and by understanding the theory behind the constructs utilised to form the current study.

*a). Relative Advantage*

$CR_{RA} = (0.694 + 0.849 + 0.643 + 0.647)^2 / [(0.694 + 0.849 + 0.643 + 0.647)^2 + ((1 - 0.518^2) + (1 - 0.279^2) + (1 - 0.587^2) + (1 - 0.546^2))]$

$CR_{RA} = (8.180)^2 / [(8.180)^2 + 1.930]$

$CR_{RA} = 0.809$

*b). Compatibility*

$CR_{CA} = (0.716 + 0.615 + 0.547 + 0.887 + 0.841)^2 / [(0.716 + 0.615 + 0.547 + 0.887 + 0.841)^2 + ((1 - 0.487^2) + (1 - 0.622^2) + (1 - 0.701^2) + (1 - 0.213^2) + (1 - 0.293^2))]$

$CR_{CA} = (13.003)^2 / [(13.003)^2 + 2.316]$

$CR_{CA} = 0.849$

*c). Complexity*

$CR_{CE} = (0.534 + 0.919 + 0.863 + 0.715)^2 / [(0.534 + 0.919 + 0.863 + 0.715)^2 + ((1 - 0.715^2) + (1 - 0.155^2) + (1 - 0.255^2) + (1 - 0.489^2))]$

$CR_{CE} = (9.187)^2 / [(9.187)^2 + 1.614]$

$CR_{CE} = 0.851$

*d). Trialability*

$CR_{TR} = (0.675 + 0.731 + 0.916 + 0.941)^2 / [(0.675 + 0.731 + 0.916 + 0.941)^2 + ((1 - 0.544^2) + (1 - 0.466^2) + (1 - 0.631^2) + (1 - 0.115^2))]$

$CR_{TR} = (10.641)^2 / [(10.641)^2 + 1.756]$

$CR_{TR} = 0.858$

*e). Observability*

$CR_{OB} = (0.751 + 0.726)^2 / [(0.751 + 0.726)^2 + ((1 - 0.436^2) + (1 - 0.473^2))]$

$CR_{OB} = (2.182)^2 / [(2.182)^2 + 0.909]$

$CR_{OB} = 0.706$

*f). Perceived Risk*

$CR_{PR} = (0.550 + 0.629 + 0.436 + 0.521 + 0.492 + 0.578 + 0.635 + 0.461 + 0.589)^2 / [(0.550 + 0.629 + 0.436 + 0.521 + 0.492 + 0.578 + 0.635 + 0.461 + 0.589))^2 + ((1 - 0.698^2) + (1 - 0.604^2) + (1 - 0.810^2) + (1 - 0.729^2) + (1 - 0.758^2) + (1 - 0.666^2) + (1 - 0.597^2) + (1 - 0.787^2) + (1 - 0.653^2))]$

$CR_{PR} = (23.922)^2 / [(23.922)^2 + 6.302]$

$CR_{PR} = 0.792$

*g). Consumer Resistance*

$CR_{COR} = (0.830 + 0.701 + 0.828 + 0.894)^2 / [(0.830 + 0.701 + 0.828 + 0.894)^2 + ((1 - 0.311^2) + (1 - 0.509^2) + (1 - 0.314^2) + (1 - 0.279^2))]$

$CR_{COR} = (10.582)^2 / [(10.582)^2 + 1.335]$

$CR_{COR} = 0.888$

### 6.4.1.3). Average Variance Extracted

Average variance extracted, or AVE, is used to measure if there is convergent validity, which explains the variance between factor loadings of the same construct (Saunders, Lewis, & Thornhill, 2012). The factor loadings obtained for each of the constructs are high except for three of the items under perceived risk, whereby it is recommended to have a loading above 0.5 (Creswell, 2014). Relative Advantage has factor loadings that range between 0.849 and 0.643; compatibility ranges between 0.887 and 0.547; complexity has ranges between 0.919 and 0.534; trialability is between 0.941 and 0.675; observability is between 0.751 and 0.726; and perceived risk is between 0.635 and 0.436 (represented in Table 6.2). Therefore, all the constructs are considered to be reliable.

AVE is calculated using the following formula: $V\eta = \Sigma\lambda yi^2/(\Sigma\lambda yi^2 + \Sigma\varepsilon i)$, which is the [(summation of the squared of factor loadings) / [(summation of the squared of factor loadings) + (summation of error variances)], and as with CR, the calculations have been expressed below for a better understanding of where the values are acquired. The ideal AVE is above 0.5, which indicates that relative advantage, compatibility, complexity, trialability, and observability have convergent validity (Malhotra, 2010). However, the convergent validity for each, besides perceived risk, is not as high as the factor loadings, indicating a difference in the results, especially with regards to perceived risk, which displays a low convergent validity of 0.3.

#### a). Relative Advantage

$AVE_{RA} = (0.694^2 + 0.849^2 + 0.643^2 + 0.647^2) / [(0.694^2 + 0.849^2 + 0.643^2 + 0.647^2) + ((1 - 0.518^2) + (1 - 0.279^2) + (1 - 0.587^2) + (1 - 0.546^2))]$

$AVE_{RA} = 2.640 / (2.640 + 1.930)$

$AVE_{RA} = 0.578$

#### b). Compatibility

$AVE_{CA} = (0.716^2 + 0.615^2 + 0.547^2 + 0.887^2 + 0.841^2) / [(0.716^2 + 0.615^2 + 0.547^2 + 0.887^2 + 0.841^2) + [(1 - 0.487^2) + (1 - 0.622^2) + (1 - 0.701^2) + (1 - 0.213^2) + (1 - 0.293^2)]$

$\text{AVE}_{CA} = 2.684 / (2.684 + 2.316)$

$\text{AVE}_{CA} = 0.537$

*c). Complexity*

$\text{AVE}_{CE} = (0.534^2 + 0.919^2 + 0.863^2 + 0.715^2) / (0.534^2 + 0.919^2 + 0.863^2 + 0.715^2) + [(1 - 0.715^2) + (1 - 0.155^2) + (1 - 0.255^2) + (1 - 0.489^2)]$

$\text{AVE}_{CE} = 2.386 / (2.386 + 1.614)$

$\text{AVE}_{CE} = 0.597$

*d). Trialability*

$\text{AVE}_{TR} = (0.675^2 + 0.731^2 + 0.916^2 + 0.941^2) / (0.675^2 + 0.731^2 + 0.916^2 + 0.941^2) + [(1 - 0.544^2) + (1 - 0.466^2) + (1 - 0.631^2) + (1 - 0.115^2)]$

$\text{AVE}_{TR} = 2.715 / (2.715 + 1.756)$

$\text{AVE}_{TR} = 0.607$

*e). Observability*

$\text{AVE}_{OB} = (0.751^2 + 0.726^2) / (0.751^2 + 0.726^2) + [(1 - 0.436^2) + (1 - 0.473^2)]$

$\text{AVE}_{OB} = 1.091 / (1.0912 + 0.909)$

$\text{AVE}_{OB} = 0.546$

*f). Perceived Risk*

$\text{AVE}_{PR} = (0.550^2 + 0.629^2 + 0.436^2 + 0.521^2 + 0.492^2 + 0.578^2 + 0.635^2 + 0.461^2 + 0.589^2) / (0.550^2 + 0.629^2 + 0.436^2 + 0.521^2 + 0.492^2 + 0.578^2 + 0.635^2 + 0.461^2 + 0.589^2) + [(1 - 0.698^2) + (1 - 0.604^2) + (1 - 0.810^2) + (1 - 0.729^2) + (1 - 0.758^2) + (1 - 0.666^2) + (1 - 0.597^2) + (1 - 0.787^2) + (1 - 0.653^2)]$

$\text{AVE}_{PR} = 2.698 / (2.698 + 6.302)$

$\text{AVE}_{PR} = 0.300$

*g). Consumer Resistance*

$AVE_{COR} = (0.830^2 + 0.701^2 + 0.828^2 + 0.894^2) / (0.830^2 + 0.701^2 + 0.828^2 + 0.894^2) + [(1 - 0.311^2) + (1 - 0.509^2) + (1 - 0.314^2) + (1 - 0.279^2)]$

$AVE_{COR} = 2.665 / (2.665 + 1.335)$

$AVE_{COR} = 0.666$

## 6.4.2). Testing for Validity

Validity has been tested for within the current research dissertation through the use of convergent validity factors such as factor loadings and through discriminant validity using an inter-construct correlation matrix and highest shared variance. The results obtained for each are displayed below in the respective sections.

## 6.4.2.1). Convergent Validity

Convergent validity can be represented through the factor loading estimates, shown in Table 6.4 below. Convergent validity is recommended to be above 0.5, whereby values deviating from 1 usually indicate a weaker convergent validity (Malhotra, 2010).

Table 6.4: Factor Loading Estimates

| Construct | | Factor Loading |
|-----------|------|------|
| RA | RA2 | 0.694 |
| | RA3 | 0.849 |
| | RA4 | 0.643 |
| | RA5 | 0.674 |
| CA | CA1 | 0.716 |
| | CA2 | 0.615 |
| | CA3 | 0.547 |
| | CA4 | 0.887 |
| | CA5 | 0.841 |

| | | |
|---|---|---|
| CE | CE1 | 0.534 |
| | CE2 | 0.919 |
| | CE3 | 0.863 |
| | CE4 | 0.715 |
| TR | TR1 | 0.675 |
| | TR2 | 0.731 |
| | TR3 | 0.916 |
| | TR4 | 0.941 |
| OB | OB1 | 0.751 |
| | OB3 | 0.726 |
| PR | PR1 | 0.550 |
| | PR3 | 0.629 |
| | PR4 | 0.436 |
| | PR5 | 0.521 |
| | PR6 | 0.492 |
| | PR11 | 0.578 |
| | PR12 | 0.635 |
| | PR14 | 0.461 |
| | PR15 | 0.589 |
| COR | COR1 | 0.830 |
| | COR2 | 0.701 |
| | COR3 | 0.828 |

| | | 0.894 |
|---|---|---|
| COR4 | | |

*Note: RA − Relative Advantage, CA − Compatibility, CE − Complexity, TR − Trialability, OB − Observability, PR − Perceived Risk, COR − Consumer Resistance.

The factor loadings for each item therefore reveal that convergent validity is only weak within the perceived risk construct (PR4, PR6, and PR14), where four of the items remaining are below 0.5. This does not make the results less valid as it has been noted by Creswell (2014) and Malhotra (2010) that quantitative data is usually characterised as having a reliability that is typically high and a validity that is typically low. Therefore, having three items out of a total of nine items within the perceived risk construct is a small percentage to be concerned over. Thus, indicating a convergent validity that resides among majority of the constructs.

### 6.4.2.2). Discriminant Validity

*a). Inter-Construct Correlation Matrix*

Discriminant validity is displayed in Table 6.5, through the use of the inter-construct correlation matrix, whereby the inter-construct correlation matrix represents the correlations between all likely sets of constructs included in the study (Heppner, Kivlighan, & Wampold, 2008).

Table 6.5: Inter-Construct Correlation Matrix

| Research Constructs | RA | CA | CE | TR | OB | PR | COR |
|---|---|---|---|---|---|---|---|
| **Relative Advantage (RA)** | **0.698** | | | | | | |
| **Compatibility (CA)** | 0.307 | **0.658** | | | | | |
| **Complexity (CE)** | -0.044 | 0.031 | **0.711** | | | | |
| **Trialability (TR)** | 0.301 | 0.421 | 0.108 | **0.786** | | | |
| **Observability (OB)** | 0.233 | 0.445 | -0.047 | 0.478 | **0.676** | | |
| **Perceived Risk (PR)** | .003 | -0.228 | 0.249 | -0.038 | -0.170 | **0.396** | |

| Consumer Resistance (COR) | -0.066 | -0.377 | 0.217 | -0.144 | -0.275 | 0.700 | **0.666** |
|---|---|---|---|---|---|---|---|

*Note: RA – Relative Advantage; CA – Compatibility; CE – Complexity; TR – Trialability; OB – Observability; PR – Perceived Risk; COR – Consumer Resistance.

From the table above, it can be observed that the correlations between all constructs are below 0.5, except for one value, which is 0.7 (consumer resistance and perceived risk). The positive values indicate a positive correlation, hence a positive relationship between the constructs. This infers that when one construct for instance increases, then the other construct will increase with it (Heppner, Kivlighan, & Wampold, 2008). On the other hand, the negative values indicate a negative correlation, hence a negative relationship. This infers that when one construct increases, the other construct will decrease (Heppner, Kivlighan, & Wampold, 2008).

However, when these correlational values are between -0.5 and 0.5, it generally indicates that the constructs cannot be explained by the other constructs and therefore, using measures such as factor analysis may not be appropriate for the data captured (Malhotra, 2010). From these results, it can be inferred that majority of the constructs cannot explain each other, except for consumer resistance when correlated with perceived risk.

The inter-construct correlation matrix in totality however, is used to measure discriminant validity when compared with the average variance extracted (AVE). When the AVE is greater than the correlation there is discriminant validity present (Creswell, 2014; Saunders, Lewis, & Thornhill, 2012). Therefore, within the matrix, the diagonal elements which are all equal to one, have been substituted for the AVE values obtained for each of the constructs to enable an accurate analysis.

The AVE for relative advantage is 0.698 which is greater than the range of correlations obtained for it: -0.066;0.307. The AVE is 0.658 for compatibility which is greater than 0.445. Complexity correlations are between -0.047 and 0.249 which is lower than the AVE of 0.711. Trialability has an AVE of 0.786 which is greater than its highest correlation of 0.478. Observability has an AVE of 0.676 which is greater than the highest correlation of -0.170. Consumer resistance has an AVE of 0.666 and does not have correlations to compare with thus indicating a higher AVE automatically. However, perceived risk has a correlation of 0.7

which is higher than the AVE of 0.396. Therefore, all constructs except for perceived risk have discriminant validity based on the inter-construct correlation matrix.

*b). Highest Shared Variance*

Discriminant validity, not only was analysed using the inter-construct correlation matrix, but also through the highest shared variance between constructs, which is represented within Table 6.6 below. The diagonal element has once again been substituted, yet with the highest shared variance of the construct.

Table 6.6: Highest Shared Variance

| Research Constructs | RA | CA | CE | TR | OB | PR | COR |
|---|---|---|---|---|---|---|---|
| Relative Advantage (RA) | 1 | | | | | | |
| Compatibility (CA) | 0.094 | 1 | | | | | |
| Complexity (CE) | 0.002 | 0.001 | 1 | | | | |
| Trialability (TR) | 0.091 | 0.177 | 0.012 | 1 | | | |
| Observability (OB) | 0.054 | 0.198 | 0.002 | 0.228 | 1 | | |
| Perceived Risk (PR) | 0.000 | 0.052 | 0.062 | 0.001 | 0.029 | 1 | |
| Consumer Resistance (COR) | 0.004 | 0.142 | 0.047 | 0.021 | 0.076 | 0.490 | 1 |

*Note: RA – Relative Advantage; CA – Compatibility; CE – Complexity; TR – Trialability; OB – Observability; PR – Perceived Risk; COR – Consumer Resistance.

When observing the values within Table 6.6, it can be seen that for relative advantage, the highest shared variance between all other constructs is 0.094, for compatibility it is 0.198, for both complexity and perceived risk it is 0.062, for trialability as well as observability it is 0.228, and for consumer resistance it is 0.490. For all these constructs the highest shared variance conveys that the data points are clustered closely around the mean obtained for each

construct, showing small variation in the results obtained (Saunders, Lewis, & Thornhill, 2012).

### c). *Average Variance Extracted and Highest Shared Variance*

Moreover, the comparison between the measured AVE and highest shared variance can be observed in Table 6.7 below, whereby each construct item measured is represented and compared. For there to be good discriminant validity, the AVE needs to be higher than the highest shared variance (SV) (Malhotra, 2010).

Table 6.7: Average Variance Extracted (AVE) and Highest Shared Variance (SV)

| Research Construct | | AVE | SV |
|---|---|---|---|
| RA | RA2 | 0.698 | 0.094 |
| | RA3 | | |
| | RA4 | | |
| | RA5 | | |
| CA | CA1 | 0.658 | 0.198 |
| | CA2 | | |
| | CA3 | | |
| | CA4 | | |
| | CA5 | | |
| CE | CE1 | 0.711 | 0.062 |
| | CE2 | | |
| | CE3 | | |
| | CE4 | | |
| TR | TR1 | 0.786 | 0.228 |
| | TR2 | | |

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| | | | |
|---|---|---|---|
| | TR3 | | |
| | TR4 | | |
| OB | OB1 | 0.676 | 0.228 |
| | OB3 | | |
| PR | PR1 | 0.396 | 0.062 |
| | PR3 | | |
| | PR4 | | |
| | PR5 | | |
| | PR6 | | |
| | PR11 | | |
| | PR12 | | |
| | PR14 | | |
| | PR15 | | |
| COR | COR1 | 0.666 | 0.490 |
| | COR2 | | |
| | COR3 | | |
| | COR4 | | |

*Note: RA – Relative Advantage, CA – Compatibility, CE – Complexity, TR – Trialability, OB – Observability, PR – Perceived Risk, COR – Consumer Resistance.

Through observation of Table 6.7, it can be noted that for relative advantage the AVE (0.698) is greater than the SV (0.091). The AVE (0.658) for compatibility is greater than the SV (0.198). Complexity has an AVE (0.711) greater than that of the SV (0.062). The SV (0.228) for trialability is less than the AVE (0.786). The AVE (0.676) is greater than the SV (0.228)

for observability and the AVE (0.396) is also greater than the SV (0.062) for perceived risk. Consumer resistance also has an AVE (0.666) that is greater than the SV (0.490).

Therefore, based on the results obtained, the constructs are all valid within the current research indicating that there is discriminant validity present within the current research, therefore inferring that based on both convergent and discriminant validity being positive, the results obtained are overall valid. This conclusion can be due to the fact that each scale was carefully selected in order to comply with the internal validity requirements where the constructs were considered appropriate and relevant to the measurements required and are related to one another, either in a positive or negative manner/relationship.

### 6.5). Structural Equation Modelling

Structural equation modelling and path modelling has been examined through model fit assessment, which analyses and discusses the CFA model and structural model fit, and the model fit indices. Also examined is path modelling with regards to hypothesis testing, whereby a summary of the results of the hypotheses is discussed in its respective section below.

### 6.5.1). Model Fit Assessment

By running the CFA, the items with factor loadings that were below the recommended 0.5 were omitted from the data to provide a stronger model fit. The CFA, represented in Figure 6.5, was then run again without the items that were omitted and this gave the model fit results. The same was done for the structural model, in Figure 6.6 below.

Figure 6.5: CFA Model
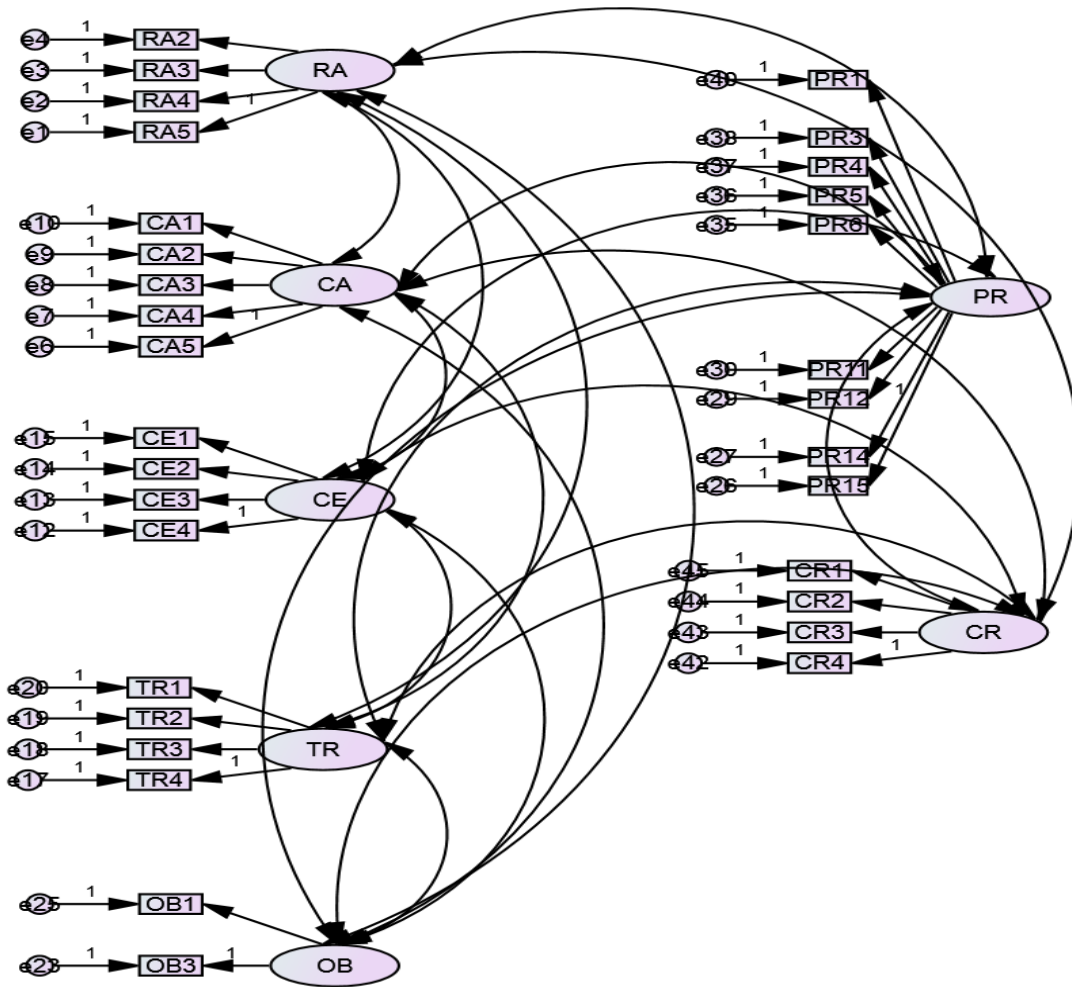


The CFA model or measurement model uses confirmatory factor analysis to test whether a relationship exists between the observed and latent constructs or factors and confirms that the number of loadings on those factors corresponds to the theory it is based on (Biaxter, Hughes, & Tight, 2010; Malhotra, 2010). As can be observed in the CFA model, Figure 6.5, the circular variables represent the latent constructs that are being measured through the rectangular variables that represent the observed constructs, and the smaller circular variables represent the error terms associated with the measured items. The type of arrows connecting the constructs also convey meaning, whereby straight arrows show relationships relying on dependence, whereas curved arrows show relationships that are correlational (Malhotra, 2010). The results obtained from the CFA model are discussed in detail in the assessment of the model fit indices below.

Figure 6.6: Structural Model
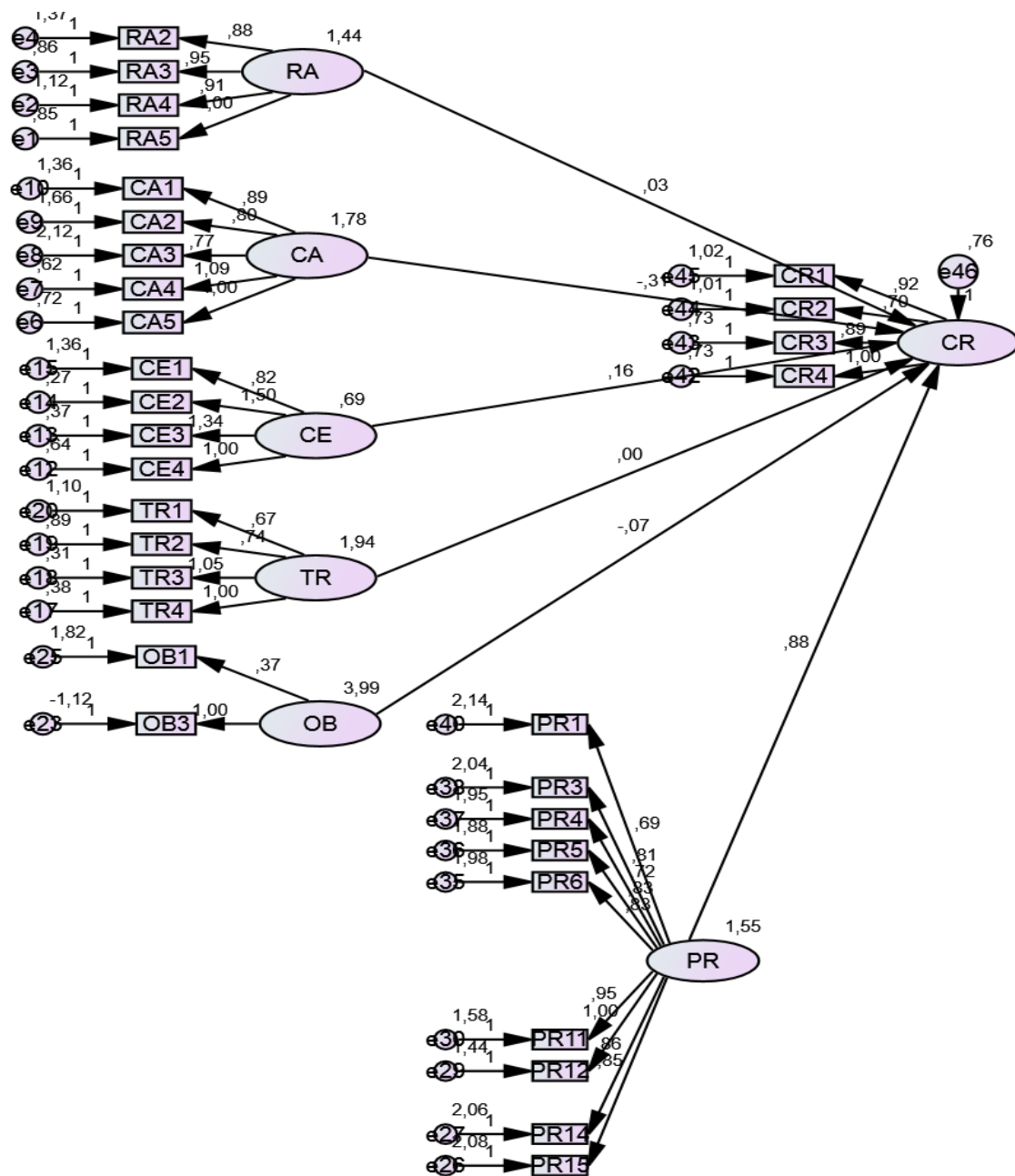


The structural model specifically identifies whether the constructs are interrelated and if a relationship in fact exists (Ghauri & Grønhaug, 2010; Heppner, Kivlighan, & Wampold, 2008). As with the CFA model, the circular variables represent the latent constructs, the rectangular variables represent the observed constructs and the smaller circular variables attached to the observed variables are the error terms. For the structural model however, an error term is also added as an observed construct cannot be explained fully through the latent

construct (Malhotra, 2010). The relationships between each construct are represented through a single headed arrow, indicating that certain constructs measure another (Malhotra, 2010).

As observed in the structural model, Figure 6.6, there are values between the constructs. The values between the latent construct and the observed constructs represent the factor loadings for each item (Heppner, Kivlighan, & Wampold, 2008). The values between the observed constructs and the error terms represent the actual errors. Finally, the values between each of the latent constructs represent the correlation between constructs (Heppner, Kivlighan, & Wampold, 2008). However, the values that will indicate the model fit for the structural model fit are discussed under the model fit indices.

### 6.5.2). Model Fit Indices

The model fit indices within the current study concerns the measures CMIN/DF or $X^2$ (Chi-Square Index), CFI (Comparative Fit Index), GFI (Goodness-of-Fit Index), IFI (Incremental Fit Index), NFI (Normed Fit Index), TLI (Tucker Lewis Index), and RMSEA (Root Mean Square Error of Approximation). Each of which is represented in Table 6.8 and discussed in detail in the respective sections below.

Table 6.8: Model Fit

| Fit Measures | CFA | Structural |
| --- | --- | --- |
| CMIN/DF | 1.658 | 2.638 |
| CFI | 0.970 | 0.933 |
| GFI | 0.916 | 0.876 |
| IFI | 0.970 | 0.937 |
| NFI | 0.928 | 0.898 |
| TLI | 0.959 | 0.898 |
| RMSEA | 0.041 | 0.064 |

*Note: CMIN/DF – Chi-Squared Test; CFI – Comparative Fit Index; GFI – Goodness-of-fit Index; IFI – Incremental Fit Index; NFI – Normed Fit Index; TLI – Tucker Lewis Index; RMSEA – Root Mean Square Error of Approximation.

**6.5.2.1). Chi-Square Index**

The CFA and structural model results obtained for the chi-square index both are represented in detail in Table 6.9.

Table 6.9: Chi-Square Index

| | NPAR | | CMIN | | DF | | P | | CMIN/DF | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | CFA | S | CFA | S | CFA | S | CFA | S | CFA | S |
| Default | 158 | 200 | 613.37 | 865.427 | 370 | 328 | 0 | 0 | 1.658 | 2.638 |
| Saturated | 528 | 528 | 0 | 0 | 0 | 0 | | | | |
| Independence | 32 | 32 | 8477.641 | 8477.641 | 496 | 496 | 0 | 0 | 17.092 | 17.092 |

*Note: CMIN/DF – Chi-Squared Test; CFA – Confirmatory Factor Analysis; S – Structural.

The values for CMIN/DF or $X^2$ for the CFA (1.658) and structural model fit (2.638) are both below three, which is the recommended value according to Malhotra (2010), therefore there is a good fit. However, because the chi-squared statistical test can be biased due to its improvement with an increased sample size and observed variables, other model fit indices were included in the study, which are the CFI (Comparative Fit Index), GFI (Goodness-of-fit Index), IFI (Incremental Fit Index), NFI (Normed Fit Index), TLI (Tucker Lewis Index), and the RMSEA (Root Mean Square Error of Approximation) (Malhotra, 2010).

**6.5.2.2). Baseline Comparison Index**

Within the baseline comparison index, the CFI, GFI, IFI, NFI, and TLI for the CFA and structural model are each measured and are represented in the table below, Table 6.10.

Table 6.10: Baseline Comparison Index

| | CFI | | GFI | | IFI | | NFI | | TLI | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | CFA | S | CFA | S | CFA | S | CFA | S | CFA | S |
| | | | | | Delta2 | | Delta1 | | Rho2 | |
| Default | 0.970 | 0.933 | 0.916 | 0.876 | 0.970 | 0.934 | 0.928 | 0.898 | 0.959 | 0.898 |
| Saturated | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| Independence | 0 | 0 | 0.306 | 0.306 | 0 | 0 | 0 | 0 | 0 | 0 |

*Note: CFI – Comparative Fit Index; GFI – Goodness-of-fit Index; IFI – Incremental Fit Index; NFI – Normed Fit Index; TLI – Tucker Lewis Index; CFA – Confirmatory Factor Analysis; S – Structural.

The values for CFI, GFI, IFI, NFI, and TLI are all recommended by Malhotra (2010) to be above the value of 0.9. When analysing the table, it can be observed that the CFI for CFA has a value of 0.970, GFI is 0.916, IFI is 0.970, NFI is 0.928, and TLI is 0.959, which are all above 0.9, therefore indicating good fit for the CFA model. The structural model reveals results for CFI as 0.933, GFI as 0.876, IFI as 0.934, NFI as 0.898, and TLI as 0.898, therefore indicating that only CFI and IFI have good fit, whereas the rest are very close to meeting the requirement.

**6.5.2.3). Root Mean Square Error of Approximation**

The RMSEA (root mean square error of approximation) results are expressed in Table 6.11 below, where both the CFA and structural model results are present.

Table 6.11: Root Mean Error of Approximation

| Model | RMSEA | |
|---|---|---|
| | CFA | S |
| Default | 0.041 | .064 |
| Independence | 0.201 | .201 |

*Note: CMIN/DF – RMSEA – Root Mean Square Error of Approximation; CFA – Confirmatory Factor Analysis; S – Structural.

RMSEA is considered marginally acceptable when less than 0.08 and acceptable at less than 0.06 (Creswell, 2014). The CFA model results (0.041) are then observed to be acceptable, however the structural model (0.064) is only just perceived to be marginally acceptable. Overall, it can be concluded that there is goodness-of-fit within the research conducted as majority of the fit measures are favourable, with the others close to being favourable (Malhotra, 2010).

It is therefore concluded that all model fit indices meet the requirements for acceptable model fit.

### 6.5.3). Path Modelling and Hypothesis Testing

The research set out to test six hypotheses regarding consumer resistance, relative advantage, compatibility, complexity, trialability, observability, and perceived risk. The outcome of each hypothesis is stipulated in Table 6.12.

Table 6.12: Results of Structural Equation Model Analysis

| Proposed Hypothesis Relationship | Hypothesis | Path Coefficient | P-Value | Outcome |
|---|---|---|---|---|
| Consumer Resistance – Relative Advantage | $H_1$ | 0.03 | 0.489 | Supported but insignificant |
| Consumer Resistance - Compatibility | $H_2$ | -0.31 | *** | Unsupported but significant |
| Consumer Resistance – Complexity | $H_3$ | 0.16 | 0.022 | Supported and significant |
| Consumer Resistance - Trialability | $H_4$ | 0.00 | 0.978 | Unsupported and |

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| | | | | insignificant |
|---|---|---|---|---|
| Consumer Resistance – Observability | $H_5$ | -0.07 | 0.195 | Unsupported and insignificant |
| Consumer Resistance – Perceived Risk | $H_6$ | 0.88 | *** | Supported and significant |

From the results obtained through the data analysis, only half of the hypotheses were not rejected. $H_2$, $H_4$, and $H_5$ were all rejected, where these hypotheses concern compatibility, trialability, and observability. Only $H_1$, $H_3$, and $H_6$ were not rejected, where these hypotheses concern relative advantage, complexity, and perceived risk, and are significant at a 0.01 critical value.

**6.6). Summary of Hypotheses Results**

**$H_1$: There is a negative relationship between relative advantage and consumer resistance.**

The first hypothesis that was proposed regarding relative advantage and consumer resistance has been proven to be supported within this study, indicating that there is in fact a negative relationship that exists between relative advantage and consumer resistance. This implies that there are many benefits associated with a product innovation, there is less consumer resistance occurring. However, the path co-efficient is 0.03 which indicates a very weak relationship. The relationship has also yielded insignificant results, therefore the implication previously stated is questionable.

**$H_2$: There is a negative relationship between compatibility and consumer resistance.**

The negative relationship between compatibility and consumer resistance was unsupported in this research study, therefore suggesting that there is no relationship between the two constructs. This implies that consumers are indifferent regarding product innovations that are compatible or incompatible. This is evident from the negative path co-efficient which is at -0.31. However, the relationship did yield significant results.

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**H₃: There is a positive relationship between complexity and consumer resistance.**

Hypothesis three stated that there is a positive relationship between complexity and consumer resistance which was supported. The results were also significant, which implies that the more complex a product innovation is, the more resistant a consumer will be toward that product. However, the path co-efficient was low, indicating a weak relationship between complexity and consumer resistance at 0.16.

**H₄: There is a negative relationship between trialability and consumer resistance.**

The negative relationship proposed in hypothesis four was both unsupported and insignificant, whereby this was reflected in the path co-efficient of 0.00. This implies that trialability is not a factor concerning the level of consumer resistance toward a product innovation.

**H₅: There is a negative relationship between observability and consumer resistance.**

As with the previous hypothesis, hypothesis five is also unsupported, indicating that there is no negative relationship that exists between observability and consumer resistance, which reflects in the path co-efficient that was measured at -0.07. Therefore, it is implied that observability does not play a role in determining the level of consumer resistance that a consumer has toward a product innovation.

**H₆: There is a positive relationship between perceived risk and consumer resistance.**

Perceived risk and consumer resistance can be said to share a positive relationship that is supported within the research conducted. Therefore, the less risk a consumer perceives of a product innovation, the less resistant that consumer will be toward that product innovation. The relationship strength was reflected in the path co-efficient, which was measured at 0.88, indicating a very strong relationship between the two constructs. The results yielded for this relationship were also observed to be significant.

**6.7). Conclusion**

Chapter 6, the empirical results, is an analysis of the data that has been gathered, showing how the data was standardised and coded, what statistical programming it was entered into, the relevant statistical tests that needed to be run, and the relevant results of those tests. The chapter then provided an interpretation of the results, which confirmed the reliability and

validity of the previously designed scales that were used in the study. These results were mostly in the form of tables and figures that summarised the large amount of output provided by the statistical programmes used.

# CHAPTER 7: DISCUSSION

## 7.1). Introduction

Chapter 7 presents a discussion of the study's research findings and investigates whether the findings corroborate or differ from the findings of prior studies done in the field of e-cigarettes with regard to COR and the predictors of the diffusion of innovations. The discussion also includes what the meaning of each of the findings is, and the achievement of the study's objectives.

## 7.2). Primary Findings

Within the primary findings, each of the hypotheses is tested regarding the evaluation of the predictors of the diffusion of innovations on COR toward e-cigarettes among South African university students. The results of these hypotheses are summarised in Table 7.1 below.

Table 7.1: Summary of Hypotheses Results

|  | Hypothesis | Result |
|---|---|---|
| H1 | There is a negative relationship between RA and COR. | Supported* |
| H2 | There is a negative relationship between CA and COR. | Unsupported* |
| H3 | There is a positive relationship between CE and COR. | Supported* |
| H4 | There is a negative relationship between TR and COR. | Unsupported* |
| H5 | There is a negative relationship between OB and COR. | Unsupported* |
| H6 | There is a positive relationship between PR and COR. | Supported* |

*Note: RA – Relative Advantage; CA – Compatibility; CE – Complexity; TR – Trialability; OB – Observability; PR – Perceived Risk; COR – Consumer Resistance.

## 7.2.1). Relative Advantage and Consumer Resistance

$H_1$: There is a negative relationship between RA and COR.

RA and COR were proposed to share a negative relationship with one another, as it was thought that a high perception of RA or added benefits attributed to the e-cigarette would result in a less resistant consumer. From the findings it can be observed that this relationship

was supported. However, on further examination, the strength of the negative relationship was low. Therefore, a negative relationship exists between RA and COR, albeit very weak.

This finding supports previous research conducted on the influence of RA on COR, which was conveyed particularly in the works of Claudy (2011), Schwarz and Ernst (2008), Lichtenstein and Williamson (2006), Al-Jabir and Sohail (2012), Arts et al. (2011), and Jung et al. (2012). For example, Jung et al. (2012) discovered that high RA is attributed to high diffusion of innovations and this relates to the consumer's resistance, in that the higher the level of diffusion, the less resistant consumers should be.

Therefore, marketers of the e-cigarette should implement this new knowledge into new product and marketing strategies regarding the e-cigarette, by incorporating activities such as promotions and campaigns that will aid in highlighting aspects that convey the benefits of RA, which will result in reducing the consumer's resistance toward the e-cigarette.

From the results obtained regarding hypothesis one, it can be summarised that this proposition was correct and therefore supported existing research on the relationship between RA and COR. Moreover, this infers that if the e-cigarette is perceived as having more added benefits or advantages than traditional cigarettes, the consumer will be less resistant toward the e-cigarette.

### 7.2.2). Compatibility and Consumer Resistance

$H_2$: There is a negative relationship between CA and COR.

Hypothesis two considered the proposition that a negative relationship exists between CA and COR, meaning that high familiarity with the features or any other attributes of the innovation, or how well the innovation already suits the life of the user, is likely to affect how compatible the innovation is with the consumer, and therefore lower resistance. From the results, it was found that this hypothesis is not supported, which indicates that CA is not influential in the determination of a consumer's resistance.

This hypothesis was based on prior studies by Claudy (2011), Claudy et al. (2010), Schwarz and Ernst (2008), Dwivedi (2005), Arts et al. (2011), Jung et al. (2012), Korhonen and Kaarela (2011), and Al-Jabri and Sohail (2012). For example, Kleijnen et al.'s (2009) study, whereby through a meta-analysis of resistance drivers observed that low CA leads to the

postponement of innovations, and therefore COR. Additionally, Claudy et al. (2010) noted that low CA with regard to consumers' daily routines and habits equated to a higher COR.

From the results obtained it can be summarised that this hypothesis was rejected, thus inferring that the relationship existing between CA and COR does not influence one or the other in any way. Thus, in terms of the South African university population, CA is not a factor that determines the level of COR with regard to e-cigarettes. Therefore, marketers of the e-cigarette should not waste valuable company resources in implementing CA into new product or marketing strategies since it will not help in reducing the consumer's resistance to the e-cigarette.

### 7.2.3). Complexity and Consumer Resistance

$H_3$: There is a positive relationship between CE and COR.

CE and COR formed hypothesis three, whereby the relationship between the two constructs was proposed to share a positive relationship with one another. This implied that the more difficult an innovation is perceived to be in terms of understanding and using it, the less likely the innovation is to be adopted by the consumer. From the current study's findings, the hypothesis was supported and the relationship was found to be positive. However, on further examination it was noted that the strength of the relationship was moderately low, indicating that there is a positive relationship between CE and COR, but it is moderately weak.

This hypothesis was based upon the research previously conducted by Al-Jabir and Sohail (2012), Claudy et al. (2010), Claudy (2011), Jung et al. (2012), and Korhonen and Kaarela (2011). For example, Claudy's (2011) research on resistance toward green product innovations showed that a lower CE results in a higher association with the consumer, and Korhonen and Kaarela's (2011) study that explored industrial services noted that CE is related to resistance.

Therefore, e-cigarette marketers and manufacturers should implement this finding by creating new product and marketing strategies that incorporate the results for CE, as this will result in reducing the level of COR among those who consider the e-cigarette. For example, by implementing new product innovations in design, longer battery life, and economy packs into those strategies.

In summary, the results showed that hypothesis three was supported, therefore corroborating the findings of the previous research conducted by other authors. Hence, from the context of South African university students it can be inferred that the less complex an e-cigarette is perceived by the consumer, the less resistant the consumer will be to e-cigarettes in general.

### 7.2.4). Trialability and Consumer Resistance

$H_4$: There is a negative relationship between TR and COR.

TR and COR were proposed to share a negative relationship, in that the more opportunity that a consumer has to try a product the less resistant that consumer will be when deciding on whether or not to adopt the product. From the findings, it was observed that this hypothesis was unsupported. This implies that TR does not have a strong enough influence to affect the resistance of a consumer.

This hypothesis was developed Demoulin and Zidda (2009), Schwarz and Ernst (2008), Claudy et al. (2010), Arts et al. (2011), Al-Jabir and Sohail (2012), and Jung et al.'s (2012) research. For example, Demoulin and Zidda (2009) found that TR relates to COR through their study on the drivers affecting the adoption of grocery retail market loyalty cards, and Claudy et al. (2010) postulated that TR has a negative on COR, and this was found to be justified.

From the findings obtained, it can be summarised that hypothesis four was rejected, stating that there is no negative relationship that exists between TR and COR with regards to e-cigarettes, and that the prior research examined was not supported either. Therefore, marketers of the e-cigarette should not waste valuable company resources in implementing TR into new product or marketing strategies since it will not help in reducing the consumer's resistance toward the e-cigarette.

### 7.2.5). Observability and Consumer Resistance

$H_5$: There is a negative relationship between OB and COR.

Hypothesis five concerned the proposed negative relationship between COR and OB. The hypothesis proposed that when there is low visibility of the successful use of an innovation, the rate of adoption slows. Observed from the findings, this relationship was unsupported, therefore indicating that OB does not influence a consumer's resistance toward e-cigarettes.

This hypothesis was based upon the prior works of Fetscherin and Lattemann (2008), Jung et al. (2012), and Lichtenstein & Williamson (2006). For example, Jung et al. (2012) observed that a greater OB relates to a more rapid adoption of an innovation among users of e-books, thus the consumer should be less resistant toward a product when there is an increased intention to adopt that product.

From the results, it is evident that this hypothesis was rejected, inferring that no negative relationship exists between COR and OB with regard to e-cigarettes. It was also inferred that since the hypothesis was rejected, the previous research upon which the hypothesis was postulated was also unsupported. Therefore, marketers of the e-cigarette should not waste valuable company resources in implementing OB into new product or marketing strategies since it will not help in reducing the consumer's resistance toward the e-cigarette.

### 7.2.6). Perceived Risk and Consumer Resistance

$H_6$: There is a positive relationship between PR and COR.

In hypothesis six, PR and COR were proposed to share a positive relationship, whereby the higher the PR is of adopting a product the more resistant consumers will be toward that product. The results indicate that the hypothesis was supported by the current study, implying that there is a positive relationship that exists between PR and COR. Upon further examination of the strength of the relationship, it can be noted that the relationship is moderately strong.

This hypothesis was based on research conducted by Abzakh et al. (2013), Schwarz and Ernst (2008), and Kleijnen et al. (2009). For example, Schwarz and Ernst (2008) found that there was a significant impact on the adoption of innovations concerning PR, especially functional risk, thus showing that with an increased intention there should be less resistance toward an innovation.

Therefore, marketers of the e-cigarette should implement this new knowledge into new product and marketing strategies regarding the e-cigarette, by investing in research and design that will reduce the PR that consumers associate with e-cigarettes since in turn this will reduce the resistance of the consumer.

In summary and within the context of South African university students, the results support this hypothesis, therefore inferring that the more risk that is perceived to surround the e-

cigarette, the more likely consumers will be to resist the e-cigarette, and supports prior research conducted regarding this relationship.

## 7.3). Summary of Findings

From these results it can be inferred that not all of the predictors of the Diffusion of Innovations Model affects COR in terms of product novelty, such as the e-cigarette. The predictors that do share a relationship with COR are RA, CE, and PR, whereas the predictors that do not share the proposed expected relationships with COR are CA, TR, and OB. The findings also revealed that the relationships that were supported mostly yielded weaker correlations, namely the relationships between COR and RA and COR and CE. The relationship between PR and COR only had a moderately strong correlation. This could be a result of the manner in which respondents perceived the items within the questionnaire presented, or it could indicate that there may be a changing dynamic among the constructs that characterise the diffusion of innovations among young university students in Johannesburg.

A summary of the findings from the results obtained also observed that it is strongly advisable that marketers and manufacturers of the e-cigarette create new product and marketing strategies that incorporate the results and what they mean into such strategies, in order to reduce the level of COR that exists among South African university students toward the e-cigarette, How these strategies could possibly be incorporated is discussed in the following chapter in the section on marketing implications.

## 7.4). Conclusion

Chapter 7 presented a discussion of the research findings obtained from the study and whether the findings corroborated or differed from the findings of prior studies done in the field of e-cigarettes in terms of COR and the predictors of the Diffusion of Innovations Model. The discussion also included the meaning of the findings and the achievement of the study's objectives.

# CHAPTER 8: CONCLUSIONS, RECOMMENDATIONS, AND CONTRIBUTIONS

## 8.1). Introduction

Chapter 8 includes a conclusion to the research contained in this dissertation and elaborates on the importance of completing the research, namely: e-cigarettes in a South African context with reference to COR and the Diffusion of Innovations Model. The meaning behind what this research has to offer in the marketing field of study is identified, and the chapter continues by elaborating on the possible recommendations that can be made. Furthermore, the chapter includes a discussion of the marketing implications and contributions that the study will provide, as well as the limitations or problems that were faced when either proposing the research, during the data gathering process, through the data analysis stage, or any other stage where a problem may have occurred. Finally, the chapter concludes with future research possibilities.

## 8.2). Conclusions of the Research

In conclusion, an evaluation of the predictors of the Diffusion of Innovations Model in relation to COR among university students in Johannesburg was researched by employing a quantitative methodology. Through the analysis of the data collected, it was discovered that the hypotheses $H_1$, $H_3$, and $H_6$ had sufficient evidence to not be rejected. These hypotheses concerned the relationships between COR and three of the predictors of the Diffusion of Innovations Model (RA, CE, and PR). However, $H_2$, $H_4$, and $H_6$ were rejected and these hypotheses concerned COR and the Diffusion of Innovations Model's remaining three predictors of the CA, TR, and OB). Thus, only a partial amount of pre-existing views in prior research conducted that state that there is a relationship existent between all predictors of the Diffusion of Innovations Model was corroborated. This new knowledge or information discovered justifies that research was in fact necessary and an important addition.

In terms of recommendations, there is a risk of bias since the sample does not employ randomisation, and therefore a lack of equal opportunity might have yielded systematic errors that lead to an overestimation or underestimation of the attributes of people from particular groups. Therefore, it is recommended that future researchers employ a sampling technique that can incorporate randomisation effectively, and if possible, the manipulation of the independent variable. By including these two characteristics, causality can be observed, which provides for a stronger research result.

A further recommendation would be in conducting research that measures demographic characteristics that are different to those captured in this study in order to gain differing perspectives on the e-cigarette. The research should possibly be conducted in a different environment where it is easier to find respondents with differing demographic characteristics, such as the workplace. However, it is highly recommended that researchers avoid e-cigarette chat forums, since this could lead to a positive bias towards e-cigarettes, therefore creating results that are skewed.

Although students are seen as the initial adopters of novelty items such as the e-cigarette, they are also known not to possess a high level of disposable income. Therefore, it may be recommended to use a sample inclusive of the working class population that do have the budget to purchase an e-cigarette. Another recommendation would be to involve a larger sample to make the research more generalisable to the population, and also to include respondents from other cities and provinces around South Africa to achieve a more accurate inference capability.

## 8.3). Managerial Implications

The research provides e-cigarette manufacturers and marketers with a new context to consider when implementing the new knowledge into new or improved product and marketing strategies, whereby manufacturers of e-cigarettes will be able to better understand how to limit COR and improve product diffusion of the e-cigarette among prospective customers, and subsequently improve the rate of adoption. Possibilities can include interventions that are proactively designed to target those consumers less inclined to adopt e-cigarettes, and e-cigarette marketers will be given the opportunity to create a climate where not only the technologically savvy will adopt an innovation, but so too will the majority (Kleijnen et al., 2009).

However, from the study results it is evident that it will only be beneficial for e-cigarette manufacturers and marketers to focus resources and efforts into manipulating the predictors of the diffusion of innovations that share a relationship with COR toward the e-cigarette. Therefore, strategies need to aim to include RA, CE, and PR as the foci of the strategy if there is to be a return on the investment taken to implement these strategies.

For example, RA can be employed in marketing strategies of the e-cigarette by formulating educational campaigns that inform consumers of the added benefits and superior advantages that the e-cigarette has over traditional tobacco cigarettes, or through promotional campaigns that highlight these benefits. This includes emphasising the fact that e-cigarettes are more cost-effective in the long run, that it is healthier to smoke e-cigarettes in comparison to traditional tobacco cigarettes as per health study indications, that the e-cigarette can be used anywhere and at any time since it does not release fumes that affect surrounding people (Barbeau et al., 2013; Schripp et al., 2013; Sutfin et al., 2013). However, it must be remembered that e-cigarettes cannot be marketed as being a smoking cessation or reduction device due to regulations surrounding the e-cigarette (Bullen et al., 2010; Caponnetto et al., 2011; Cho et al., 2011; Trumbo & Harper, 2013).

Regarding CE, e-cigarette manufacturers could employ strategies to make e-cigarette less complicated, such as design, battery life, and economy packs. Firstly, e-cigarette manufacturers could employ an innovative design that makes the e-cigarette less complex by improving the lifespan of the filters, so that the filters do not need to be changed as frequently, or by making the refilling of e-liquid more convenient via an injector system that reduces the likelihood of spills and cuts down on having to completely disassemble the e-cigarette. Secondly, e-cigarette manufacturers could make the perceptions of e-cigarettes less complex by using batteries that have a longer lifespan so that consumers do not have to recharge the e-cigarette as often and have the inconvenience of the battery depleting in situations where it is difficult to recharge the e-cigarette. Another method of achieving this is to sell more than one battery with an e-cigarette, offer energy banks suited to the e-cigarette, or have wireless chargers that can be used anywhere.

Lastly, in terms of incorporating strategies that use the results obtained for CE in relation to e-cigarettes, it is suggested that e-cigarette manufacturers utilise economy packs in their sales strategies. An economy pack offers more than a so-called bulk item that comes with the offer of a discount. These economy packs are likely to work well with the use of larger e-liquid refills, such that the e-liquid would cut down on the inconvenience of having to visit an e-cigarette retailer or shop online for refills. Therefore, via an economy pack the offer of a discount for buying more products could incentivise sales and reduce the perceived CE of the e-cigarette reducing COR.

From the perspective of utilising PR in e-cigarette manufacturers and marketers' strategies, research and design could aid in the future of the e-cigarette. By investing in research and design costs in the form of studying the long-term effects of smoking an e-cigarette and the results of using the e-cigarette as a successful smoking cessation or reduction device could favour all e-cigarette manufacturers and marketers in the long-term. With studies to support long-term use of the e-cigarette in terms of health effects, the e-cigarette marketers could use these findings in the strategy, employing RA as well as PR. By showing the consumer that long-term use is in fact a healthier option with no unwanted long-term effects, the consumer's PR will reduce, which reduces COR. If the studies can also corroborate that e-cigarettes aid in smoking cessation and reduction they could also aid in allowing marketers to use this as a RA, which reduces COR.

## 8.4). Contributions

The contributions of this study can be separated into three sections, namely conceptual contributions, theoretical contributions, and marketing contributions, each of which are discussed in detail hereunder.

### 8.4.1). Conceptual Contributions

The current research contributed conceptually by providing new contextual knowledge that built upon previous studies regarding the predictors of the Diffusion of Innovations Model and COR. The results and analysis of these results has allowed for the contribution of a new context regarding the Diffusion of Innovations Model and COR in terms of e-cigarettes in South Africa. Therefore, contextual knowledge has been expanded in terms of the research in this study.

### 8.4.2). Theoretical Contributions

The research will contribute toward existing literature on COR and the Diffusion of Innovations Model, all in terms of e-cigarettes in the South African market, particularly that of Johannesburg residents. Thus, a new context and unique contribution to knowledge will be provided to the aforementioned gap stated in the problem statement, since currently there seems to be no existing literature that refers to all three constructs, namely e-cigarettes, COR, and product diffusion. However, this is subject to the research that was available to the researcher within the period of gathering secondary research.

**8.4.3). Marketing Contributions**

The marketing contributions that arose from the current research include a contribution towards the South African context in terms of how to use the results obtained to aid in marketing activities regarding the predictors of the Diffusion of Innovations Model and COR surrounding e-cigarettes. It also contributes towards a better understanding of how to implement strategies in the South African e-cigarette market and which predictors should be focused on, so that valuable resources are allocated correctly in order to achieve the best returns.

Conducting research in a South African context has allowed for an analysis of how the South African market determines the importance of the predictors of the Diffusion of Innovations Model in terms of the influence that those factors have upon COR. It has also allowed for a better understanding of how university students in South Africa perceive a product novelty such as the e-cigarette. This context creates a platform on which future research of the topic can be built, allowing for the most information on the South African e-cigarette market to be available to marketers and manufacturers of the e-cigarette.

A contribution can be made to marketing activities by adopting this study's findings and by implementing its results into future product and marketing strategies in terms of e-cigarettes. For example, this can be achieved by creating strategies that focus on implementing RA by aiming to promote or to educate and inform consumers as to the added benefits of the e-cigarette. This can also be achieved via strategies implementing CE in the form of making the e-cigarette less complicated through innovative design, increased battery life, and economy packs. Lastly, strategies can implement PR by investing in further research and design of e-cigarettes. The research also contributes by assisting marketers and manufacturers of e-cigarettes in allowing them to refine investment by dissuading the implementation of predictors of the Diffusion of Innovations Model that do not aid in reducing COR toward the e-cigarette, thus resulting in a better return on investment.

**8.5). Limitations**

Limitations within the current study include the use of university students as the sample, the demographics of the sample, and the e-cigarette as the topic of the study. Firstly, the study in this research was limited to the generalisation of only university students in South Africa, because the sample consisted of university students at the University of the Witwatersrand in

Johannesburg. Therefore, only data for the South African e-cigarette market and only for a partial percentage of consumers could be captured.

The second limitation also lies within the sample due to the use of university students who are typically between the ages of 18 and 25. This age category seems to hold very similar perceptions of e-cigarettes, whereas a different age category could offer different results that may be of interest, considering that older age groups and the working class may have different opinions of e-cigarettes since they are able to afford to place the e-cigarette through a trial, whereas students have very limited incomes and cannot afford to do this.

Finally, the use of the e-cigarette as a topic may have been limiting due to the attitude that respondents had to answering the questionnaire. As noted in the results, the majority of the respondents were non-smokers and found that the questionnaire seemed to be irrelevant to them, due to the fact that these respondents do not have an interest in smoking. Therefore, there was a resistance to the actual questionnaire and this may have slightly skewed the investigation into COR toward e-cigarettes. This created an issue in sorting through questionnaires that were valid to use since people who found the questionnaire irrelevant did not take the time necessary to read that the questionnaire was gauging more COR rather than the use of e-cigarettes.

### 8.6). Future Research

Based on the research conducted in this study and the previous research concerning the Diffusion of Innovations Model and COR, it can be concluded that possible future research t should aim to eliminate the limitations and gaps presented in this study and in prior studies. Therefore, possible studies should target the South African e-cigarette market in all spheres of target consumers, and on any topic that does not cover the same constructs used in this study. As noted in the problem statement, there seems to be a lack of research pertaining to all topics in terms of the South African e-cigarette market, therefore literally any marketing topic could and should be explored in order to gather a better understanding of the product's novelty.

## 9). Appendices

## 9.1). Questionnaire



Date: 16 June 2015

Good Day

My name is Nastasje Johnson and I am a Masters student in the Marketing Division at the University of the Witwatersrand, Johannesburg. I am conducting research on an evaluation of the predictors of the diffusion of innovations on the consumer resistance toward e-cigarettes among South African university students. The predictors will include relative advantage, compatibility, complexity, trialability, observability, and perceived risk.

As students at the University of the Witwatersrand, you are **invited** to take part in this questionnaire. The purpose of this questionnaire is to evaluate the predictors of the diffusion of innovations on the consumer resistance toward e-cigarettes among South African university students.

Your response is important and there are no right or wrong answers. This questionnaire is both confidential and anonymous. Anonymity and confidentiality are guaranteed by not needing to enter your name on the questionnaire. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether or not you participate. You may withdraw from the questionnaire at any stage.

The first part of the questionnaire captures some demographic data. Please tick the boxes that are applicable. The second part of the questionnaire comprises 45 statements. Please indicate the extent to which you agree with each statement, by circling the appropriate number. The entire survey should take between 10 to 15 minutes to complete.

Thank you for considering participating. Should you have any questions, or should you wish to obtain a copy of the results of the survey, please contact me on 082 876 5977 or at nastasje.johnson@gmail.com.

My contact details: nastasje.johnson@gmail.com – Cell number: 082 876 5977.

My supervisor's name and email are: Marike Venter; **marike.venter@wits.ac.za**, 011 717 8067.

Kind regards,

Nastasje Johnson

Masters Student: Division of Marketing

School of Economic and Business Sciences

University of the Witwatersrand,

1 Jan Smuts Avenue & Jorissen Street, Braamfontein, Johannesburg, 2000

**Title of the research:** An Evaluation of the Predictors of the Diffusion of Innovations on the Consumer Resistance toward e-Cigarettes among South African University Students
**Name of principle researcher:** Nastasje Johnson
**Department address:** Faculty of Commerce, Law and Management, School of Economic and Business Sciences University of the Witwatersrand, Johannesburg
**Telephone:** 082 876 5977
**Email:** nastasje.johnson@students.wits.ac.za
**Nature of the research:** Educational

**Participant's involvement:**

What's involved?
Risks: there are no risks involved in participating in the following.
Benefits: aid in the completion of research needed.

I acknowledge the following:

- I agree to participate in this research project.
- I have read this consent form and the information it contains and had the opportunity to ask questions about them.
- I agree to my responses being used for education and research on condition that my privacy is respected, subject to the following:
  - I understand that my personal details will not / may be included in the research / will be used in aggregate form only, so that I will not be personally identifiable (delete as applicable.)
  - I understand that I am under no obligation to take part in this project.
  - I understand I have the right to withdraw from this project at any stage.

Signature of Participant:

Date:

Name of person who sought consent: Nastasje Johnson

Signature of person who sought consent:

<u>RESEARCH QUESTIONNAIRE</u>

Please answer the following questions by marking the appropriate answer with a X. This questionnaire is strictly for research purposes.

SECTION A: GENERAL INFORMATION

This section is asking for your background information. Please indicate your answer by placing an X in the appropriate box.

A1                                            Please indicate your gender:

| Male | | Female | |
|------|---|--------|---|

A2       Please indicate your age category:

| | |
|---|---|
| Younger than 18 | |
| Between 18-25 | |
| Older than 25 | |

A3       Please indicate your highest academic level:

| | |
|---|---|
| High School | |
| Undergraduate degree | |
| Postgraduate Diploma | |
| Postgraduate Degree | |

A4       Please indicate your smoking status:

| | |
|---|---|
| Smoker | |
| e-Cigarette Smoker | |
| Non-Smoker | |
| Both Smoker & e-Cigarette Smoker | |

## SECTION B: RELATIVE ADVANTAGE

This section is intended to measure relative advantage. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| B1 | e-Cigarettes have an advantage over other smoking products because they are less expensive | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| B2 | e-Cigarettes have an advantage over other smoking products because they are perceived as healthier | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| B3 | e-Cigarettes have an advantage over other smoking products because they have a wider variety of flavours available | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| B4 | e-Cigarettes have an advantage over other smoking products because they are non-disposable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| B5 | e-Cigarettes have an advantage over other smoking products because they are more convenient to use | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## SECTION C: COMPATIBILITY

This section is intended to measure compatibility. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| C1 | Using an e-cigarette suits my person | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| C2 | Using an e-cigarette requires few adaptations in my personal life | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| C3 | Using an e-cigarette yields few problems for me | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| C4 | If I were to adopt e-cigarettes, it would be compatible with my smoking lifestyle | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| C5 | If I were to adopt the e-cigarette, the quality of my smoking experience would improve | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## SECTION D: COMPLEXITY

This section is intended to measure complexity. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| D1 | e-Cigarettes are complex | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| D2 | It is hard to find e-cigarette products (i.e. e-liquid, charger, etc.) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| D3 | It is difficult to order e-cigarette products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| D4 | It is hard to compare e-cigarettes and e-cigarette products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| D5 | Learning to use an e-cigarette would be easy for me | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## SECTION E: TRIALABILITY

This section is intended to measure trialability. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| E1 | Before adopting the e-cigarette, I would be able to use it on a trial basis | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| E2 | Before adopting the e-cigarette, I would be able to test the suitability of the product | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| E3 | I believe that by being able to test the e-cigarette would help me to better decide on whether to adopt the product or not | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| E4 | By being able to test the e-cigarette I would feel more confident in the product's claims | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| E5 | Testing the e-cigarette would not allow for me to evaluate the suitability of the product | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## SECTION F: OBSERVABILITY

This section is intended to measure observability. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| F1 | I would have greater confidence in using e-cigarettes when observing others also doing so | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| F2 | I have observed people using the e-cigarette before | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| F3 | Seeing my friends using the e-cigarette would make me more open to considering adopting the product | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| F4 | I would not consider using the e-cigarette, even if the "cool kids" were all smoking them | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| F5 | I feel that the use of an e-cigarette is a social status marker | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

SECTION G: PERCEIVED RISK

This section is intended to measure perceived risk. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| **Financial Risk** | | | | | | | | |
| G1 | I can spend my money in a better way rather than buying an e-cigarette | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G2 | I would be concerned that I would not get my money's worth from the e-cigarette | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G3 | I find that use of e-cigarettes are a waste of money | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Psychological Risk** | | | | | | | | |
| G4 | The thought of purchasing an e-cigarette causes me to experience unnecessary tension | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G5 | The thought of purchasing an e-cigarette makes me feel psychologically uncomfortable. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G6 | The thought of purchasing an e-cigarette makes me feel worried. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Functional Risk** | | | | | | | | |
| G7 | I would not know where I should purchase e-cigarettes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G8 | The number of available stores, etc. for selling e-cigarettes is not satisfying. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G9 | As I consider the purchase of e-cigarettes, I worry whether or not it will really perform as well as it is supposed to. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G10 | I am concerned that the e-cigarette will not provide the level of benefits that I would be expecting. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Physical Risk** | | | | | | | | |
| G11 | One concern I have about purchasing an e-cigarette is that the risk of endangering my health might be high. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G12 | I am concerned about potential physical risks associated with the use of e-cigarettes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G13 | I have confidence concerns in the case of smoking e-cigarettes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **Social Risk** | | | | | | | | |
| G14 | The purchase of an e-cigarette would cause some people whose opinions I value to perceive me in a negative way. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| G15 | My friends would think I was just being foolish by buying e-cigarettes. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| G16 | I worry over what others will think of me if I were to use an e-cigarette | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

SECTION H: CONSUMER RESISTANCE

This section is intended to measure consumer resistance. To what extent do you agree with the following statements? Please indicate your answer by placing an X in the appropriate box.

| | | Strongly Disagree | Disagree | Slightly Disagree | Neutral | Slightly Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|---|
| H1 | I would be making a mistake by purchasing an e-cigarette | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| H2 | In the near future, the purchase of e-cigarettes would be connected with too many uncertainties | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| H3 | In sum, a purchase of an e-cigarette would cause problems that I don't need | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| H4 | I am resistant toward the use of e-cigarettes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| H5 | I have no negative feelings toward the use of the e-cigarette | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Thank you for your time!

## 9.2). Ethics Clearance Certificate

Research Office

**HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)**
R14/49   Johnson

| | |
|---|---|
| **CLEARANCE CERTIFICATE** | **PROTOCOL NUMBER: H15/07/20** |
| **PROJECT TITLE** | An evaluation of the predictors of the diffusion of innovations on the consumer resistance toward Ecigarettes among South African University students |
| **INVESTIGATOR(S)** | Ms N Johnson |
| **SCHOOL/DEPARTMENT** | Economics and Business Science/ |
| **DATE CONSIDERED** | 24 July 2015 |
| **DECISION OF THE COMMITTEE** | Approved unconditionally |
| **EXPIRY DATE** | 13 August 2018 |

**DATE**   14 August 2015        **CHAIRPERSON**  _____
(Professor J Knight)
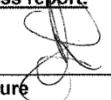
cc:  Supervisor : Ms  M Venter

---

**DECLARATION OF INVESTIGATOR(S)**

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions.  Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.  **I agree to completion of a yearly progress report.**

_____
**Signature**

19 , 08 , 2015 .
**Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

**9.3). Certificate of Editing**

# ISABELLA MORRIS

### Editor

### M.A. Writing – University of the Witwatersrand

*1E Westlake Drive, Lakeside, 1609*

*081-0468501*

13 November 2015

TO WHOM IT MAY CONCERN

University of the Witwatersrand

South Africa

Dear Sir/Madam,

**CERTIFICATE OF EDITING -  Nastasje Johnson**

I hereby confirm that Nastasje Johnson's dissertation entitled "**AN EVALUATION OF THE PREDICTORS OF INNOVATIONS DIFFUSION ON CONSUMER RESISTANCE TOWARD E-CIGARETTES AMONG SOUTH AFRICAN UNIVERSITY STUDENTS**" for the University of the Witwatersrand was edited by me during November 2015.

Sincerely

Isabella Morris

Editor

*Associate Editor - SA PROFESSIONAL EDITORS' GUILD*

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