

FUNDAÇÃO GETÚLIO VARGAS  
ESCOLA DE ADMINISTRAÇÃO DE EMPRESAS DE SÃO PAULO

LUÍS MIGUEL FERREIRA PINTO VELOSO

BEING AHEAD OF ITS TIME  
THE CONSUMER RESISTANCE PHENOMENON:  
A COMPARATIVE CASE STUDY RESEARCH

SÃO PAULO  
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Dissertação apresentada à Escola de Administração de Empresas de São Paulo da Fundação Getúlio Vargas, como requisito para obtenção do título de Mestre Profissional em Gestão Internacional.

Campo do Conhecimento:  
Gestão e Competitividade em Empresas Globais

Orientador Prof. Dr. Tales Andreassi

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*For those who have no respect for the status quo*

## RESUMO

As empresas frequentemente negligenciam o fenômeno da resistência dos consumidores, culminando em investimentos em vão que podem comprometer a sustentabilidade financeira da empresa. Em um mundo onde a novidade é solicitada pelo mercado, as empresas impulsionadas por inovação devem perceber se os consumidores estão preparados para receber uma tecnologia disruptiva.

Neste cenário, a difusão tecnológica tornou-se um tema importante de debate entre os pesquisadores. A resistência dos consumidores, no entanto, tem sido negligenciada na literatura. Este estudo analisa as características de inovação percebíveis que inibem a massa crítica de consumidores a adotar produtos tecnológicos. Além disso, este estudo complementa a literatura atual, fornecendo resultados empíricos e testando a teoria existente. O projeto de pesquisa tem uma abordagem qualitativa de estudo de caso múltiplo, investigando as características mais relevantes de dois produtos tecnológicos disruptivos que foram rejeitados pela maioria dos consumidores, versus outros dois produtos tecnológicos disruptivos que foram positivamente reconhecidos. Os resultados mostram que a compatibilidade com o estilo de vida do cliente constitui o fator mais importante que levanta barreiras para a adoção.

**Palavras-chave:** resistência do consumidor, produtos tecnológicos disruptivos, estudo de caso múltiplo, difusão da tecnologia

## ABSTRACT

Companies frequently neglect the consumer resistance phenomenon, which climaxes in vain investments that may compromise the financial sustainability of the company. In a world where novelty is requested by the market, companies driven by innovation should realize whether consumers are prepared to receive a disruptive technology.

In this scenario, technology diffusion has become a critical topic of debate among researchers. Consumer resistance, nevertheless, has been neglected in the literature. Thus, this study analyses the perceived innovation characteristics that inhibit the critical mass of consumers to adopt technological products. Moreover, it complements the current literature by providing empirical results and by testing the existing theory.

The research design takes a qualitative multi-case study approach by investigating the most pertinent characteristics of two disruptive technological products that were rejected by the early majority of consumers versus other two disruptive technological products that were largely accepted. The results show that compatibility with the customer's lifestyle constitutes the most prominent factor that raises barriers to adoption.

**Keywords:** consumer resistance, disruptive technological products, multiple case study, technology diffusion

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>14</b>
<b>2. LITERATURE REVIEW .....</b>	<b>17</b>
2.1. Innovation .....	17
2.2. Consumer Innovation Resistance and Consumer Innovativeness.....	18
2.3. Adoption Decision Process .....	20
2.3.1. Goal Setting Process .....	20
2.3.2. Goal Striving Process.....	21
2.4. Barriers to Innovation Adoption .....	22
2.4.1. Consumer Characteristics .....	23
2.4.2. Perceived Innovation Characteristics.....	25
2.4.3. Propagation Mechanisms Characteristics .....	29
<b>3. METHODOLOGY .....</b>	<b>32</b>
3.1. Object of Analysis.....	32
3.2. Procedures.....	33
3.2.1. Design .....	33
3.2.2. Data analysis .....	34
<b>4. INDIVIDUAL ANALYSIS OF THE FOUR CASE STUDIES.....</b>	<b>35</b>
4.1. Rocket eBook Reader .....	35
4.1.1. Description of the product.....	35
4.1.2. Product characteristics affecting consumer decision .....	35
4.2. Amazon Kindle .....	39
4.2.1. Description of the product.....	39
4.2.2. Product characteristics affecting consumer decision .....	40
4.3. HP Compaq Tablet PC TC1000.....	43
4.3.1. Description of the product.....	43
4.3.2. Product characteristics affecting consumer decision .....	44
4.4. iPad .....	48
4.4.1. Description of the product.....	48
4.4.2. Product characteristics affecting consumer decision .....	49
<b>5. COMPARATIVE ANALYSIS OF THE FOUR CASE STUDIES.....</b>	<b>54</b>
<b>6. CONCLUSION .....</b>	<b>62</b>
<b>7. REFERENCES.....</b>	<b>64</b>



## LIST OF TABLES

Table 1: Sources of adoption barriers .....	28
Table 2: Classification of each Product according to Consumer Resistance Model.....	54

## LIST OF FIGURES

Figure 1: Types of passive innovation resistance .....	19
Figure 2: Technology adoption life cycle .....	20
Figure 3: A Model for Consumer Resistance to and Acceptance of Innovations – A Goal Setting Process .....	20
Figure 4: A Model for Consumer Resistance to and Acceptance of Innovations – A Goal Striving Process .....	22
Figure 5: Classification of propagation mechanisms .....	29
Figure 6: Units sold worldwide in Millions, per fiscal year .....	42
Figure 7: The proposed framework for ecosystem, developed by the author .....	59

## LIST OF ACRONYMS

<b>3</b>	Dynamic Random Access Memory ..... 35
<b>3G</b>	<b>E</b>
Third Generation.....48, 50	EBSCO
<b>A</b>	Elton B. Stephens Company ..... 33
AAC	EDR
Advanced Audio Coding.....48	Enhanced Data Rate..... 48
AIFF	EVDO
Audio Interchange File Format .....48	Evolution-Data Optimized..... 40
AT&T	<b>G</b>
American Telephone and Telegraph .....50	GB
AVI	Gigabyte..... 44, 48, 50
Audio Video Interleave .....48	GHz
<b>C</b>	Gigahertz..... 44, 48
CEO	GIF
Chief Executive Officer .....43, 49	Graphics Interchange Format..... 48
COMDEX	<b>H</b>
Computer Dealers' Exhibition.....44	HE
<b>D</b>	High Efficiency..... 48
DDR	HP
Double Data Rate .....48	Hewlett-Packard ..... 8, 32, 33, 43, 44, 54
DOC	HTC
Document.....48	High Tech Computer Corporation ..... 58
dpi	HTM
dots per inch.....35, 40	HyperText Markup ..... 48
DRAM	HTML

HyperText Markup Language .....	42, 48	Megabyte .....	35, 40, 44, 48
<b>I</b>		MOV	
IEEE		QuickTime Movie.....	48
Institute of Electrical and Electronics Engineers.....	44	MP3	
IP		Moving Picture Experts Group Layer-3 Audio .....	24, 40, 48, 51, 56
Internet Protocol.....	26	MS	
IR		Microsoft .....	45
Infrared.....	37, 46	<b>O</b>	
<b>J</b>		OEBPS	
JPEG		Open eBook Publication Structure .....	37
Joint Photographic Experts Group .....	37	OS	
JPG		Operating System.....	48, 49
Joint Photographic Group .....	48	<b>P</b>	
JSTOR		PC	
Journal Storage.....	33	Personal Computer... 8, 32, 33, 35, 36, 37, 40, 43, 44, 45, 46, 48, 50, 53, 54, 64, 65, 66, 68, 69, 70	
<b>L</b>		PDA	
LC		Personal Digital Assistant.. 36, 37, 38, 39, 45, 46, 47, 48, 53, 57, 69, 71	
Low Complexity .....	48	Personal Digital Assitant .....	46
LCD		PDF	
Liquid-Crystal Display.....	35, 47	Portable Document Format.....	41, 42, 48
LED		PNG	
Light-Emitting Diode.....	48	Portable Network Graphics.....	37
<b>M</b>		ppi	
M4V		pixels per inch.....	48
iTunes Video File.....	48		
MB			

PPT	Universal Serial Bus ..... 50
Power Point File format .....48	
<b>R</b>	<b>V</b>
RAM	VBR
Random-Access Memory.....44, 48	Variable Bit Rate ..... 48
RTF	VCF
Rich Text Format .....48	Virtual Card File ..... 48
<b>S</b>	VCR
SD	Video Cassette Recorder..... 14
Secure Digital.....40, 44	
<b>T</b>	<b>W</b>
TFT	WAV
Thin-Film Transistor .....44, 48	Waveform Audio File Format..... 36, 48
TIFF	Wi-Fi
Tagged Image File Format.....48	Wireless Fidelity, wireless internet 40, 48, 52
TXT	<b>X</b>
Text File.....48	XGA
<b>U</b>	Extended Graphics Array ..... 44
US	XLS
United States .... 17, 35, 38, 39, 40, 43, 44, 45, 46, 48, 50	Excel Spreadsheet..... 48
USA	XML
United States of America ....35, 39, 42, 70	Extensible Markup Language ..... 37
USB	<b>XP</b>
	eXPerience..... 43, 44, 45

## 1. INTRODUCTION

Technological innovation has played a vital role at various levels, namely international trade, industry structure, and formation and development of new industries (Utterback, 1971). The process of technological innovation comprehends three phases: idea generation, problem solving, and implementation, perchance followed by diffusion (Utterback, 1971).

Adoption and diffusion of technological innovations has received the main attention of researchers. The key reason for this has been the pro-innovation bias of researchers (Ram, 1987), which is based on the assumption that innovation is good and therefore should be adopted by everyone. In part, this explains the tendency of researchers to classify late adopters as “laggards”. However, this pro-innovation fallacy is unveiled when confronted with the high failure rates for innovations (Heidenreich & Spieth, 2013).

Since the bias has been recognized, there is an increasing literature on consumer resistance and rejection. Nevertheless, the difference between resistance and rejection is still blurred. In this study, and following the definitions given by Kuisma, Laukkanen & Hiltunen (2007), rejection is a passive behavior that results in a final decision not to adopt an innovation. Resistance, on the other hand, is an active behavior, which may occur during the adoption process, but may not result in rejection.

Most innovations do not reach diffusion, because they do not reach the critical mass of adopters. In fact, consumers fall into one of five classifications that are arranged, in ascending order, in an axis of sensitivity to risk: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). Each type of consumer has different needs, product criteria, and reactions to new innovations. In particular, innovation is usually rejected when it falls into a chasm (Meade & Rabelo, 2004). This chasm is situated between the consumers in the early market (innovators and early adopters) and the early majority. Consequently, consumer resistance to new technologies is often the main reason for failure (Nov & Ye, 2008).

The transition from the early market to the early majority can be a protracted process (Montaguti, Kuester & Robertson, 2002), which instills to the company greater costs during the commercialization phase (Beard & Easingwood, 1996). Numerous technologies, namely microwaves and VCRs, required more than a decade to reach takeoff. Despite this inescapable fact, marketing managers continuously persist in accelerating takeoff (Montaguti, et al., 2002). Takeoff is the phase of the product life cycle that follows immediately after the chasm. According to Montaguti (2002), marketers are driven by several objectives: “leverage patents while still valid, leverage competencies before imitated, achieve first mover

advantage, or create a critical mass of customers in order to set a dominant standard” (p. 22). However, consumer resistance delays the process and thus challenges these objectives. In particular, it is not clear if first movers have a positive net benefit.

The benefits of being a first mover extend from technological leadership, anticipation of scarce assets, and exploitation of buyers’ switching costs (Schilling, 2002). Nevertheless these advantages, a firm that presents its new technology later can avoid mistakes made by the first mover, have a clear perception of consumer needs, and capitalize on the development investment of the earlier entrant (Schilling, 2002). Despite several studies have paid substantial attention to entry timing, there is still considerable disagreement about the net benefit provided by early entry, and how early such entry should be. Consumer resistance seems not to support the assumption that first movers will be the successful firms.

The importance of consumer resistance is especially relevant for high-tech markets. These high innovation failure rates culminate in ineffective investments, inability to generate future revenues, loss of reputation, and can undermine the competitiveness of companies in the long run (Heidenreich & Spieth, 2013). In fact, a product that is successful during the first 12 months (i.e. a product that did not face consumer resistance) is more likely to develop a new market in the near future (Beard & Easingwood, 1996). Henceforth, understanding the phenomenon of innovation resistance is the key to successful development of innovations.

The purpose of this case study research is to examine the phenomenon of Consumer Resistance on real case studies, contributing to the understanding of this theory. More specifically, the aim of this study is to match the theory with real facts that either precluded the success of some innovative products or fostered the success of similar innovations. Therefore it is qualitative case study research. For this purpose, two product categories will be studied: tablets and e-books. These case products were selected because they faced strong resistance among consumers in the first stages of their life cycle. Therefore, this study systematically identifies and compares the most relevant factors that determined the decision of the consumer whether to adopt or reject these products.

The study exploits both functional and psychological barriers to innovation. The paper begins with some theoretical review about consumer resistance, followed by the approach and method used. Then the case products are individually described and cross-compared. Finally, the analysis, conclusions and implications are presented.

Therefore, this research complements the literature on Consumer Resistance, where there is still a lack of empirical findings (Ram, 1987).

The research objective of this thesis is to examine the different consumer responses to similar innovative products:

What are the product characteristics that inhibit the adoption of innovative technological products among the group of early majority?



## 2. LITERATURE REVIEW

### 2.1. Innovation

The definition of innovation is frequently confused with the definition of invention. Invention is the outcome resulting from two distinct data: information about a need or want and information about the technical means required to satisfy this need or want (Utterback, 1971). Innovation is an invention, but it has reached market introduction (Utterback, 1971). In other words, innovation has an economic impact. The degree of the economic impact is subject to exogenous variables to the firms, namely political, social, economic, and cultural factors.

Innovation is not a static occurrence, but a process divided into three phases: idea generation, problem solving, and implementation, which may have a significant economic impact (Utterback, 1971). Therefore, the implementation stage refers to the emergence of an innovation.

Firms tend to be short-term oriented in relation to innovation. Put differently, firms tend to invest in innovative products where there is evident potential for short-term profit (Utterback, 1971). However, empirical evidence suggests that neither the cost nor the technical knowledge constraint the process of innovation. In actual fact, only 21 percent of firms recognize that their most important new products or processes were driven by the perception of a technical opportunity; 53 percent were market-driven; and the remainder recognizes that the starting point arose from production, design, administrative, and other internal changes (Utterback, 1971). Moreover, 23 percent of the most important innovations were adopted from other firms; and 67 percent of innovations costed less than US\$100,000 to introduce, suggesting that the majority of the cases reported tended to invest mostly in minor innovations (Utterback, 1971). Consequently, the main constrain firms face to successfully launch an innovative product is their ability to recognize the needs of the external environment.

Innovation and marketing need thus to be tightly connected (Beard & Easingwood, 1996). An innovation cannot be simply defined as an “idea, practice or object that people see as different” (Ram, 1987, p. 208). This general definition needs to be more focused, from a marketer’s point of view. An innovative product has to be *perceived* by the consumer as *new* (Ram, 1987). This perceived newness may come from two sources: continuous change(s) in one attribute of the product (e.g. design), or discontinuous change in the product concept (e.g. 8 Picturephone instead of the voice telephones). Perceived newness is thus the point of departure for every product in the market to be a potential innovation. In fact, consumer resistance is only activated when the consumer perceives a product to be innovative.

Nevertheless, an *intended* innovation came up by a firm, may not be perceived as new to the consumer (Ram, 1987). If the consumer does not perceive newness, then the product may face lack of adoption. In this case, however, it is not due to consumer resistance, but due to the failure on the part of the firm to stimulate optimal newness.

Innumerable innovative firms fail to realize the concept of innovation from a marketer's perspective. In fact, innovation merely driven by technology availability i.e. discovery-push, is likely to cause resistance, as demonstrated by the high failure rate (Ram & Sheth, 1989). In fact, only one in three new product concepts reach the commercialization phase, and only 10% of these were well received by consumers. As a result, innovation has to be driven by market analysis i.e. market-pull orientation (Ram & Sheth, 1989).

## **2.2. Consumer Innovation Resistance and Consumer Innovativeness**

The concept of consumer resistance is used by most researchers to explain innovation failures. Innovation resistance is a natural consumer response to innovative products (Ram & Sheth, 1989). Radical innovations, such as the automobile and the computer, which have already proved to deliver incalculable benefits to the consumer, have faced consumer resistance in the initial stages of their technology adoption life cycles. In fact, most technological innovations not only face resistance but also opposition (Cavusoglu, Hu, Li & Ma, 2010). Radical innovations, by definition, are superior both in technical terms and in the ability to meet consumer needs (Montaguti et al., 2002). Nonetheless, the conceptualization of consumer resistance differs across studies.

According to Kuisma (2007), the psychology of innovation resistance is generated when there is a tendency towards an existing practice or behavior, which is driven by the desire of stability and status quo, and when there are perceived risks associated with innovation adoption, which can be physical, social, economic, and functional risks. Heidenreich & Spieth (2013), in their turn, believe that this phenomenon is the result of two distinct foundations: product-specific barriers, and adopter- and situation-specific factors. The former is defined as active innovation resistance and the latter is defined as passive innovation resistance.

Consumer innovativeness is the opposite of consumer resistance to innovation. According to Heidenreich & Spieth (2013), it is the propensity an individual has to seek variety and novelty more often than others. Consumer innovativeness is driven by two central needs: need for stimulation, and need for uniqueness (Heidenreich & Spieth, 2013). The adoption of new products occurs as a consequence of consumer innovativeness.

### **2.2.1. Active Consumer Innovation Resistance**

A consumer evaluates product novelty attributes and forms an attitude towards the innovation. Inevitably, a certain degree of divergence will result from comparing the actual perceived attributes with consumer's optimal expectations. Barriers to adoption will rise, if this divergence exceeds the consumer's minimum level of tolerance on each attribute (Bagozzi & Lee, 1999). The impact of product-specific barriers within new product evaluation on negative attitude formation, i.e. active innovation resistance, has been empirically confirmed in the literature (Heidenreich & Spieth, 2013).

Active innovation resistance can have catastrophic consequences which frequently are irreversible, namely complaining behavior, negative word-of-mouth, and boycott (Heidenreich & Spieth, 2013).

### 2.2.2. Passive Consumer Innovation Resistance

Contrary to active innovation, passive innovation resistance has not drawn the attention of researchers. It is still lacking empirical validation of the impact of this variable on consumer resistance. Passive innovation resistance can be defined as a natural response that serves to maintain status quo, when this is being threatened by changes imposed by innovations (Ram, 1987). Any change imposed on consumers' behavior may disturb their psychological equilibrium (Osgood & Tannenbaum, 1995). Consequently, consumers often opt for resisting the change rather than going through a distressing process of readjustment.

Passive innovation resistance is driven by cognitive-passive resistance and situational-passive resistance (Heidenreich & Spieth, 2013). The former is determined by an inclination to resist changes, and the latter is determined by status quo satisfaction, as illustrated in Figure 1.

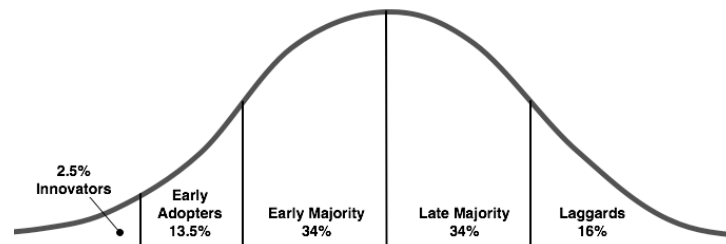
		Inclination to resist change	
		Low	High
Status quo satisfaction	Low	Low passive resistance	Cognitive-passive resistance
	High	Situational-passive resistance	Dual-passive resistance

**Figure 1: Types of passive innovation resistance**

**Source: Heidenreich & Spieth, 2013**

Consumers who are less sensible to risk, innovators, have low passive resistance. These individuals are permanently searching for new products, because they are open to change and new behaviors (Heidenreich & Spieth, 2013). Nevertheless, innovators do not constitute the majority of consumers, as it can be observed in Figure 2 (Rogers, 2003). In fact, most

consumers tend to prefer consistency and status quo rather than continuous search for new products and thus changing behaviors. As a result, the majority of consumers show a certain level of passive innovation resistance. Consumers who are characterized by a high level of passive innovation resistance are skeptical about innovation, they hardly break away from routines, and they are emotionally stressed when faced with change (Heidenreich & Spieth, 2013). Moreover, resistance to innovation increases when it is taken into account that these consumers are satisfied with current products. The repetition of existent product usage is thus encouraged. Even if a new product increases consumers' utility, the act of learning the new product may bring negative responses (Heidenreich & Spieth, 2013).



**Figure 2: Technology adoption life cycle**

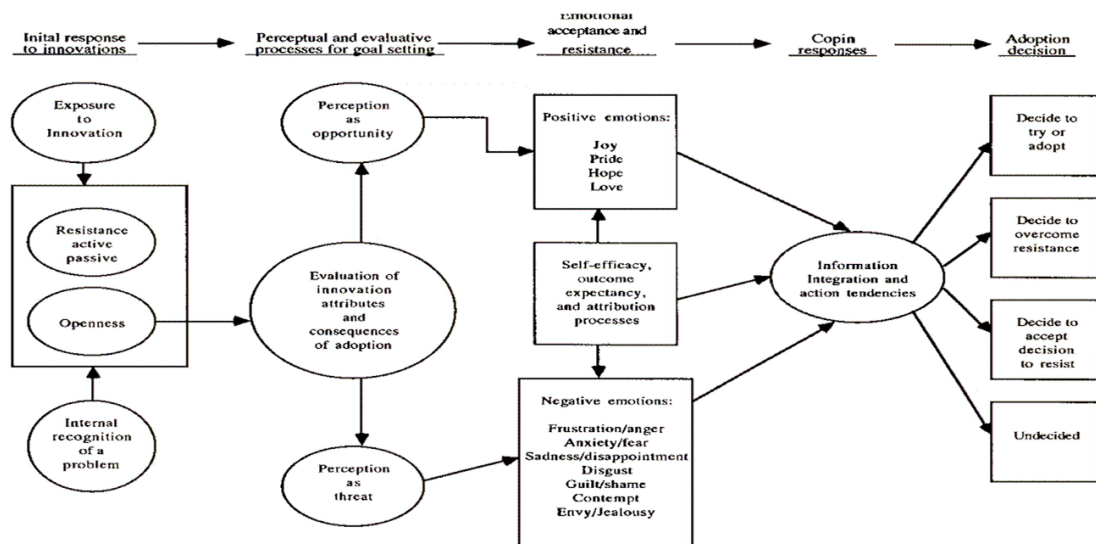
Source: Rogers, 2003

### 2.3. Adoption Decision Process

The development of consumer resistance is divided into two processes, goal setting and goal striving, where goal is anything consumers want to experience (Bagozzi & Lee, 1999).

#### 2.3.1. Goal Setting Process

The goal setting process consists of five stages, as Figure 3 illustrates (Bagozzi & Lee, 1999).



**Figure 3: A Model for Consumer Resistance to and Acceptance of Innovations – A Goal Setting Process**

Source: Bagozzi & Lee, 1999

In stage one, a consumer witnesses an alteration of an external (communication of an innovation) or internal (recognition of a need) situation and responds by resisting or opening to this alteration. For example, certain religions encourage their followers to resist certain medical practices, independently of their benefits. In fact, ingrained habits in daily life can lead consumers to resist change.

The second stage starts when consumers are open to *consider* an innovation, evaluate its characteristics and consequences of adoption, and infer whether an innovation is an opportunity or a threat. If it is perceived as an opportunity, consumers may adopt the innovation that very instant; if it is perceived as a threat, consumers may reject it immediately. However, these two situations do not constitute the majority of consumer decisions, and most consumers will continue information processing, throughout steps three and four.

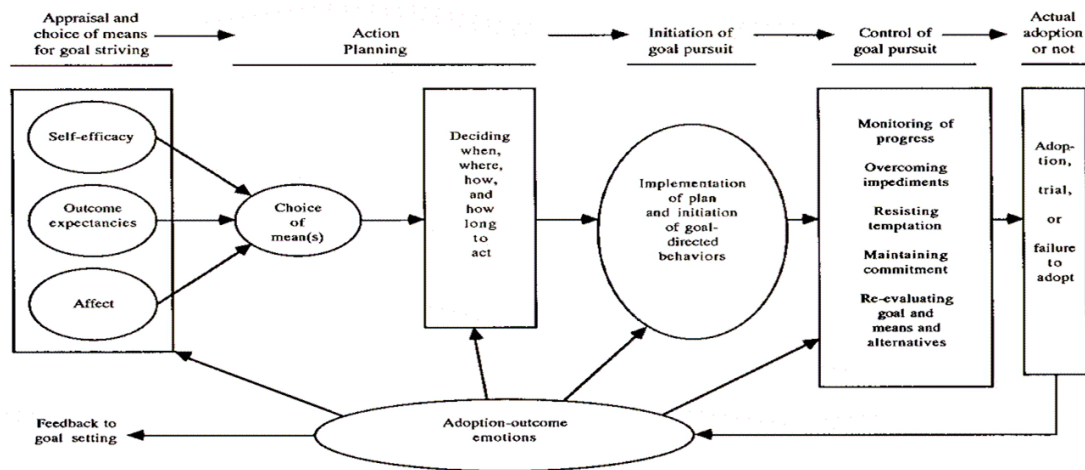
In stage three, consumers develop positive or negative feelings and beliefs about the new product, in which these emotional responses are influenced by some cognitive processes, namely self-efficacy, outcome expectancies, and attribution processes. Self-efficacy is the confidence a consumer has on his/her ability to adopt the innovation; outcome expectancies are beliefs that the new product will meet the desired goals; and attribution processes shape consumer's responses.

In stage four, feelings and cognitive responses are translated into coping activities. For example, consumers who experience emotional reactions of anger usually attack the source of frustration, either verbally or physically. In fact, the decision to adopt or not an innovation is a function of coping responses.

Finally, in the last stage, a consumer decides whether to adopt or try an innovation, to resist adoption, or to remain undecided, a case that occurs when information has not been completely integrated.

### **2.3.2. Goal Striving Process**

After the consumer has decided whether to adopt or not an innovation, he/she has to decide how the decision will be implemented. Figure 4 shows how the implementation process can be divided in five goal-striving phases (Bagozzi & Lee, 1999).



**Figure 4: A Model for Consumer Resistance to and Acceptance of Innovations – A Goal Striving Process**

**Source: Bagozzi & Lee, 1999**

In stage one, a consumer considers the alternatives available to implement the decision, considering the three appraisal mechanisms: self-efficacy, outcome expectancy, and affect i.e. how much a consumer likes each mean. To illustrate this first stage, imagine a consumer who wants to install innovative devices in his/her car, that is, he/she has already decided to adopt the new devices. In order to install innovative devices, this consumer may opt for different means, namely hiring someone to install the new devices, managing the project by hiring and supervising several contractors, or installing the new devices oneself. In each alternative, the consumer will consider the three appraisal mechanisms in order to maximize his/her utility.

The second stage is action planning, which is constituted by four decision points: when, where, how, and how long to act.

In stage three, consumers execute the action planning delineated in the previous stage. For example, a consumer may opt today to buy an innovative product in the future, when the price drops below a certain level.

In stage four, a consumer develops control activities, namely overcoming obstacles encountered, resisting temptations, committing to goal attainment, and reevaluating goal, means, and alternatives, in order to assure that the goal will be achieved.

Finally, in stage five, consumers will opt to adopt, try, or reject the innovation.

#### **2.4. Barriers to Innovation Adoption**

Innovation resistance is affected by cultural, situational, and social factors (Ram, 1987). More specifically, consumer innovation resistance depends on three major subgroups: consumer characteristics, perceived innovation characteristics, and characteristics of propagation

mechanisms (Ram, 1987). These elements are not mutually exclusive and thus they depend on each other.

#### **2.4.1. Consumer Characteristics**

Consumer characteristics influence the perception he/she has about the attributes of an innovation. Some of the consumer characteristics that are relevant to explain his/her behavior in the context of product innovations are: personality traits, attitudes, previous innovative experience, perception, motivation, and beliefs (Ram, 1987).

Personality plays an important role in innovation resistance. In fact, variety-seekers have low resistance to new products, because they like to innovate and to feel new experiences; oppositely, if a new product cannot be tried out prior to adoption, consumers with low self-confidence would postpone the purchase (or reject it definitely) until the uncertainty of the product performance has disappeared (Ram, 1987).

Attitudes and beliefs also determine the adoption of an innovation. Attitudes are viewed by theorists as a central element to how persons deal with their surroundings (Haugtvedt & Kasmer, 2008). Consequently, attitudes have a significant impact on perceptions, and on individual, social, and cultural behavior (Haugtvedt & Kasmer, 2008). In relation to beliefs, consumers recognize that products help to build their identity (Ram, 1987). For example, a consumer may buy an innovative product if he/she believes that it will reflect an image of a modern person. Beyond that, consumers' current choices may be affected by expectations about future choices (Meyer et al., 1997). For example, expectations about price decrease in the near future or the belief that there are some bugs to be fixed may delay the adoption of an innovation.

Past innovative experiences have shaped the problem-solving capability of consumers (Ram, 1987). In the same way, past choices influence consumers' current choices and affect their perception and attitude formation (Meyer et al., 1997). Moreover, it is very probable that rejection will occur, if consumers have an insufficient level of how-to knowledge prior to adoption of a new product (Wood & Lynch Jr, 2002). Knowledge is approximately related to the concept of memory.

Memory is the record of individual's personal past and it shapes the way individuals learn and behave as a consequence of past experiences (Mantonakis, Whittlesea & Yoon, 2008). In fact, past experiences with events, objects, or people may be re-experienced, a case where the environmental context is matched with stored memory representations. The ability to recognize previously encountered experiences is named recognition memory, which is derived from two foundations: recollection and familiarity (Mantonakis et al., 2008),

frequently denoted as remembering and knowing, respectively. Recollection is a slow and meticulous search process, and familiarity is a fast and involuntary process. Mandler (1980) provided the classic example of the “butcher on the bus”, where it is possible to distinguish the concepts of recollection and familiarity. Consider noticing a man entering on a crowded bus. Instantaneously, you realize that you have seen this man before, but you cannot remember who he is. This initial sense of knowing the man is an involuntary process, which is called familiarity. The next phase of recognition memory is originated when you try to remember who this man is, by retrieving details about your previous encounter, such as remembering him wearing an apron. This careful process of remembering facts is called recollection.

Familiarity consequently fosters automated thinking, which in turn speeds up the process of learning and may free up resources to other cognitive tasks (Wood & Lynch Jr, 2002). However, consumers with prior knowledge often fall short of these advantages, since they may become overconfident, but actual accuracy in performance does not increase, and thus they may end up using incorrect inferences and misusing a product (Wood & Lynch Jr, 2002). This is particularly true for radically new products. Part of the explanation is that overconfidence does not motivate the consumer to search for new information, especially when obsolescence of prior knowledge is not perceived explicitly (Wood & Lynch Jr, 2002). The consumer’s perception of the innovation characteristics likewise influences the intention to adopt. In fact, the same product may have different perceptions across the wide range of consumers. For example, a consumer located in the right extreme of the technology adoption life cycle, laggards, may overestimate the complexity of a new product and, thus, he/she may reject the innovation. Innovators are less likely to overestimate an innovation. The concept of consumer’s perception is related with the notion of categorization. Consumer category is defined as a set of products, services, or brands that are *perceived* by the consumer to be related in some way (Loken, Barsalou & Joiner, 2008). The information about a consumer category allows consumers to draw inferences about a particular product or service (Loken et al., 2008). For example, a new product can be classified as an MP3, because consumers used prior knowledge about physical or functional features of other MP3. Additionally, unknown features of a new MP3 are subject to inferences based on prior categorical information about MP3.

Finally, motivation is the driving force that leads individuals to action (Mogenson, Jones & Yim, 1980). Motivation may be associated with the need to minimize dissatisfaction or to maximize pleasure. Needs may arise by several reasons, viz. physiological arousal (e.g. a



decrease in temperature makes individual aware of the need for warmth), emotional arousal (e.g. people who often engage in daydreaming may have their latent needs stimulated), cognitive arousal (e.g. a movie that reminds people of home may create the need to call ones parents), and environmental arousal (e.g. the smell of bakery goods may stimulate the need for food). These needs are never completely satisfied and they appear to substitute old needs, with higher goals set. In the context of innovation resistance, motivation also refers to the degree the consumer is satisfied with his/her current situation, and thus any innovation that threatens the status quo has lower chances to be adopted (Ram, 1987).

Notwithstanding the fact that these psychological characteristics affect the *willingness* to innovate, the consumer may not have the *ability* to innovate (Ram, 1987). The ability to innovate is therefore affected by other consumer characteristics that go beyond the psychological field. These characteristics are demographic variables, namely education, income, mobility, and age (Ram, 1987).

#### **2.4.2. Perceived Innovation Characteristics**

Passive innovation resistance is a predisposition to resist innovations. Notwithstanding passive innovation resistance does not have a significant direct effect on intention to adopt, it influences intention to adopt indirectly through different innovation attributes (Heidenreich & Spieth, 2013). Different innovation attributes are thus source for product-specific barriers. According to Rogers (2003), the most prominent ones are relative advantage, complexity, compatibility, observability, trialability, and risk (Bagozzi & Lee, 1999; Heidenreich & Spieth, 2013; Ram, 1987).

Relative advantage is associated with value barrier. The value barrier concept states that consumers are more likely to resist innovation, if the new product does not provide superior performance to existent substitutes, which are used as reference points (Ram, 1987; Heidenreich & Spieth, 2013). The perceived value of an innovation is the difference between innovation's benefits and possible negative effects associated with adoption (Heidenreich & Spieth, 2013). On the one hand, these benefits may either deliver an economic gain (e.g. network externalities, where the utility of a product is positively related with the number of its users) or a cost saving (financial or social) to the consumer (Montaguti et al., 2002; Ram, 1987). On the other hand, these possible negative effects, namely changing consumers' ways of performing their tasks, disturb consumers' psychological equilibrium, and they will be greater if a consumer is highly resistant to change. Moreover, according to prospect theory, the costs associated with deviating from existent products are greater than the gains provided by an innovation (Heidenreich & Spieth, 2013). As a result, consumers with high passive

innovation resistance will underestimate the value of an innovation (Heidenreich & Spieth, 2013).

Complexity barrier is divided into two subcategories: complexity of the idea and complexity of execution (Heidenreich & Spieth, 2013). If an innovation is difficult to understand and use, consumers will be less willing to adopt it. In fact, product comprehension, in particular for radical innovations, may require cognitive effort on the part of the consumer (Heidenreich & Spieth, 2013). Complexity barrier is thus associated with the concept of perceived ease of use, which is the belief that using a product will be effortless (Nov & Ye, 2008). Even when an innovation conveys substantial benefits to the consumer, he/she may reject the new product, because learning and using it are psychologically difficult for them (Nov & Ye, 2008; Heidenreich & Spieth, 2013). More precisely, consumers with high levels of passive innovation resistance overestimate the complexity of an innovation and thus they will face a higher complexity barrier (Heidenreich & Spieth, 2013). As an illustration, consider Skype, a freemium voice-over-IP service and instant messaging client. One factor that differentiates Skype from other potential substitutes is its ease of use, which starts with the download and ends with video features.

The attribute of compatibility drives the usage barrier. According to Ram (1987), compatibility denotes consistency with consumer, traditional, and cultural values, and with consumer lifestyles. For example, despite the fact that Coca-Cola may have an almost identical flavor to other coke substitutes, consumers who are loyal to the brand i.e. whose current lifestyle is associated with the brand, are unlikely to purchase its substitutes. Therefore, the usage barrier arises when an innovation discontinues the routine of past experiences and requires changes in consumers' behavior. Consumers satisfied with their status quo will overestimate the innovation's usage barrier. In fact, since consumers largely inclined to passive innovation resistance have high cognitive rigidity, passive innovation resistance is positively related to usage barrier.

As stated by Ram (1987), communicability refers to the ease with which the consumer conveys the benefits of the innovation. Observability is composed by: tangibility of the results from adopting the innovation, and communication of these results or benefits. Online gaming constitutes a good example where observability can be identified. An online gaming website that has launched a new edition of a game, which has 20 more guns than in the last edition, transmits visible benefits to the consumer. However, if the only change is the position of a tree, consumers will find it difficult to observe any positive benefit. Consumers characterized by high level of innovation resistance will find it difficult to realize the benefits

of a new unfamiliar product (Heidenreich & Spieth, 2013). As a result, passive innovation resistance leads consumers to underestimate the tangibility of the benefits of a new product, which in turn decreases the intention to adopt a new technology.

Trialability refers to how easy consumers can interact with an innovation prior to adoption (Heidenreich & Spieth, 2013; Ram, 1987). If consumers face a completely innovative product, which cannot be tried prior to purchase, then the consumer may perceive a high level of risk in purchasing the product and thus he/she will probably reject the product. For example, websites that offer paid subscription based financial services usually offer a free one month subscription. In fact, consumers who register high level of passive innovation resistance are less interested in trying new products and also less informed about opportunities to try them (Heidenreich & Spieth, 2013). Passive innovation resistance is thus positively related to trialability barrier.

Finally, perceived risk is the risk that an innovation can bring (Ram, 1987). There are four types of risk: physical risk, which can cause harm to a person or his property; functional risk, in which an innovation does not function properly; psychological or social risk, which is a result of the fear of being seen in an undesirable way; and economic risk, which is the result of not waiting for a better or cheaper version (Ram, 1987; Kuisma et al., 2007). The type of innovation clearly influences the level of perceived risk. Since major innovations compromise the routine of the consumers, these types of innovations have higher levels of perceived risk and thus higher innovation resistance. The keyword in the attribute of perceived risk is uncertainty. Innovations comprehend a certain degree of uncertainty, which entails some level of perceived risk (Heidenreich & Spieth, 2013). Consumers are frequently uncertain whether a new product is completely developed or whether it performs as expected. Since individuals tend to consider more potential losses than potential gains (Heidenreich & Spieth, 2013), consumers high on passive innovation overestimate the risk of an innovation. Despite the fact the abovementioned innovation attributes are the most critical ones, according to Zaltman, Duncan & Holbek (1973), there are other relevant perceived innovation characteristics, namely reversibility, realization, amenability to modification, and effect on adoption of other innovations (Ram, 1987).

Reversibility refers to the capacity of the consumer to terminate the adoption of the innovation, if he/she desires to do so; consequently the lower the reversibility of an innovation, the higher will be the innovation resistance (Ram, 1987).

Realization is related to the speed the consumer expects to receive the benefits from the innovation; accordingly, the lower the realization of an innovation, the higher will be the innovation resistance (Ram, 1987).

Amenability to modification refers to the possibility of modifying the innovation to meet consumer satisfaction; therefore, the lower the amenability to modification of an innovation, the higher will be the innovation resistance (Ram, 1987).

Finally, the adoption of one innovation may inhibit the adoption of other innovations; thus, the higher the inhibitory effect of an innovation on the adoption of other beneficial innovations, the higher will be the innovation resistance (Ram, 1987).

Table 1 summarizes the perceived innovation characteristics that constitute a source of adoption barriers.

<b>Factors</b>	<b>Description</b>	<b>Author</b>
Relative advantage	Superior performance over substitutes.	Rogers (2003)
Complexity	Perceived difficulty to use the innovation.	Rogers (2003)
Compatibility	The level of harmony between an innovation and individual's life.	Rogers (2003)
Observability	The degree that an innovation is visible to others.	Rogers (2003)
Trialability	The possibility to try an innovation before purchasing.	Rogers (2003)
Perceived Risk	Physical, functional, social, and economic risk of adopting an innovation.	Rogers (2003)
Reversibility	Ability of the consumer to discontinue the adoption of an innovation.	Zaltman et al. (1973)
Realization	The speed of the innovation payback.	Zaltman et al. (1973)
Amenability to modification	The possibility to modify the innovation.	Zaltman et al. (1973)
Effect on adoption of other innovations	The inhibitory effect on the adoption of other profitable innovations.	Zaltman et al. (1973)

**Table 1: Sources of adoption barriers**

**Source: Author**

From a consumer point of view, all these innovation characteristics can be divided into two categories: those that are dependent on the consumer, and those that are not (Ram, 1987). The characteristics that depend on the consumer create different levels of innovation resistance across consumers. Trialability, reversibility, and the form of innovation (idea, product, or

process) are consumer-independent characteristics. Relative advantage, complexity, compatibility, perceived risk, observability, and the remaining attributes constitute some examples of perceived innovation characteristics that do depend on the consumer.

Despite this categorization of barriers to innovation adoption, the literature also suggests that barriers to innovation adoption can be divided into functional and psychological barriers (Kuisma et al., 2007). Given this classification, functional barriers are composed by usage, value and risk barriers, whereas psychological barriers are divided into tradition (routine) and image (reputation of product class, industry or company) barriers (Kuisma et al., 2007).

### 2.4.3. Propagation Mechanisms Characteristics

According to Ram (1987), propagation mechanisms are distinguished in relation to marketer control and type of contact with the consumer (Figure 5).

		Marketer control	
		High	Low
Type of contact with the consumer	Personal	Change agents Professional advocates	Neighbours Friends
	Impersonal	Radio Television Print media	Consumer reports Government publications

**Figure 5: Classification of propagation mechanisms**

**Source: Ram, 1987**

In the early stage of an innovation, the firm needs to inform consumers about the new product. Consequently, the firm is usually the initiator of the communication process (Ram & Sheth, 1989). Since the firm aims to overcome the initial consumer resistance and product uncertainty, the message is both informative and persuasive and the typical propagation mechanisms are media advertising and change agents (Ram & Sheth, 1989). Using face-to-face contact, change agents provide favorable information to the market, develop the need for and desire to change, provide information to the consumers, stabilize product acceptance, prevent adoption cessation, and achieve a terminal relationship (Ram & Sheth, 1989). Through advertising and promotional budgets, mass media advertising informs consumers about new products (Ram & Sheth, 1989).

With increasing maturity of the product, word-of-mouth and other propagation mechanisms outside the marketer control start to impact consumer resistance (Ram, 1987). Among the low market control propagation mechanisms, word-of-mouth and opinion leadership have been

proven to play a significant role on innovation acceptance, due to their personal communication. Word-of-mouth refers to the direct contact between the potential consumer and the source of communication, such as consumer's friends, family, or peers. Opinion leaders, who are also called influentials, have a precise knowledge about a product (van Eck, Jager & Leeflang, 2011). Moreover, according to Ram (1987), consumers see their innovation resistance decreasing more effectively when propagation mechanisms are based on direct and personal contact.

Despite the different impact that each propagation mechanism has on innovation resistance, all of these instruments have the same implications (Ram, 1987). First, clear propagation mechanisms reduce the innovation resistance. Second, when consumers perceive expertise and credibility on the part of the propagation mechanism, the intention to adopt will increase. Third, the more information that the transmitter conveys to the consumer, the lower will be innovation resistance. Finally, the higher perceived similarity between the source of communication and the consumer, the higher will be the intention to adopt.

## **2.5. Strategies to Reduce Consumer Resistance**

According to Beard & Easingwood (1996), launching a new product comprehends four distinct tactics: prepare the market, target the product, position the product, and attacking the market. However, the impact of these tactics depends on the nature of the technology (continuous or discontinuous innovation), and on the barriers to innovation adoption.

In relation to preparation tactics, licensing the technology has to be the starting point, in order to protect the company from imitation. Furthermore, selling to other equipment manufacturers allows the producer to retain full ownership of its innovation and to expand its marketing capacity, notwithstanding at a lower margin. Another tactic is preannouncing directed to the media, service suppliers, and distribution network, since it informs, creates awareness, accelerates the creation of a larger network (Montaguti et al., 2002), enriches company's reputation, and fosters distributor support (Eliashberg & Robertson, 1988). Nonetheless, preannouncing may delay sales of existing products, expose the new product to competitors, and create frustrated expectations (Eliashberg & Robertson, 1988). Finally, resorting to special distribution arrangements (e.g. joint ventures) may assure that companies dispose the necessary competencies and resources to commercialize radical innovative products (Montaguti et al., 2002).

Concerning targeting tactics, new technologies should target innovators, despite the difficulty to identify them, since they are very receptive to innovation and they may persuade others to adopt. In the case of companies that are not technological leaders, the best option is targeting

early adopters, who are often large organizations and initiators of word-of-mouth, since the objective is to reach rapid takeoff (Montaguti et al., 2002). Conversely, targeting late adopters is suitable when the market has already accepted a new technology to a larger degree. Finally, existing customers should be targeted when the pace of technological advancement is fast; if competition is based on superior price/value combination, then the target should be competitors' customers.

Regarding positioning tactics, small firms may benefit from concentrating sales on heavy users, since they will increase sales volume. Moreover, a company may focus on low prices, by following a penetration strategy, which creates product awareness, increases consumers' willingness to pay, and contains entry of new competitors (Montaguti et al., 2002). Alternatively, a firm may emphasize technological superiority, particularly a certain application, since consumers may not understand the benefits of the entire innovation. Finally, position the product as a safe bet may reduce uncertainty, where company reputation or product exclusivity may help to build credibility.

With regard to market attack tactics, using opinion leaders, especially industry ones, rather than public celebrities, may lead to word-of-mouth spreading. In fact, it is more likely that a consumer buys a brand product, given a positive word-of-mouth, than a consumer rejects a brand product, given a negative word-of-mouth (East, Hammond & Lomax, 2008). Furthermore, reference sites and market education (lectures, seminars, and roadshows) inform consumers about the benefits associated with adopting a given product. Companies should also use a winner image, in which communication is focused on the success of the new product: image, not the technology, is the main priority of the company. Finally, companies should create trialability, by lending or leasing the product.

### **3. METHODOLOGY**

#### **3.1. Object of Analysis**

In order to obtain an answer to the question of this study, a multiple rather than a single case study approach is used as a valuable technique to obtain replication logic in analyzing pattern-matching properties between cases and theories. By using the product, not the firm, as the focus of the analysis, it is expected that the systematic use of cross-case analysis draws some conclusions about the foundations of consumer resistance and thus the barriers inhibiting product adoption. The cases selected, namely tablets and e-books, were not randomly chosen and they will be thoroughly compared. In this study, it is considered the definition given by Stork (2000), where an e-book reader is any mixture of hardware, software, and content that results in equivalent of a traditional print book.

The e-books analyzed were the Rocket eBook (case 1), introduced in 1998, and the Amazon Kindle (case 2), launched in 2007; the tablets that were subject to study were the HP Compaq Tablet PC TC1000 (case 3), released in 2002, and the iPad (case 4), released in 2010. These four products were selected after an intensive research about other products that have also faced consumer resistance. The choice of these products is due to the fact that they were innovative technological products at the time they were introduced in the market, there is a clear distinction between the successful and the unsuccessful cases, in which the successful cases are known by most consumers and the unsuccessful are unfamiliar, and the final reason that justifies the choice for these products is the fact that the majority of consumers did not use e-book readers or tablets before the launch of the Kindle or the iPad, respectively.

The products of the same category present similar characteristics that enable a better isolation of the phenomenon of consumer resistance. This sample allows some level of variance to be observed, because it includes groups of products that operate in different industries, and that belong to firms with different sizes. Moreover, these products have encountered different levels of consumer resistance. Notwithstanding the elements that enable the observation of a certain degree of variance, all the cases selected share a common characteristic: they were perceived by consumers as innovative.

While there is not a consensus on the definition of consumer resistance, there is a need to detail the concept in order to scale the chosen products. Controversially, diffusion is the process of acceptance of a new product by the market. However, diffusion excludes the psychological processes a consumer undergoes – an element that is crucial in the concept of adoption. Notwithstanding the importance of the psychological equilibrium, a concrete concept of consumer resistance can be derived from the notion of diffusion. As such,



throughout this study it will be considered that products that did not face consumer resistance, have reached market diffusion. According to this criterion, case 1 and case 3, the Rocket eBook and the HP Compaq Tablet PC TC1000 respectively, fall under the category of products that encountered consumer resistance. In contrast, case 2 and case 4, the Amazon Kindle and the iPad respectively, did not face any type of consumer resistance.

## **3.2. Procedures**

### **3.2.1. Design**

According to Yin (1989), the choice of using a case-study method depends largely on the research question(s). Questions directed to “how” or “why” some social phenomenon occurs, an exploratory “what” question, and “how much” or “how many” type of questions are good indicators of the relevance of a case-study approach (Yin, 1989). Multiple case study research aims to achieve several goals, namely to provide description, test theory, or generate theory about the phenomenon being investigated (Eisenhardt, 1989). In fact, theory built from cases has several advantages when compared to other ways of doing social science research (Eisenhardt, 1989). The first advantage is the possibility of generating new theory. Additionally, the emergent theory can be testable since constructs can be measured. Finally, the theory can be empirically valid, because it emerges from a close observation of the reality. Nonetheless, a case study approach also includes some disadvantages (Eisenhardt, 1989). For example, the theory might be complex, given the exhaustive use of empirical evidence. Another disadvantage is that the theory may be narrowed to the cases observed, where generalization is difficult to raise.

In order to obtain both internal and external validity, as well as to obtain robust conclusions, it was used more than two methods to test the results, i.e. triangulation concept. In fact, if these two or more methods have led to the same results, the validity of the conclusions is stronger and more robust than if the result was reached through only one method. Therefore, all sources of information, which were possible to access, allowed for different perspectives on each case, specifically interviews with academics in the field of Innovation Management, company websites, internal documentation, product and firm brochures, magazines and newspapers, and other secondary data. Due to the impossibility to interview people from the analyzed companies, the secondary data was the only possible way to get specific information about the products. However, it is included primary data, which includes interviews with experts on Innovation Management.

In relation to academic journals, it was conducted an intensive research on several databases, namely EBSCO, JSTOR, and Google Scholar. Non-academic articles were taken from

innumerable sources: newspapers and magazines, such as The New York Times, The Guardian; blogs; and companies' websites. Finally, in order to add more information and validate the existent one, it was conducted in-depth, semi-structured interviews with 4 Professors experts on Innovation Management. The interviews were face-to-face (except for interviewee 2, in which was only possible to interview via Skype), lasted 30 minutes on average, and they were recorded with the consent of the interviewee.

Given the qualitative nature of the research, the most appropriate interviews are in-depth ones (Legard, Keegan & Ward, 2003). In-depth interviews are a form of conversation, in which an interviewee is asked each time to reveal motivations, beliefs, attitudes and feelings about a particular topic (Vieira & Tibola, 2005). This type of interview combines structure with flexibility, in which key topics are covered during the interview, but the interviewee is free to explore the topics in the order most suited to him/her (Legard, et al., 2003). The questions are intended to encourage the respondent to talk freely. Some key questions were prepared in advance, however there was flexibility to comment on other issues raised and to departure from the established order. Furthermore, some questions could be left out if appropriate.

### **3.2.2. Data analysis**

Eisenhardt (1989) considers data analysis as “the heart of building theory from case studies” (p. 539). It was conducted an intense within-case analysis, particularly about the perceived innovation characteristics, in order to become conversant with each case. Detailed descriptive case study write-ups are fundamental to get familiarized with each product and to accelerate cross-case comparison. The tactic used in this study to search for cross-case patterns was to allocate the cases to different categories, followed by a survey of within-group similarities and differences, together with intergroup differences.

The primary and secondary data were examined according to the variables mentioned in Table 1. The interviews were analyzed in line with the technique of Content Analyses (Bardin, 1977). The methodology based on content analysis is a technique of controlled interpretation of words or texts of various natures, which applies to diverse discourses. The content analysis is based on the deduction, oscillating between the rigor of objectivity and subjectivity. Thus, the researcher extracts the latent message of the speeches of the respondent.

## **4. INDIVIDUAL ANALYSIS OF THE FOUR CASE STUDIES**

In this section, the different variables that affect the adoption rate of an innovation are matched against the empirical findings related to the four case studies. In particular, it is examined the perceived innovation characteristics of the selected case studies.

### **4.1. Rocket eBook Reader**

#### **4.1.1. Description of the product**

Launched in 1998 at a price of US\$199 (Lawinski, 2010), the Rocket eBook was an early e-book reader, initially manufactured by NuvoMedia, a company founded in 1997 in Palo Alto, California, USA (Lebert, 2011). The product moved unsteadily for a couple of years, but it was never accepted by the general public, even after RCA/Gemstar had bought the Rocket eBook in 2000 and had proceeded with some modifications (Pence, 2012). The Rocket eBook was discontinued 5 years after its launch (Lawinski, 2010).

The Rocket eBook had 4 MB flash memory and 2 MB DRAM, which is equivalent to 10 novels or 4,000 pages of text. Additionally, it had an internal socket for extra memory. The battery charge time was 90 minutes, and the battery would last between 17 and 30 hours per charge. Moreover, the Rocket eBook displayed high-resolution monochrome LCD touch screen with stylus and built-in backlight. It had a 4.5 by 3 inch active viewing area, and 106 dpi resolution. The size of the product was 5" x 7.52" x 1.5", height, width, depth, respectively, and it weighed 22 ounces. The operating system was RocketEngine, which was property of the parent company, merely designed for electronic books.

The Rocket eBook was not available with wireless, and the connection to a computer (PC or Macintosh) was made through the Rocket eBook Cradle, a device with two cables: one for power through a wall transformer, and another for computer (Lebert, 2011).

The product had four soft-buttons, above and below the display area, which complemented the touch screen (Chvatik, 2000). On the bottom right was the Bookshelf button, where it was possible to choose and delete titles, alter settings, and get information about the e-book. The bottom left, the Book button, included the Lookup, Underline, Add note, Set bookmark, Previous Location, About This Title, and the Bookmarks and Go To commands, where there was the Find option. On the top right, there was the Page Orientation button, which changed the disposition of the screen between portrait, landscape, and their reverses. Finally, on the top left, the Shortcut button was a shortcut chosen by the reader for the function that he/she used most.

#### **4.1.2. Product characteristics affecting consumer decision**

*Relative advantage*

At the time the Rocket eBook was launched, there was no popular hardware similar to an e-book reader. Although a personal computer, a laptop, or a PDA could be used to read an e-book, the real competitor of the Rocket eBook was the paper book (Pence, 2012). As such, the comparison should be made between the utility derived from reading a paper book and the one derived from reading from the Rocket eBook.

The Rocket eBook offered several advantages over a paper book. The most prominent one was the possibility to hold in a single device many magazines, newspapers, and books, which could not go out of print (Stork, 2000). This was particularly relevant for heavy travelers. In fact, the power supply accepted international voltages. Likewise, the backlight of the e-book reader did not disturb people around, constituting an important detail during flights (Chvatik, 2000).

The Rocket eBook brought other convenient advantages that were commonly associated with computers, namely features like find, dictionary, and hyperlinks, and apparatus like speaker that supported the playback of .WAV files (NuvoMedia, Inc., 1999). This device was able to store digital audio data. Additionally, people could customize fonts to adapt to their eyesight (NuvoMedia, Inc., 1999). Similar to print books, the Rocket eBook allowed the reader to underline and to insert bookmarks, and it opened the page where the reader stopped reading the last time (NuvoMedia, Inc., 1999). Finally, some readers had mentioned that it was very comfortable to use this product (Rothman, 2009).

There were, nevertheless, several disadvantages, namely black-and-white screen, pixelated text, scarcity of published e-books, and e-books' prices only 20% cheaper than paper books – the high price of the device may have not been compensated (Chvatik, 2000). Furthermore, contrary to print books, e-books could not be borrowed to a friend's e-book reader, because each Rocket eBook was registered to a single owner. This would guarantee copyrights for the authors. This brought another disadvantage: it was easier to find a book in the shelf than to find which Rocket eBook had the e-book.

The Rocket eBook therefore presents clear advantages over a paper book but also disadvantages: the net benefit of this innovative product is still positive.

### *Complexity*

The NuvoMedia's Rocket eBook was the first e-book reader to be considered user-friendly. The process to purchase Rocket Editions and store them into the Rocket eBook was composed of three steps. In the first step, a consumer would purchase any e-book (as long as it was available in Rocket Editions) in any online bookseller. Then, the e-book would be encoded solely for the customer's Rocket eBook, and sent to his/her PC, where the e-book

could not be read. Finally, the reader would transfer the e-book from his/her PC to the Rocket eBook, and the title could be transferred back to the PC as a storage device.

Nevertheless, some features were not intuitive (Chvatik, 2000). The Find option was in the Go To menu; battery and memory status, and clock were hidden on the Bookshelf button; the underlining process (click on the underline command and then select a text) was done differently from what a consumer was used to do in a computer; and, in order to program the Shortcut button, a reader would have to open the menu that had the command that he/she wanted as a shortcut, then click on the Shortcut button, and finally select the command. This last process would be more intuitive if it was in the Settings option.

### *Compatibility*

A brief description of the events that preceded the launch and the discontinuation of the Rocket eBook is a guide to understand how close the innovation was to consumers' lifestyle.

In the beginning of the 1990's, the increasing use of Internet attracted publishers and vendors, who started to consider the hypothesis of presenting and selling digital books (Muravskiy, 2010). However, the process of making books available online was still in an embryonic phase, characterized by its time consuming and expensive manual work.

In 1992, Book Stacks Unlimited, as Books.com, initially a dial-up bulletin board located in Cleveland, began selling new paper books online with a number of visitors of approximately half a million (Norman, 2013).

One year later, Apple launched the first PDA, Newton Message Pad, which had incorporated the following features: fax and email, handwriting recognition, plug-in memory cards, and IR communications (Zeldes, 2005). Despite this technical advancement, Apple Newton was discontinued in 1998, because it had never reached the critical mass of consumers. In fact, it could not compete with Palm Pilot, which had been introduced in 1996 (Zeldes, 2005).

In 1995, Amazon entered the online business of selling physical books (Webley, 2010) and, one year later, the Internet Archive was founded with the purpose of allowing people, from researchers to the general public, to have permanent access to historical collections in digital format (Internet Archive, 2001).

It was in this context that, in 1998, the Rocket eBook was introduced, together with the Soft Book, as the first hand-held e-book readers (Kozlowski, 2013).

In 1999, iBooks began to sell books both in digital and print formats, and the OEBPS 1.0 was created, as an e-book format, with XML based specifications, that was able to present images in JPEG and PNG formats (Digital Preservation, 2013). Moreover, when Net Library was

launched in the same year, 2,000 e-books became commercially available, enabling the observation of e-books consumption trends: computer and business titles (Muravskiy, 2010).

In the same year, BlackBerry was introduced as a merge between PDAs and cell phones (Hill, 2013). This first BlackBerry was a two way pager that provided wireless access to email, corporate data, organizer features, web, and phone. Sales skyrocketed followed by rapid growth (Hill, 2013).

In 2000, just for illustration, Stephen King's novel, *Riding the Bullet*, was published exclusively on the net for US\$2.50, reaching 400,000 copies downloaded in the first day (Muravskiy, 2010).

In 2001, Apple introduced the iPod, a portable music player, which convinced the world to pay for downloaded music (Apple, 2014). Despite its role as a music industry changer, iPod's sales remained low until 2004, due to its price and exclusive compatibility with Mac (Lloyd, 2004).

In the same year, Wikipedia, the free internet encyclopedia based on volunteer contributors, was created, increasing exponentially the number of electronic articles (Muravskiy, 2010).

These main events show that the digital era was still in its embryonic phase and the critical mass of consumers was still skeptical about electronic devices. Internet was still far from being generally used (Internet World Stats, 2014). In fact, the Rocket eBook had never reached takeoff, serving only a niche of computer and business readers, who valued transportability and convenience. The majority of consumers still preferred to read from paper books.

Nevertheless, this e-book reader had some level of compatibility with the consumers' lifestyle. The Rocket eBook had a similar size and shape of any paper book. This subtle characteristic of the device would appear to the consumer as a version of a paper book, in other words, the consumer did not need to redefine his/her concept of reading.

#### *Observability*

The Rocket eBook was a high transportable device and thus was publicly exposed. Users of this product could be agents of communication outside their houses, whether in a subway journey or in a restaurant.

#### *Trialability*

At that time, it was not possible to try e-book readers before purchasing them. Nevertheless, it was possible to read a description of an e-book before purchasing it, as if a consumer was reading the back cover of a paper book. Additionally, in some cases, e-books were free,

namely in Gutenberg Project website (Project Gutenberg, 2014). However, this variable might have depended on the availability of the seller.

#### *Perceived Risk*

The Rocket eBook, as any early e-book reader, was not cheap. Consequently there was an economic risk. Additionally, since it was a new product, it may have still some bugs to be fixed, raising a functional risk. Furthermore, since it was a new disruptive device, the adopters may have been seen as eccentric people and thus there was some level of social risk. Finally, there was no risk of physical order.

#### *Reversibility*

Purchasing the Rocket eBook, or any other e-book reader, did not preclude further purchases of paper books. The consumer had the initial cost of buying the device, but he/she could discontinue the adoption of this innovative product.

#### *Realization*

The consumer may have used the product as soon as he/she purchased any e-book, which could be bought online. The lead time between buying an e-book and actually starting to read it, was the time spent transferring an e-book to the Rocket eBook through a cable.

#### *Amenability to modification*

The product, by its nature, could not be modified, since it had rigid features, i.e. it only served as a reading device as initially programmed. Future modifications would only be possible in later versions.

#### *Effect on adoption of other innovations*

Palm Pilots and PDAs were the hot technology, when the Rocket eBook tried to reach a critical mass of consumers. Contrary to the e-book reader, PDAs were multi-task, including reading e-books. However, the user experience was not as comfortable as the one derived from the Rocket eBook. The Palm Pilot Personal was US\$100 more expensive than the Rocket eBook (Kairer, 2006).

## **4.2. Amazon Kindle**

### **4.2.1. Description of the product**

The first generation of the Kindle was released on November 19, 2007. This Amazon's e-book reader, initially priced at US\$399, sold out in five and a half hours (Patel, 2007) and it was only available until April 2008 (Sorrel, 2008). Although Amazon does not release figures, the sales of this product continued to be extremely positive (Reed, 2013). This version of the Kindle was only sold in the USA. Through Amazon store, the company had already had a relationship with 65 million online shoppers, and 88,000 e-books, priced

significantly below from hardcover books, were available for download on launch day (Slywotzky, 2011).

The first generation of the Kindle could support approximately 5,000 books. Apart from its memory of 256 MB with 180 MB free, it had an expandable memory, 4GB SD card. Moreover, it had a resolution of 600 x 800 pixel resolution at 167 dpi, with 4 level of gray scale. Its display technology E-Ink® allowed the Kindle to have a battery life of several weeks. The size of the product was 7.5" x 5.3" x 0.7", height, width, depth, respectively, and it weighed 10.3 ounces. It was incorporated with Linux 2.6.26 operating system.

It featured wireless technology, EVDO, with no subscription required, which allowed consumers to download e-books from the Amazon website directly to the Kindle, in less than 60 seconds (Wollman, 2010). Consumers could use the keyboard to search for e-books.

The Kindle First Generation had a Select wheel that allowed the reader to scroll the silver cursor up and down the page. Readers could access audio files using a speaker and a headphone jack.

#### **4.2.2. Product characteristics affecting consumer decision**

##### *Relative advantage*

The first generation of the Kindle offered several advantages over physical books. Firstly, the convenience to carry five thousand books, magazines and newspapers in a purse (Bauer, 2011).

Readers could surf the web, listen to MP3 music or podcasts, and play games (Pressman, 2007). Furthermore, it was possible to increase the font size, search for a certain word in an e-book, or use a dictionary. Consumers could buy an e-book anytime, or simply read a sample of it, since the Kindle was the first e-book reader that had its own cellular wireless connection (Pressman, 2007).

The Kindle had a mobile broadband, not a Wi-Fi, which gave the reader free, fast, and unlimited wireless anywhere, for instance, on the beach (Elgan, 2007). In fact, it was possible to search for e-books directly on the Kindle and download them without a PC.

Any author could upload his/her book directly to the Kindle Marketplace, bypassing traditional publishers (Hyatt, 2013). These e-books were sold at a relatively low price, US\$2.99 to US\$5.99, and some were even free (Richardson, 2012).

The e-books sold in Amazon are significantly cheaper than in hardcover. The more expensive digital books average US\$12-20 (Muravskiy, 2010). However, a significant number of e-books are available on the Kindle Store or other websites, namely the Gutenberg Project, for free.



Despite these advantages, the Kindle had some disadvantages (Wolverton, 2010). The first one was its incapacity to display colored pictures. Second, it is hard to lend books to friends, unless the reader lends his/her e-book reader. Another inconvenient is, for example, seen in a family. A book in the shelf is much easier to get it and read it, than wondering whose Kindle has the book. Moreover, it was not possible to select titles to read, turn pages or zoom into text by touching the screen.

Another problem with the Kindle was the restriction of e-books a person could read (Wolverton, 2010). In fact, the Kindle had no support for ePub, which meant that a reader could only read e-books bought in Amazon store or e-books imported in certain other formats, namely Adobe's PDF. Furthermore, a consumer was forced to get a subscription, if he/she wanted to read newspapers or magazines. Nonetheless, the subscriptions arrived hours or even days before print subscribers got theirs.

Consequently, the value of the net benefit of the Kindle, similarly to the Rocket eBook, is moderate, given the advantages and disadvantages of the product when compared to its contemporary alternatives.

### *Complexity*

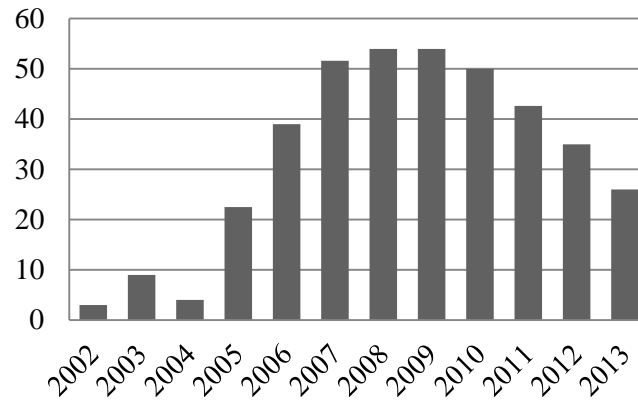
The first generation of the Kindle looked familiar to the purchaser, since he/she had witnessed the evolution of handheld devices, from the Gameboy to the iPhone. In fact, this familiarity decreased the perceived complexity of the device (Bauer, 2011).

However, the Kindle had some critics in relation to its ease of use. Besides the fact that page-turn buttons were uncomfortably located (Nussbaum, 2008), turning pages was not instantaneous and it was common to accidentally touch the page turn buttons on the side of the device (Slooten, 2008; Wolverton, 2010). This could be very frustrating for readers who were very involved in reading.

### *Compatibility*

In this section it will be described the events that followed the Rocket eBook discontinuation, to understand whether consumers had altered their lifestyles towards a more technological life.

In 2004, as it was already mentioned, the iPod started to see its sales skyrocketing (Figure 6) (Goldman, 2011). This coincided with the introduction of iTunes Music Store, in 2003 (Ahlroth, 2011). Before its introduction, consumers needed to connect Apple devices to a computer that run Apple's iTunes software (Ahlroth, 2011). This Apple's Music Store allowed consumers to buy music for the iPod.



**Figure 6: Units sold worldwide in Millions, per fiscal year**

**Source: Goldman, 2011**

In the same year, Google introduced Google Print Library Project, which would be lately named Google Book Search, as a cooperative venture with major international libraries that offered scanned books to the masses (Muravskiy, 2010). Also in 2004, Ebook Library and MyiLibrary were founded as e-book providers that were differentiated with their flexible pricing and access models (Muravskiy, 2010). Furthermore, various publishers began hosting and selling e-books directly to libraries, through in-house e-book publishing initiatives (Muravskiy, 2010).

In 2006, Sony released the Sony Reader, which was the first e-book reader with e-ink technology (Wollman, 2010). iRex iLiad was also launched in 2006 (Rothman, 2006), where it was possible for consumers to read e-books in PDF and HTML formats, add notes, highlight, and personalize the text (Vogel, 2011).

Finally, in 2007, in the same year that Apple introduced the successful iPhone (Apple, 2014), as an internet-enabled, multimedia cell phone, the Kindle Original was launched in the USA by Amazon (Business Wire, 2007), which would sell e-books. The size and shape of the Kindle were familiar to consumers, since they were similar to a paper book.

At the time Amazon's e-book reader was launched, concluding, consumers were at this time more open to digital products.

#### *Observability*

Users of the Kindle were agents of propagation, since they could carry the device anywhere and thus expose the product publicly.

#### *Trialability*

The Kindle was sold through Amazon webstore, and thus consumers could not try the device before purchasing it. However, Amazon webstore allowed consumers to read a small sample

of an e-book, before purchasing it. Additionally, in some cases, e-books were free, for example in Gutenberg Project website.

#### *Perceived Risk*

There was some level of economic and functional risk, since it was a new product and thus it may have contained problems and may have been overpriced compared to later versions. Moreover, there was a social risk, because users may have been seen as eccentric people. Finally, there was no physical risk.

#### *Reversibility*

A consumer was not unable to buy paper books, after purchasing the handset. He/she had the initial cost, but the adoption of the Kindle may have been discontinued.

#### *Realization*

E-books could be read as soon as the consumer bought them online: consumers could buy e-books directly from the Kindle. Therefore, the lead time was very short.

#### *Amenability to modification*

The possibility to modify the innovation could only be done in future versions. The product was not able to run features other than the initially programmed.

#### *Effect on adoption of other innovations*

In the year the Kindle was launched, the iPhone was the big innovation. In fact, the launch of Apple's product had already been preannounced some months before. The iPhone allowed its users to read periodicals and e-books, but not as comfortably as a consumer could read from its Kindle. The launching price of the iPhone was US\$600, but it dropped to US\$400 only two months after (Hafner & Stone, 2007).

### **4.3. HP Compaq Tablet PC TC1000**

#### **4.3.1. Description of the product**

In 2001, the CEO of Microsoft, Bill Gates, revealed the first prototype of a Tablet PC (Ahlroth, 2011). Alexandra Loeb, general manager of Microsoft's Tablet PC at that time, defined the Tablet PC as a primary PC, but with the simplicity of a pen and a paper (PressPass, 2000).

Windows XP Tablet PC Edition, a special version of Windows XP Professional, was sold directly to hardware manufacturers, namely Hewlett-Packard Co., Samsung Electronics, Toshiba Corp., and Acer Group (Svensson, 2012). This edition designed for tablets contained some exclusive software features: digital ink applications, namely the Windows Journal, Sticky Notes, and Ink Ball; tablet input panel, namely virtual keyboard and handwriting

input; and platform binary executables, which assured third-party software vendors that their software would function with digital ink features (Jarrett & Su, 2002).

In 2002, Microsoft released its first Microsoft Tablet PC on June 11, 2002, designed and built by HP: the HP Compaq Tablet PC TC1000, at a price of US\$1,700 (Pearlman, 2003). Although the product has been updated in a new version, the TC1000 only came to the attention of business and healthcare markets and thus it was discontinued three years after the launch of the first model (Ahlroth, 2011).

The TC1000 had a Transmeta Crusoe TM5800 1.0 GHz processor, a 10.4" touchscreen display in TFT active matrix. Its maximum resolution was 1024 x 768 (XGA). The operating system was Microsoft Windows XP Tablet PC Edition, and thus the TC1000 run the familiar Microsoft Office, namely PowerPoint, Excel, and Word, and it also supported the types of files that a common PC would run. Other functionalities could be downloaded online.

Furthermore, the TC1000 could store Hard Drive 40.0 GB, and RAM installed size of 512.0 MB SD. Concerning its dimensions, the TC1000 was 8.3" x 10.8" x 0.8", height, width, depth, respectively, and it weighed 4 pounds. In relation to its battery, it had a lithium ion technology that could last up to 2.5 hours.

The device had wireless 802.11 b; network interface 10/100 Ethernet; and the compliant Standards were IEEE 802.3, IEEE 802.3u, IEEE 802.2.

This device had a touch screen technology using a pen. It was also possible to use a pointing stick. Moreover, besides its virtual keyboard, it had incorporated an external keyboard. In relation to its audio connections, it had a microphone, jog dial, and stereo speakers.

#### **4.3.2. Product characteristics affecting consumer decision**

##### *Relative advantage*

When Bill Gates introduced the prototype of a Tablet PC, at COMDEX Fall 2001, in Las Vegas, he predicted that the tablet would become the most popular form of PC within five years (Schofield, 2001). In fact, the speeches coming from Microsoft were persisting on the idea that tablet was a full Windows computer and thus it would substitute the forms of PC that consumers were used to (PressPass, 2000). In this sense, the advantages of the HP Compaq Tablet PC TC1000 should be compared to a common computer.

The TC1000 offered some advantages over a common laptop. As transportability was a key issue for the target consumers (business users who spend a long time away from their desks), the lighter weight of the tablet compared to a laptop was a great advantage. During a business meeting, a consumer could simply write on the tablet, since note-taking application was presented as a sheet of paper – handwriting recognition was so differentiated that Microsoft

treated “ink as a first class citizen” (PressPass, 2000). Likewise, the digital ink enabled the consumer to save, move, manipulate, highlight, sort, and search for handwritten notes (PressPass, 2000).

The first generation of tablets of the 2000’s did look like tablets (some with keyboards), but they were actually a PC from the inside. As such, this would increase the price – this earlier generation had an average price of US\$1,500 (Svensson, 2012). In other words, consumers were paying a lot for the simplicity that a pen can provide. Additionally, Windows was still an operating system for keyboard and mouse, many functions were not suitable for pen, third party applications were not converted for pen use: Microsoft forced Windows XP on the tablet (Gralla, 2011). Furthermore, early tablets were still heavy and had short battery life (Svensson, 2012). According to interviewee 1, the transportability of the TC1000 was an illusion, since efficient wireless internet was still to come. Consequently, consumers could not benefit entirely from TC1000’s value proposition:

“Why do I have portability if I do not have internet everywhere? Then I could just use the Microsoft Tablet at home, and at home I have my PC, where I use Word and Excel.”

Regardless of the comparison with common computers, it is also important to compare the TC1000 with PDAs. During this period, PDAs were increasing the number of users. And so were the PDA phones. Besides the capability to call, these devices provided some features of the tablet PC, such as wireless access to email, corporate data, organizer features, and web.

The tablet had several advantages over a PDA (Roseberry, 2007). It was larger and thus was more comfortable to take notes and read during meetings. Tablets with keyboard were even more comfortable to annotate. Moreover, the TC1000 was compatible with MS and MS XP applications, the most utilized applications at that time, and so there was no time lost converting information. Finally, it had all the features of PDAs (PressPass, 2000).

However, this tablet cost significantly more than a PDA, it was more vulnerable to virus, it was heavier and thus more difficult to transport, and it was more difficult to enter data quickly (Roseberry, 2007).

The TC1000 delivered thus both advantages and disadvantages to consumers, but the positive effect compensates for the negative.

### *Complexity*

Tablet PC Edition is a superset of Windows XP Professional. Being a subset of Professional, general public might have overestimated the complexity of the product. Furthermore, Office applications were not modified to work properly with the tablet, and so many functionalities

were slow and annoying (Enderle, 2010). As the product was designed for a mouse, it was awkward for touch. According to interviewee 1:

“The pen was not easy to use, you could not, for example, zoom in in an intuitively way. Moreover, the operative system was not well adapted to the device: a fact that contributed to a poor usability of the product.”

Nonetheless, according to a review written by Alan Pearlman (2003), the TC1000 outperformed in relation to versatility and easy use.

### *Compatibility*

In this section, it will be reviewed some events that preceded the launch and the discontinuation of the TC1000.

In 1993, Apple launched Newton Message Pad, the first Personal Digital Assistant (PDA). This device offered the consumer fax and email, handwriting recognition, plug-in memory cards, and IR communications (Zeldes, 2005). However, in 1998 Apple Newton was discontinued, since it did not reach the critical mass of consumers and could not compete with Palm Pilot, which was launched in 1996 (Zeldes, 2005).

Also in 1993, BlackBerry merged the concepts of PDAs and cell phones, providing wireless access to email, corporate data, organizer features, web, and phone. The sales of this device escalated (Hill, 2013).

In 1996, Palm Computing introduced the first Palms: Pilot 1000 at a retail price of US\$299, and Pilot 5000 at a retail price of US\$369 (Kairer, 2006). Serial communications port, automatic information synchronization with a PC, handwriting recognition, and lack of infrared port, backlight, and flash memory were common characteristics; still Pilot 5000 could support five times more data: beyond its expandable memory, Pilot 1000 could accumulate one year of appointments, 100 to-do items and 100 memos, or any combination thereof, and 750 addresses (Kairer, 2006). The success of the Pilot 1000 granted it the title of mobile technology icon, and it had boosted the sales of the industry as a whole: from 1997 to 2003, worldwide annual sales of PDAs had a 55% year-on-year growth rate. The speed, intuitiveness, and simplicity were very attractive for the target group: PC users who work outside their desktops (Kairer, 2006).

Also in 1996, Nokia released the Nokia Communicator 9000, a merge between cell phones and PDAs (ECDL, 2011), which had evolved into new versions, the smartphones, until 2007. The Nokia Communicator is a brand name of business smartphones, which function as a normal phone on the outside, but it could open in clamshell format to access a QWERTY

keyboard and an LCD screen nearly the size of the device footprint. The Nokia Communicator 9000 became the world's best-selling PDA (ECDL, 2011).

In 2001, the iPod was introduced as a portable music player. Despite its astonishing success, this Apple device would only see its sales skyrocketing after 2004 (Lloyd, 2004).

In the same year, it was created a free internet encyclopedia based on volunteer contributors: Wikipedia (Muravskiy, 2010).

In fact, when the TC1000 was launched, consumers were not yet submersed into the digital era as the low number of internet users can demonstrate (Internet World Stats, 2014). In fact, according to interviewee 1, consumers could not fully benefit from the transportability of the product, since wireless internet was not widely used.

#### *Observability*

Since the TC1000 was targeting businessmen who work inside their business environment, it was not commonly visible to the critical mass of consumers.

#### *Trialability*

It was not possible to try the TC1000 before purchasing it. However, there might have been some few exceptions depending on the seller.

#### *Perceived Risk*

The TC1000 was an expensive new product. Therefore it had both economic and functional risks. Furthermore, since the image of the company was not well-seen by the majority of consumers (Dudley, 2003), and it was a completely new product, the adopters may have been seen as eccentric people. Consequently, there was some level of social risk. Finally, there was no risk of causing harm to its users.

#### *Reversibility*

The consumer had the initial cost of buying the device, but he/she may have discontinued the adoption of this innovation, by switching back to laptops.

#### *Realization*

The consumer may have used the product as soon as he/she purchased the TC1000.

#### *Amenability to modification*

The possibility to modify the innovation could only be done after consumers have given feedback. These modifications could have been materialized in future versions. The product, even so, could download programs that allowed the consumer to have more flexibility with regard to the usability of the device.

#### *Effect on adoption of other innovations*

The TC1000 faced competition from PDAs, because they were cheaper. Nonetheless, due to its specificity, consumers that bought the TC1000 would not buy some other innovative products, namely a PDA, because the tablet PC had all the functionalities of PDAs and some others. The TC1000 was, obviously, a multi-task device. Due to its categorization, TC1000 would be a substitute to a laptop, as envisioned by Microsoft. However, this categorization pushed the price up (Gralla, 2011) and in practice the TC1000 could not replace the laptop.

#### **4.4. iPad**

##### **4.4.1. Description of the product**

At an initial price of US\$499, the first-generation of the iPad was released worldwide in 2010 by Apple Inc., which designed and marketed the iPad (Stone, 2010). The device was positively received by reviews from several technology publications, which allowed the product to sell three million units during the first 80 days, and 15 million units in 9 months – more than every tablet PC ever sold (Warren, 2011). In fact, even before the launch of the product, there were already rumors around it on blogs and, furthermore, the product was preannounced by Steve Jobs.

The first tablet PC of Apple features an Apple A4 1 GHz processor, a 9.7" multi-touchscreen display in TFT active matrix, with LED backlight. Its maximum resolution was 1024 x 768 (132 ppi). Using iOS 4.2 operating system, the iPad included YouTube, Camera, iBooks, iTunes, Maps, Game Center, Photo Booth, FaceTime, Videos, Safari, Find My iPad, Photos, App Store, iPod, Mail, Notes, Calendar, and Contacts. Other functionalities could be downloaded as applications in the Apple Store. The iPad supported the following type of files: AAC, AAC-LC, AIFF, AVI, Apple Lossless, Audible Format 2, Audible Format 3, Audible Format 4, DOC, DOCX, GIF, H.264, HE-AAC, HTM, HTML, JPG, Key, M4V, MOV, MP3, MP3 VBR, MP4, MPEG-4, Numbers, PDF, PPT, PPTX, Pages, Protected AAC, RTF, TIFF, TXT, VCF, WAV, XLS, and XLSX.

In addition, the iPad could store Flash Drive 16GB, 32GB, or 64GB, depending on the model, and RAM installed size of 256 MB DDR. In relation to its dimensions, the iPad's size was 9.56" x 7.47" x 0.5", height, width, depth, respectively, and it weighed 1.5 pounds for Wi-Fi model, or 1.6 pounds for Wi-Fi + 3G model. In relation to its battery, it had a lithium polymer technology that could last up to 10 hours.

The Wi-Fi model had Bluetooth 2.1 EDR, and Wi-Fi 802.11 a/b/g/n. Moreover, it had a microphone incorporated, and it could support headphones, line out, sound card, and speaker(s).



#### **4.4.2. Product characteristics affecting consumer decision**

##### *Relative advantage*

Despite the fact that some reviewers labelled the device as a competitor to laptops and netbooks, Steve Jobs categorized the iPad as product that was situated between a smartphone and a laptop (Gartenberg, 2010; Gralla, 2011; Warren, 2011). Consequently, the iPad did not substitute any of these products, since it was an independent product with different functionalities. The operating system was designed specifically for tablets. It was not an adaptation from traditional computers' (Gralla, 2011). According to interviewees 1 and 2, the iPad was not only categorized as a device between a smartphone and a laptop, but also as an innovative product that was well adapted to its business model, the basis of which was the iTunes Store. The disruption from the conventional brought out the benefits perceived by consumers, since it could extract the maximum incremental innovation, and thus consumers were willing to pay for this product.

The CEO of Apple mentioned that this new product had to be far better at some key things, namely browsing web, emailing, enjoying and sharing photos, watching videos, enjoying music collection, playing games, and reading e-books (Starrett, 2010). Netbooks, according to some people, already occupy this category. However, as mentioned by Steve Jobs during the presentation of the iPad, "netbooks aren't better at anything, (...) they're just cheaper" (Starrett, 2010). And the iPad wanted from its birth to be highly differentiated, including in the attractive design, by targeting the middle upper income population who value the comfort of transportable information. In fact, Windows general product manager Gavriella Schuster confessed that netbooks running Windows were getting cannibalized by the iPad (Warren, 2011).

Moreover, almost every iOS device was able to read every iOS app. The user could stream, transfer, edit, and control his/her files from anywhere in the world, using one of its Apple devices. The user merely needed to save freely the files on the cloud.

Another advantage of the iPad was its ecology with the App Store. Before the iTunes Music Store was launched in 2003, consumers needed to connect the Apple devices to a computer that were running Apple's iTunes software. With iTunes Music Store, consumers only need to plug the iPod into the computer, which will run automatically the Music Store within the iTunes software. This ecology was developed to the App Store used in the iPad (Ahlroth, 2011), which offered a comprehensive variety of application. These apps increased the usability of the iPad: interviewee 1 said the entertainment applications broaden the usability of the product and thus its users' generation, from children to adults.

Shopping at App Store was done through a very simple process called “one-click shopping” (Ahlroth, 2011). Like Amazon webstore, but even more simplified, the iTunes Store does not require the consumer to enter his/her information every time he/she wants to buy content online. When the iPad was launched, it had already a huge user database, which included the user’s credit card details (Ahlroth, 2011).

However, there was some criticism to this device, namely the closed nature of the operating system, and the incapability to run Adobe Flash multimedia format (Naone, 2010). Moreover, the lack of a physical keyboard slowed text entry: tablets were slower than laptops to write long emails or blog posts. In fact, the iPad was only suitable for short text entry. Additionally, the iPad was not a full computer and so it was not able to run Windows or Mac’s software – users must have downloaded software from the iTunes App Store, where apps must have been approved by Apple (Viswanathan, 2014). For PC and Mac, anyone could write and distribute software. Consistent with interviewee 1, Apple software was compatible with the device, or in other words, Apple software was done specifically to work on the iPad.

Furthermore, it was not possible to add extra storage capacity, and the iPad did not have a USB connection nor was it able to use external hardware designed for computers. Moreover, the size of the iPad was not suitable for watching videos, since the user had to choose between having black bars on the top and bottom of the screen and zooming the video to fill the entire screen. This latter choice would limit the content of the video.

Finally, users of the 3G version had to pay an extra fee for cellular data access through AT&T Wireless. In contrast, smartphones had unlimited data plan. In the case of the iPad, users were limited to 2GB data, and had to pay US\$25 per month.

Despite these disadvantages, the advantages clearly compensate for the negative aspects of the iPad. In fact, since the comparison was not done with laptops, the benefits of this device were perceived as extremely positive.

### *Complexity*

In 1983, giving a speech to the International Design Conference in Aspen, Steve Jobs stated the strategy of his company: “Now Apple's strategy is really simple. What we want to do is we want to put an incredibly great computer in a book that you can carry around with you that you can learn how to use in 20 minutes. That's what we want to do and we want to do it this decade. And we really want to do it with a radio link in it so you don't have to hook up to anything; you're in communication with all these databases and other computers” (Chan, 2012). Steve Jobs seemed to be talking about a device that would be the iPad.

The iPad was envisioned as a device that a consumer could learn how to use in 20 minutes. In fact, the iPad was fast, light, and with a bright and responsive multi-touch screen, in which Apple software was easy to use (Bates, 2010; Pogue, 2010). Furthermore, the battery life was also praised and the product would appeal to less tech-savvy users (Bates, 2010; Pogue, 2010).

The iPad had only one button at the surface – 99% of the apps works merely through touchscreen (Oliveri, 2011).

According to interviewee 1, user experience was one of the key success factors of the iPad. The interface was very intuitive and user-friendly, and the touch response was faster than with a pen. Interviewee 4 adds that every generation was able to use the tablet of Apple.

In relation to apps, the App Store offered a wide selection of apps that were designed only for touch, and extremely easy to buy through a “one-click shopping” (Ahlroth, 2011). Therefore they were practical, and easy to understand.

### *Compatibility*

Before the iPad was launched, Apple took one decade to educate (purposely or not) the market about key features, introducing them individually, that would be useful to understand the iPad.

In 2001, Apple launched the iPod. At that time, MP3 were no longer a novelty in the market, but they were still a market hit. What allowed the iPod to stand out from its competitors was the convenient synchronization with iTunes and FireWire support for speedy transfers. In fact, iTunes Music Store was only launched in 2003, after which sales started skyrocketing. The iTunes Music Store gave rise to an ecosystem that attracted a large mass of consumers. Moreover, the marketing campaign and the slogan “1,000 songs in your pocket” contributed to its success (Tien, 2001). By September 2009, Apple sold more than 220 million iPods (Brooks, 2009).

Contrary to its oversophisticated competitors, the iPod had an extremely simple user interface (Ahlroth, 2011). The iPod had only one button, around which there was an intuitive circular disc used to scroll up and down. Millions of users were learning the touch motion of circling instead of the familiar scrolling used on computers (Gartenberg, 2010).

Later, Apple added color displays and the ability to display photographs on screen, as well as to play videos. Videos and other media content could be purchased on the iTunes store, creating therefore the first app market, where games and other programs could be downloaded (Gartenberg, 2010).

With the introduction of the iPhone in 2007, consumers were fascinated with the possibility of using email, surfing web, or listening to music in a cell phone (Pogue, 2007). This concept was not new, but the mass market had never seen a device like the iPhone. Furthermore, the iPhone functioned with a multi-touch interface, which was an innovation in the industry. Some months after, this technology was introduced in the iPod Touch (Gartenberg, 2010).

Apple taught consumers how to use multi-touch device and to connect with a store full of popular apps. The stage was prepared for the iPad, which could be seen as an extension of the iPhone, as mentioned by interviewee 2.

Additionally, as mentioned by interviewee 1, the worldwide use of Wi-Fi allowed consumers to benefit from the transportability of the device.

### *Observability*

The first ad of the iPod showed a guy listening to music on his computer, plugging in his iPod, transferring music, plugging in white headphones, and leaving his bedroom with some dance steps (Bergen, 2011). The white color started to be a symbol of the brand, and any white device would be associated with the brand. The color would be the same as the iPad, and consumers were thus able to recognize it as an Apple product.

Apple had built a reputation of highly respected, innovative, and game changing products. In fact, Apple had built high expectations over its products, by pre-announcing them, and any anticipation of a product would cause a big rumor. The word-of-mouth started before the product come to market. The product of Apple was itself marketing. And the products were highly recognizable as being an Apple product (Ahlroth, 2011).

Likewise, the high transportability of the device, the broad consumer target, and the lack of an external keyboard made the iPad very visible and recognizable.

### *Trialability*

Apple retail stores allow users to see, touch and learn how new products work for themselves. It is almost a classroom that contributes to the consumer education. Some retail analysts were skeptical, but Apple retail stores proved to be a laboratory. These stores also provide post-purchase assistance (Ahlroth, 2011).

Moreover, some applications are for free, and even within those that the consumer has to pay, some have a free edition, so that the consumer can use it before buying the applications.

### *Perceived Risk*

The iPad had a reasonable price. In fact, price analysts were criticizing that the price could be an entry barrier for new tablets (Ahlroth, 2011). Even so, it still had a cost, and thus there was an economic risk, since later versions could be cheaper or could perform better.

Additionally, since it was a new product, it may have had some bugs to be fixed. So there might have been some functional risk. However, contrary to the TC1000, the image of Apple did not give a bad image to its users. So there was no social risk. Lastly, there was no risk of physical order.

#### *Reversibility*

The consumer had the initial cost of buying the device, but he/she may have discontinued the adoption of this innovation.

#### *Realization*

The consumer may have used the product as soon as he/she purchased the iPad.

#### *Amenability to modification*

The possibility to modify the innovation could only become visible in later versions. The consumer, nonetheless, could download applications that would provide more flexibility and usability to the device, as well as they would allow the consumer to personalize the product. Apple's Software Development Kit allowed anyone to develop their own app (Ahlroth, 2011).

#### *Effect on adoption of other innovations*

The iPad was the hot technology when it was launched, and so there was no other innovative product at that time. Due to the specificity of the iPad, consumers who bought this product would not buy some other technological products, namely a PDA, because the tablet PC had all the functionalities of PDAs. Nevertheless, due to its categorization, the iPad did substitute neither a laptop nor a smartphone. Consequently, a consumer may have bought a laptop, a smartphone, and an iPad.

## 5. COMPARATIVE ANALYSIS OF THE FOUR CASE STUDIES

In this section, it is conducted a comparative analyzes between the four products (Rocket eBook, Kindle, HP Compaq Tablet PC TC1000, and iPad). The purpose of this analyze is to observe the emergence of patterns that corroborate or refute the theory. The emergence of factors that complement the existing theory may also be observable.

Table 2 classifies each product in relation to the variables mentioned in Table 1.

<b>Factors</b>	<b>Case 1</b>	<b>Case 2</b>	<b>Case 3</b>	<b>Case 4</b>
	<b>Rocket</b>	<b>Kindle</b>	<b>TC1000</b>	<b>iPad</b>
Relative advantage	Medium	Medium	Medium	High
Complexity	Low	Low	Medium	Low
Compatibility	Low	High	Low	High
Observability	High	High	Medium	High
Trialability	Low	Low	Low	High
Perceived Risk	High	High	High	Medium
Reversibility	High	High	High	High
Realization	Medium	High	High	High
Amenability to modification	Low	Low	Medium	Medium
Effect on adoption of other innovations	Medium	Medium	High	Low

**Table 2: Classification of each Product according to Consumer Resistance Model**

**Source: Author**

Both the Rocket eBook and the HP Compaq Tablet PC TC1000 failed to capture the interest of the general public. They were merely sold among a niche market, namely business and healthcare. Nevertheless, these two products not only delivered superior performance in many aspects in relation to their contemporary substitutes, but also they rival the Kindle and the iPad in relation to their technological performance. For example, the backlight used in the Rocket eBook allowed, according to some reviewers, for a more comfortable reading experience than the e-ink used in the Kindle; and the TC1000's processor speed competed side by side with the iPad's. According to interviewee 2, these products failed to deliver perceived value as a consequence of weak propagation mechanisms.

Propagation mechanisms have, in fact, a direct impact on the brand image. According to interviewee 4, the brand images of Amazon and Apple drove the rapid expansion of the products among the early adopters and the capacity to escalate to other groups of consumers. Interviewee 4 adds that their well-defined brand cause breaks paradigms and was built through consistency, coherence, and experience rather than advertisement: a different story

from the ones of Microsoft and RCA/Gemstar. Notwithstanding the great image of Microsoft, the company's reputation was less conducive to disruptive innovation. In his own words:

“The purpose of the brand and the brand itself were crucial to the success of the products. In the specific case of the iPad, Apple's purpose is to break paradigms and thus the audience of the brand is more likely to buy the product because of the brand itself. And consequently there is a resistance to other brands. This initial audience, or early adopters, allows the product message to be spread.”

Furthermore, Microsoft launched its Office software aimed at tablets, but it would eventually have the same functionalities of laptops'. The categorization of the product, as a direct substitute of laptops, required the company to deliver a superior advantage in relation to laptops to compensate for the high price. In fact, according to interviewee 2, consumers did not perceive that tablets were superior enough to compensate for the price gap, since inefficient wireless internet decreased the perceived value of transportability.

The Kindle and the iPad reached very rapidly the early majority of consumers, attracting much more than a specific niche of the market. In fact, as mentioned by interviewee 2, both products were different from what consumers were used to and they created an identity, in which consumers could feel they were part of a group. Both products offered considerable advantages over its potential substitutes, from transportability to usability.

Regarding complexity, the Rocket eBook was easy to use but the TC1000 was still hard to use with anything other than a keyboard. In fact, the user interface of Windows' tablet did not properly match the device, since its software was forced to work on the TC1000. It was awkward to use Touch or a Stylus, because the software was initially programmed for a mouse. The pen was just another mouse, and developers were not forced to make new programs that were focused on touchscreen. Since the software was initially developed for computers, and then adapted to the tablet, consumers were not forced to use the tablet functions in the tablet and thus the new input method did not become a habit. As such, tablets were simply lighter and more expensive laptops, since the simplicity of a pen increased its price, but it was not properly used. It was still better to work with a keyboard and a mouse.

Contrary, the Kindle and the iPad were perceived by consumers as user-friendly devices. Consumers were fascinated with the possibility to buy from a broad variety of books or applications in Amazon and Apple stores, through one-step shopping system. Nevertheless, they were still under some negative criticism: format of the Kindle and, in the case of the iPad, the inability to run all familiar programs.

Regarding compatibility with consumers' lifestyle, when the Rocket eBook and the TC1000 were launched, consumers were still not embedded in the digital era. Laptops and internet were not widely used by the society. In fact, these early products were launched in an era when consumers were not likely to buy personal electronic devices. Mobile media consumption, MP3 and handhelds video games were still in their embryonic stage.

On the other hand, when the Kindle and the iPad were introduced in the market, consumers were already familiar with technological handhelds devices. In fact, the general public had witnessed the evolution from the Gameboy to the iPhone. The handheld devices were thus already part of consumers' lifestyle. Moreover, in the case of the iPad, Apple took a decade to educate and teach consumers its features, by introducing a feature one at a time over a period of years, from the first iPod to the iPhone. In other words, Apple had altered the external environment in its favor, while the Kindle exogenously took advantage of the external environment – despite the fact that Amazon had already Amazon store that triggered the success of the Kindle.

As part of their value proposition, Rocket eBook, TC1000, Kindle, and iPad were highly portable devices. Consequently, these two products could be easily observable to third parties and thus easily communicable. Nonetheless, in the case of the TC1000, it was mainly used in the work environment, specifically in business and healthcare. Contrary to the Rocket eBook, the Kindle, and the iPad, which were not only targeting the work environment, Microsoft's tablet had never the chance to be visible in subways, restaurants, or other places heavily attended by the general public.

Furthermore, Rocket eBook, TC1000, and Kindle were not available to be tried before purchasing. Nevertheless, in contrast to the failure of the formers, the Kindle was sold out in five and a half hours and it was merely sold in Amazon store. As mentioned by interviewee 1, in the case of the Kindle, these initial consumers were already familiar with online shopping and thus they were accustomed to buy products without trying them. Interviewee 3 adds the idea of segmentation, stating that there are consumers who do not need to try an innovative product before purchase. Additionally, time might be a scarce resource to this consumer segment. Therefore, resistance to buy innovative products was low. In the case of the iPad, Apple retail stores are authentic laboratories that allow consumers to experience the products even without the compromise to purchase them. According to interviewee 2, the difference between buying online and on a store like Apple retail stores is the intimate relationship that online shops cannot provide. Thus, consumers feel more linked with products that they can touch before purchase. As stated by interviewee 2:



“There is a theory that addresses the experience of touching a new product. If you are in the Apple stores, you can experience the product. The online purchase, in turn, is very good when you do not have a feeling with the product. For example, a woman does not buy clothes on the internet because she has to try it. A refrigerator can be purchased online, because there is no feeling associated with this product. I think in the case of the iPad, it was established a personal relationship with the consumer: an intimate relationship. The iPad, unlike the Kindle, created stimuli on the consumer, so that they feel tempted to go to the store and test the product.”

In relation to perceived risks, the Rocket eBook and the TC1000 had great potential, but they were expensive and had not proved its worth yet. Consequently, consumers would incur in an economic and a functional risks. Likewise, the Amazon’s e-book reader and the Apple’s tablet conveyed both economic and functional risks to consumers, since these products may had been overpriced in relation to future versions and, as new products, there might have been still some technical problems. Moreover, Apple had a respectable reputation on disruptive products and iPad’s identity and category were clearly defined: as this did not happen to the other three products, they had a significant degree of social risk. Actually, as mentioned by interviewee 2 and 3, consumers felt that the iPad created a social value.

Regardless of these perceived risks, consumers were not obliged to continue the adoption of the product and thus they could switch back to paper books, in the case of the Rocket eBook and the Kindle, or laptops or any other similar device, in the case of the TC1000 and the iPad. Consumers could use the product, as soon as they purchased them. However, in the case of the Rocket eBook and the Kindle, consumers needed to buy an e-book to use the device. This process was nevertheless faster on the Kindle than on the Rocket eBook, since consumers could buy e-books through the handheld device.

These four products had different levels of flexibility in relation to their use. The dedicated products, the Rocket eBook and the Kindle, could not be modified; and the convergent products, the TC1000 and the iPad, were able to download programs – even so in the case of the TC1000, not every program worked well on tablet format, since third party programs were not perfectly suited to the product. Contrary to the iPad, Microsoft did not have a store, where consumers could buy applications that would enlarge the usability of the product. There were some free applications available on the Apple store.

At the time the Rocket eBook and the TC1000 were launched, PDAs were generally used by consumers. PDAs were multi-task devices that were competitive in terms of price and variety. The Kindle and the iPhone were launched in the same year. In fact, consumers could

read e-books on the iPhone. The difference in price probably still attracted consumers to buy the Kindle. In relation to the iPad, there was no other hot new technology in the market, and so the Apple's tablet had the stage only for itself. This is particularly true, since Apple did not categorize, neither did consumers, the tablet as a laptop. So consumers could not substitute the tablet for a laptop.

The comparative analysis demonstrated that relative advantage is not sufficient for a new product to succeed. The fact that the Rocket eBook and the TC1000 performed better in many aspects in relation to their contemporary alternatives reinforces the theory that companies that are merely driven by technological opportunities, which may deliver a better product performance, have a big chance to fail and thus to waste the investment done.

According to interviewee 3, the Kindle and the iPad obtained positive feedback, which started with the early adopters and was extended in number of users, until it reached a critical mass of consumers and, lately, a network effect. A network effect is the influence that one consumer of a good or service has on the value of the product for other consumers. This network effect was, in his opinion, the main cause of success for these two products and not necessarily the benefits conveyed by them. The network effect thus locked-in consumers. In the words of interviewee 3:

“There is a concept called positive feedback that arises for several reasons. The positive feedback arises when I see a lot of people talking about this technology as well. Several people using a product, encourages others to use it too. This will create a small snowball, until it reaches a critical mass. After a given point in time, this critical mass will start the network effect. The net effect is the one that justifies a winning technology to another; and not the fact that it is better or not.”

Among other factors, interviewee 3 mentioned that preannouncing a product delivers a positive effect, but if the time between preannouncing and actual launch is too large, other competitors may imitate the idea. This happened to the iPad, which was preannounced long before its launch, allowing imitators, like HTC, to sell similar products before Apple.

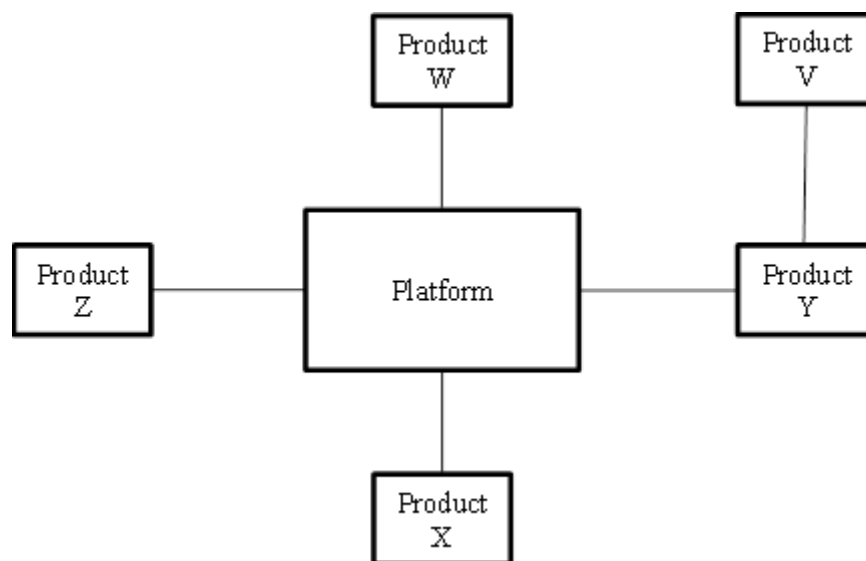
While enhancing the adoption rate, the analysis shows through the inexistence of characteristics patterns (Table 2) that there are some innovation attributes suggested by the literature that have a small weight on the dependent variable, namely relative advantage, complexity, observability, trialability, perceived risk, reversibility, realization, amenability to modification, and effect on adoption of other innovations.

As a result, the factor that proved to differentiate the successful from the unsuccessful products and thus demonstrated to be critical to consumer resistance is compatibility. This

result reinforces the idea that consumers have a desire to maintain status quo, they feel threatened by innovative products that impose changes to their habits and behavior, and that high-tech companies should therefore be guided by market trends and customer lifestyles instead of technological opportunities.

In actual fact, companies that are driven by market opportunities communicate with customers in order to know what is best for them, while companies in which product development is only based on their engineering departments believe they know what are the needs and wants of their customers. These latter companies usually offer superior technology and therefore their technology-driven products attract early adopters. Moreover, technology-driven companies offer new and disruptive products that may contain a considerable level of perceived risk. This perceived risk may not lure early adopters away, but it certainly scares the majority of consumers.

Apart from the analyzed perceived innovation characteristics, the Kindle and the iPad have another common characteristic that distinguishes them from the unsuccessful products: the ecosystem that supported these two products. Figure 7 represents an ecosystem, in which different products of the same company interact and are linked through ramifications.



**Figure 7: The proposed framework for ecosystem**

**Source: Author**

In the center of the ecosystem there is the platform: a hub in which information and other content are transmitted and diffused to products. As an illustration, consider the Kindle and the iPad. The platform of the e-book reader was the Amazon store, in which was possible to transfer content, namely e-books, to the Kindle; in the case of the iPad, the platform is iTunes, which transfers applications, music, movies, and other content to Apple's products.

When the Kindle and the iPad were launched, consumers had already been stuck into these two ecosystems, which allowed these products to penetrate the market in an easy and fast way. For example, consumers, since they were used to buy from Amazon store, found it easy to buy e-books from this platform directly to the Kindle. Additionally, since consumers had been submersed in the platform, they tended to buy the derivative products of the platform, as a way to increase the hub and products' utility. It was therefore a consequence of network externalities.

The importance of the platform is noticeable in cases in which it is inexistence. Consider the following example: when Apple introduced the iPod to the market, there was no platform that supported this product and consequently the sales were low. In fact, the iPod took three years to take off, which was only possible one year after the introduction of iTunes Music Store. Comparing with the Kindle, which was launched when Amazon store had already a large number of users, the e-book reader only needed five and a half hours to be sold out.

Both Amazon store and iTunes belong to the company that commercializes the Kindle and the iPad, respectively. Notwithstanding this ownership, the platform may belong to third parties, if the hub has a large number of consumers, in which a derivative of this platform is perceived by consumers as a continuation of the platform, as well as an increaser of its utility. The Kindle and the iPad were perceived as a continuation of their platforms or, in other words, as a ramification of their ecosystem. However, they were different types of ramification. The Kindle was a direct ramification, since it departs directly from the platform i.e. Amazon store; the iPad was an indirect ramification, since it was needed to launch the iPod and the iPhone firstly, so that consumers could learn some of their features.

In actual fact, both the iPod and the iPhone were bridge-products, because they allowed consumers to accept a new product that otherwise would probably be rejected (in Figure 7, product Y represents a bridge-product). Although the assumption of rejection may be a strong one, the definition of bridge-products justifies it, as it is explained in the following paragraphs.

On the one hand, bridge-products allow companies to better understand what features consumers value most, to invest in these features that have proven to be successful on the bridge-products, to produce them massively in order to reach economies of scale, and to realize how much consumers are willing to pay for these new features. On the other hand, they are a source of consumer education, since their inexistence may threaten the status quo: they prepare consumers to adapt to new incremental features that will be incorporated in the goal-product. In the case of Apple, the iPad was the goal-product (in Figure 7, product V

represents a goal-product). Moreover, the iPad was envisioned before the iPhone conceptualization: a fact that reinforces the idea that it was needed a bridge-product to educate consumers in relation to iPad's features (Ahloth, 2011).

Additionally, bridge-products increase the familiarity with the goal-product and thus they accelerate the process of learning; they influence perception and attitude formation towards the goal-product, given the similar innovative experience they provide; and they stimulate curiosity about the goal-product, if consumers perceive they are in the presence of consecutive bridge-products. In short, they prepare the market to accept the goal-product.

## 6. CONCLUSION

Whereas the technology-driven companies offer superior technology that appeals to early adopters, market-driven companies explore the needs and wants of customers and therefore their products attracted the majority of consumers.

For a better understanding of the factors that inhibit the adoption of innovative technological products among the group of early majority, in this empirical research it was conducted a comparative analysis of a qualitative sample of disruptive products that faced consumer resistance versus other innovative products that were massively demanded. In particular, it was examined the perceived innovation characteristics of two e-book readers and two tablets. According to the results, the perceived innovation characteristics suggested by the literature have different weights on the adoption rate. More specifically, the results suggest that compatibility is the most prominent perceived innovation characteristic in relation to the creation of adoption barriers.

Nevertheless, it is acknowledged that the outcomes of this research cannot be statistically generalized to other empirical contexts, since it is a qualitative study based on four products in which product information was collected on secondary data. Notwithstanding this limitation, the results can be theoretically generalized. Additionally, they contain relevant implications at an academic and managerial level.

For academics, this research covers a failure in consumer resistance, where little has been done to prove empirically the theory through case studies approach. This study presents fruitful conclusions that explain the phenomenon of consumer resistance. However, the research design has limitations, which constitute an opportunity for future research.

This present research focused on the consumer electronic product category and therefore it would be interesting to examine whether the conclusions in this study can be transferred to other product categories. Furthermore, the relative small sample of this study makes it difficult to generalize statistically the results reported. Future research may attempt to measure the weights of the factors statistically and consequently adopting a quantitative approach, where it is possible to isolate some variables, namely the consumer characteristics and the propagation mechanisms. This will improve the current understanding of which variable plays a bigger role in consumer resistance.

Theories built from case study research may become idiosyncratic ones, because these theories followed a bottom up approach, i.e. the particularities of the cases may have produced generalization to the theory. Lack of time was a hindrance to conduct a quantitative approach, and therefore with a more representative sample, which would be a way to produce

transversal results for most products. Reinforcing the idea, future researchers should conduct statistically generalizable studies.

In addition to what has already been said, this study has reached the result that compatibility is the factor that most influences intention to adopt and consequently it would be noteworthy if future research identifies the drivers of this perceived innovation characteristic, namely lifestyles, economic environment, sociocultural evolutionism, among others, and measures their weigh on compatibility. Insights on this recommendation would be meritorious to marketers to segment consumers in relation to their source of resistance to innovation and therefore to tackle these sources of resistance.

This study also provides remarkable implications for managers. Firstly, managers should understand that consumers are rational, but they do not act rationally every time. They tend to underrate the new benefits of a disruptive product, which justifies the innumerable innovative products that did not succeed. This incorrect perception of the benefits of an innovation is driven by high levels of passive consumer resistance, which is observable in most consumers. Notwithstanding this misperception, innumerable companies still ignore this phenomenon. The product cases in this research deliver good examples of what distinguishes those products that reach rapidly the takeoff from those that encounter consumer resistance. With the intention of decreasing the occurrence of unsuccessful products, managers should first analyze the market and therefore identify and measure the consumer resistance that will be encountered.

Secondly, consumer resistance is a natural response of consumers that is driven by status quo satisfaction and inclination to resist change. Accordingly, launching marketing campaigns aimed at accelerating takeoff might end up being in vain. Consequently, innovation managers should identify, even before the product launch, what are the most prominent barriers that the innovation may face and therefore decide if it is necessary to launch a bridge-product beforehand. Nevertheless, propagation mechanisms such as marketing campaigns are equally necessary. But they are not sufficient.

In fact, the results suggest that companies should visualize a goal-product and launch consecutive products with incremental innovations, i.e. bridge-products, which prepare the stage for this final disruptive product, i.e. the goal-product. This would assure that the routine and status quo of consumers are not challenged.

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