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Value-driven Adoption and Consumption of Technology: Understanding Technology Decision Making

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Copenhagen
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Value-driven Adoption and Consumption of Technology:

Understanding Technology Decision Making

Gregory Gimpel

LIMAC PhD School
Programme in Informatics

PhD Series 15.2011

Value-driven Adoption and Consumption of Technology

Value-driven Adoption and Consumption of
Technology:
Understanding Technology Decision Making

PhD Thesis

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In this thesis, I detail the journey that I have undertaken to shift from businessman to academic researcher. It has been an amazing adventure and one that has greatly shaped me. Throughout my study I have been graced with much help, without which my research and this thesis would not have been possible.

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Abstract

Recent innovations have integrated information and communication technology (ICT) into the fabric of people’s daily lives. Wireless technology, with its constant presence and transcendence of geographical boundaries, has profoundly influenced people’s behavior and the consumption of technology and related services. During the past few years, wireless technologies have shifted from simple devices offering mobile phone calling to multipurpose devices that incorporate the capabilities of other devices. The multiple uses of these devices, coupled with the blurring of the work-home and utilitarian-hedonic technology, creates the need for a new understanding of technology adoption and use.

When making the decision to use a wireless technology, consumer end users must make their decisions in a context that often includes alternatives and substitutes that can fulfill their needs. As the breadth of wireless capabilities increases, the decision to use technology becomes more complex because the number of competing options grows. Given the need to understand wireless technology usage, this thesis asks *why do consumers use a given wireless technology when they have so many options to choose from?*

To answer this question, this thesis views technology use as both adoption (decision to begin using) and consumption (the use once someone has accepted a technology). It draws upon two qualitative field studies and five research papers. To address consumer technology decision-making, this thesis borrows the theory of consumption values (TCV) from market research and employs a behavioral economics lens to understand how people decide among choices. The findings indicate that people decide to use technology to satisfy functional, social, emotional, epistemic and conditional needs; and that a technology’s value is created by satisfying these needs. However, consumers do not make their usage decisions by evaluating wireless technologies in isolation, but in context by comparing them against a technology with which they are already familiar (in the case of adoption) or by comparing the wireless option against another choice that can also address their need. The consumption value of the wireless technology *relative* to the referent drives the decision. Accordingly, the referent against which consumers compare a wireless technology will determine

the outcome of their decision process. If they choose a referent that is inferior to the wireless technology, then they will use the wireless option. If, however, they choose a referent that is superior to the wireless technology, then they will use the referent, unless the use of the referent is perceived to be too inconvenient.

This thesis contributes the understanding of technology use and the process by which individual users make ICT decisions by introducing the adoption and consumption of technology (ACT) model, which provides an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology.

"Værdi-drevet adoption og anvendelse af teknologi: en forståelsesramme for valg af teknologi"

Abstrakt

Informations-og kommunikationsteknologi (IKT) er, gennem teknologiske nyskabelser, blevet en integreret del af folks dagligdag. Trådløs teknologi har, med dets konstante tilstedeværelse og overskridelse af geografiske grænser, en grundlæggende indflydelse på folks adfærd og anvendelse af teknologi og IKT-relaterede tjenester. I løbet af de sidste år har trådløse teknologier udviklet sig fra at være relativt simple teknologier, anvendt til tale og tekst, til at være multifunktionsenheder, der erstatter en lang række forbrugerteknologier.

De mange anvendelser af disse apparater, kombineret med den øgede uklarhed mellem arbejdsbrug/fritidsbrug og utilitaristiske/hedoniske aspekter af teknologi har skabt et behov for en ny forståelse af teknologi-adoption og -anvendelse.

Når forbrugere af teknologi skal træffe beslutninger om anvendelse af en given trådløs teknologi, involverer det ofte et valg mellem flere alternative teknologier, der kan opfylde lignende behov. I en kontekst hvor mulighederne indenfor trådløs teknologi vokser, bliver beslutningen om at adoptere og anvende en given teknologi mere kompleks, fordi antallet af konkurrerende muligheder vokser. I betragtning af det store behov for at forstå trådløs teknologianvendelse, vælger denne afhandling at undersøge, hvorfor forbrugere vælger at anvende en given trådløs teknologi, blandt de mange alternativer.

For at besvare dette spørgsmål vil denne afhandling betragte teknologianvendelse som både en beslutning om at påbegynde brug samt en beslutning vedrørende fortløbende forbrug, dvs. brug på baggrund af allerede adopteret teknologi. PhD afhandlingen bygger på to kvalitative feltstudier og fem videnskabelige artikler.

Denne PhD afhandling benytter teorien om forbrugerværdier (consumption values) for at belyse beslutningstagning ift. forbrugerteknologi. Teorien stammer fra markedsanalyse og anvender en adfærdsökonomisk optik til at forstå, hvordan folk tager beslutninger, når der forefindes alternativer. Resultaterne tyder på, at folk vælger at anvende teknologier til at opfylde funktionelle, sociale, følelsesmæssige, epistemiske og betingede behov, og at en teknologis særlige værdi skabes ved at opfylde disse behov. Forbruger evaluerer dog ikke trådløse teknologier i isolation men derimod i en større sammenhæng ved at sammenligne dem med en allerede kendt teknologi (i tilfælde af adoption) eller ved at sammenligne den trådløse løsning med andre muligheder,

der også kan adressere deres behov. Forbrugerværdien af den trådløse teknologi i forhold til en alternativ referent betinger beslutningen. Derfor vil referenten, mod hvilke forbrugerne sammenligner en trådløs teknologi, afgøre udfaldet af deres beslutningsproces. Hvis valget står mellem en referent, der er ringere end den trådløse teknologi, og en trådløs teknologi, så de vil vælge den trådløse løsning. Men hvis de vælger en referent, der er overlegen i forhold til den trådløse teknologi, så vil de vælge referenten, medmindre brugen af referenten opfattes som værende for besværligt et valg.

Denne afhandling bidrager til forståelsen af teknologianvendelse og den proces hvorved den enkelte bruger foretager et valg der vedrører anvendelsen af informations og kommunikationsteknologier (IKT). Afhandlingen bidrager også med teori ved at indføre forbrugerværdier (consumption values) i forhold til informationssystemer, samtidigt med at den fremmer anvendelsen af adfærdøkonomiske teorier i IKT-forskning; et teoretisk felt der kun har haft et minimalt fokus i informationssystemforskningen.

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Abbreviations and Acronyms

1G	First generation mobile technology
2G	Second generation mobile technology
3G	Third generation mobile technology
4G	Fourth generation mobile technology
ACT	Adoption and consumption of technology model
B2B	Business-to-business
B2C	Business-to-consumer
CACM	Communications of the ACM
CAIS	Communications of the AIS
CBS	Copenhagen Business School
CD	Compact disc
CDMA	Code Division Multiple Access
CDMA2000	3G technology based on CDMA
CFT	Cognitive fit theory
CR	Critical realism
DOI	Diffusion of innovations
DR	Danish Radio
DREAMS	Development, Realization, and Exploitation of Advanced Mobile Services
DSL	Digital subscriber line
DSS	Decision Support Systems
ECRA	Electronic Commerce Research and Applications (ECRA)
EDGE	Enhanced Data-rates for Global Evolution
EJIS	European Journal of Information Systems
FDMA	Frequency Division Multiple Access
Gbit	Gigabit
GPRS	GSM Packet Radio Service
GSM	Global System for Mobile Communications
HSDPA	High-Speed Downlink Packet Access
I&M	Information and Management

ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IS	Information Systems
ISJ	Information Systems Journal
ISR	Information Systems Research
IT	Information Technology
ITC	Information technology continuance model
iUse	Project name for Study II of this thesis
JAIS	Journal of the AIS
LTE	3G Long Term Evolution
Mbit	Megabit
MISQ	MIS Quarterly
MP3	MPEG-1 or MPEG-2 Audio Layer III audio data compression encoding
MUG	Microsoft usability guidelines
NABIIT	Danish Program Committee for Nanoscience Technology, Biotechnology and IT
OS	Operating system
PC	Personal computer
PCI	Peripheral Component Interconnect
PDA	Personal digital assistant
RIM	Research in Motion
RQ	Research question
SIM	Subscriber identification module
SMS	Short Message Service (aka text messaging)
SSCI	Social Science Citation Index
T9	Standard 12-key telephone keypad
TAM	Technology acceptance model
TBD	To be determined
TCV	Theory of consumption values
TDMA	Time Division Multiple Access
TD-SCDMA	Time Division Synchronous Code Division Multiple Access

TTF	Task-technology fit
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus
UTAUT	Unified theory of acceptance and use of technology
WAP	Wireless Application Protocol
WCDMA	Wideband CDMA
Wi-Fi	"Wireless Fidelity" wireless local area network
WiMAX	Worldwide Interoperability for Microwave Access

1. Introduction

This thesis represents the culmination of an adventure that began during the spring of 2007. One warm and sunny day in California when I was nearing the end of my MBA studies, my classmate and friend Thomas told me that he met a Danish Information Systems professor heading a project researching advanced mobile services. Thomas' brief description of the Copenhagen-based project immediately triggered my curiosity. Scandinavia was known as a hotbed of innovation for wireless technology and doing research at the center of the action was a thrilling prospect.

Why did the DREAMS project – the Development, Realization, and Exploitation of Advanced Mobile Services – capture my imagination? Information technology has always interested me, from my first computer, the Commodore VIC20, through the Treo smartphone I carried at the time. But the opportunity to spend three years exploring wireless technology captured more than my love of technological widgets and gizmos. It presented a chance to help influence the future and to better understand how technology would shape our lives for years to come. Technology pervades our daily lives, and its influence on the way we live, work, think, and play will only increase as IT becomes further integrated into our lives. Wireless technology is different from prior IT – it is always ready-at-hand and pervades much of our business and social activity. Put simply: wireless technology represents the future direction of information and communication technology (ICT).

I could see the changes spurred by recent innovation all around me. Recent innovations have integrated ICT into the daily fabric of people's lives. Wireless technology, in particular, has profoundly influenced people's behavior and consumption of technology and related services. What began as business-oriented use shifted into distinctly different patterns of use between work-related use and personal devices and has changed once again. The distinction between ICT used for work and personal reasons, as well as utilitarian and hedonic uses is blurring (Vodanovich 2010). People are bringing their laptops and smart phones into their beds in the evening and working until late into the

night (Hafner 2006). Others find themselves using ICT to do work, even when celebrating their holidays at vacation resorts (Sandberg 2004). While organizations historically provided the ICT to be used outside the office, people are increasingly using their personal devices at the workplace (Schwartz 2010). For example, while only 11% of information workers are given a smart phone by their employer, 33% use their personal smart phones for work (Weingarten 2010).

In addition to the breakdown of the boundary between work and personal ICT, the distinction between utilitarian and hedonic use has also blurred. Traditionally, different artifacts were used for different purposes. For example, a personal music player and television were used for entertainment while a computer was used to facilitate tasks. Early Atari video gaming systems were developed for pleasure, not for task-oriented reasons. While dedicated gaming consoles still command much attention, mobile phones and personal computers are frequently used for playing video games; blurring the distinction between such IT artifacts as utilitarian or hedonic devices. Rather than online banking, etc. people now spend the majority of their personal online internet usage surfing for leisure, as an end in itself rather than as an activity that will help them achieve some other goal (Heathfield 2010; Howard et al. 2007).

As the overall ICT landscape changes, the recent emergence of affordable mobile ICT has caused a material change in the role technology plays in daily life. Mobile technology frees users from the previous limitations of location, so that now people can access hard-core computing power and information and communication media anytime, anywhere. As a result, the world is becoming one of ubiquitous ICT. It is pervasive throughout almost every facet of modern life within the developed world. Mobile technologies not only enable this connectivity, but they are becoming a constant companion. With lightweight laptop computers and highly versatile smart phones, people are constantly connected. They bring ICT with them everywhere. In fact, the mobile phone, keys, and money are the three items someone would return home to fetch if he or she forgot either (Chipchase 2007). No other objects demand this kind of

attention nor is deemed as important to have on one's person. Because it is always with the user and plays an increasingly large part in everyday life, mobile technology is viewed as increasingly more personal; and is often viewed as an extension of the user (Heidegger 2009). The intimate relationship between users and technology also suggests that a new technology age has dawned, one that requires us to search for new insights and new ways to understand it.

Wanting to become a more active participant in this new world emerging around me, I applied for the DREAMS project-sponsored PhD fellowship at Copenhagen Business School. Leaving the sun and surf of Southern California seemed a small price to pay for the opportunity to dedicate myself to exploring cutting-edge innovation. My adventure began in earnest in February 2008, when I touched down in Copenhagen. I immediately immersed myself in the information systems literature and I diligently observed my new environment, both my new city and the technological landscape within which I would research. One of the first things I noticed about my new home was the absence of cutting-edge wireless technology in use around me. I had expected to see a Scandinavian landscape filled with bleeding-edge IT and a different type of lifestyle powered by anytime, anywhere mobile connectivity. But that was not what I observed.

In the United States, smartphones were becoming common among professionals; whereas it appeared that almost everyone around me in Copenhagen still used traditional mobile phones. In fact, Danes did not have access to wireless technology like Blackberry devices and 2G iPhones that were widely available back home. People in Denmark used SMS extensively, but called each other infrequently; whereas in California, people used both services, with voice calls dominating mobile phone use. At the same time, I observed many of the students in Copenhagen integrating their laptops into many aspects of their lives that Americans usually delegated to separate devices. I observed young people using their laptops to make international phone calls, watch movies, and listen to music; whereas in America I had become accustomed to people using phones for making calls, large televisions for watching movies,

and MP3 players or stand-alone CD players for listening to music. I was fascinated by the different uses of ICT that I observed. Given the many uses of modern ICT, along with the plethora of different devices and technological services available, I began to ponder what drives the use of different technologies. I began to notice that while different technology offers unique features, the landscape has evolved into one in which many different ICT offerings can satisfy similar needs. A century ago, for instance, if people wanted to listen to music, they could use a phonograph. In the present ICT world, however, they can choose from CD player, radio, internet stream, MP3 player, etc. The complicated, redundant landscape presents more ICT choices than ever before. Besides having multiple choices, users now have access to multipurpose devices such as laptop computers and smartphones that can perform many tasks that used to require separated devices. The change in IT choices resulting from the increased presence of multipurpose devices intrigued me. I wanted to know how these devices affected the landscape, and how such new innovations impacted our ICT choices.

As a consumer whose most numerous observations are of the consumers with whom I interact every day, I decided that my contribution to the DREAMS project would focus on consumers, a fit that seemed both natural and self-evident. Given the undeniable impact of mobile technology in our daily lives and the new alternatives it offers within the technology landscape, I began to ask the question: ***why do consumers use a given wireless technology when they have so many options to choose from?***

Through the eight chapters and five research papers I include in this thesis, I strive to provide an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology.

My initial observations made me wonder what makes people decide to begin using a new wireless technology. At the same time, I was intrigued with the way people decided to use technology after they had accepted it. During my research, it became apparent that the decision to adopt a new technology can be

different than the decision to use it in a given situation. Therefore, in this thesis I will seek to answer my research question by investigating both the adoption and subsequent use of wireless technology by consumers.

In the thesis, I may use the terms “mobile” and “wireless” interchangeably; however, I use both terms to refer to wireless cellular delivery technology (see chapter 2) as a delivery mechanism. The term “technology” refers to the instantiation of the ICT that the consumer chooses to use or not use. It can be the artifact, such as a mobile phone, the service that delivers the experience to the user, such as a subscription to mobile voice communication or wireless internet, or the combination of the two if the consumer perceives the artifact and service to be an inseparable embodiment.

I have divided this thesis on into two primary parts. Part I, also known as the *kappa*, introduces the research problem area, reviews the relevant literature, and details the research methods used to answer the research questions. It also provides a digested overview of each paper’s findings, followed by a discussion of the results and concluding comments that propose a new understanding of the adoption of wireless technology by individuals. Part II consists of five research papers, four of which have been published in peer-reviewed journals or refereed conference proceedings. These five papers detail the research taken to fulfill the research objectives of the dissertation (see Table 1.1).

The remainder of Part I proceeds as follows. Chapter 2 provides an overview of wireless technology, including an introduction to cellular delivery technologies, the different generations of mobile telecommunications, and the evolution of the mobile phone. Chapter 3 reviews existing Information Systems literature published 2000-2010 in order to understand what knowledge has been contributed through prior research, as well as to establish existing gaps in understanding that this dissertation will help fill. Chapter 4 raises specific research questions that will help answer the general question: why do consumers use a given wireless technology when they have so many options to choose from? Chapter 4 also discusses theories relevant for investigating the research questions and details the reasons for the selection of the theory of

consumption values (TCV) and behavioral economics for the research undertaken to answer the research question. Chapter 5 details the research design and reflects upon the methodological choices made during the creation of this thesis. Chapter 6 discusses how the results of the five research papers included as part of this dissertation help answer my research questions. Chapter 7 details my thesis' primary contribution to information systems research by proposing a new model for understanding technology decision making. Chapter 8 reflects upon how my work related to prior literature, offers practical guidelines for practitioners who design and market wireless consumer technology, and takes a final look back at my journey as a PhD student.

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Technology Use as Consumption: A Longitudinal Study of Smart Phones	Mads Bødker Gregory Gimpel Jonas Hedman (Equal contribution)	Proceedings of the International Conference on Information Systems 2009, Paper 88, Phoenix, USA, 16-18 December 2009
The adoption of hyped technologies: a qualitative study	Jonas Hedman Gregory Gimpel (Equal contribution)	<i>Information Technology and Management</i> (11:4) 2010, pp 161-175.

Choices, Substitutes, and the Smartphone: A Comparative Task-Technology Fit Perspective	Gregory Gimpel Jonas Hedman Mads Bødker	Unpublished journal article expanding a conference paper published in the Proceedings of the Eighth International Conference on Mobile Business, Dalian, China, 27 June 2009 – 28 June 2009.
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Table 1.1 List of research papers comprising Part II of the Thesis

2. Wireless Technology

At the time that I embarked on my research journey, I was a consumer of mobile telephony and mobile data services; and I knew some basic information about wireless cellular technology. I knew that there had been different generations of mobile technology, and that different technical standards were in use, depending on the market and/or provider. But in order to conduct effective research, I had to familiarize myself with the technology that I would be investigating. At the same time, I had to focus the scope of my research in order to provide a more meaningful research agenda.

When I commenced my research, laptop computers already had high penetration. In a seeming paradox, however, very few users subscribed to a mobile internet service for their laptops. At the same time, the low penetration of smart phones in a country known for its innovative use of technology and first-in-the-world ranking in broadband penetration, drew my attention to the smartphone as an artifact of interest. When choosing where to focus my attention, I decided to exclude the widely accepted and widely used Wi-Fi technology from my research. I wanted to focus my attention on the how consumers make decisions regarding emergent wireless technology. Intel, the dominant microprocessor supplier, integrated Wi-Fi technology into its laptop chips, and the vast majority of laptops came Wi-Fi ready. Because it was already integrated with laptops, consumers did not have a choice in whether or not to adopt it.

In this chapter, I present the overview to wireless technology (as delimited as wireless cellular technology in Chapter 1) that was necessary for me to commence my PhD research. I present an overview of cellular networks and the different generations of standards that have evolved over the past three decades. Because such technology involves both a service and an artifact through which the user utilizes the service, it is necessary to understand both the architecture upon which the consumer artifacts function and the devices themselves. Therefore, I also include an overview to the basic principles of mobile networks, a discussion of the different wireless standards, and a look at

the evolution of the mobile devices available to consumers. I focus my attention on two devices: the smartphone and the laptop computer, which are the two instantiations of wireless consumer technology upon which I decided to focus my research efforts. I also provide basic information about the Danish market, which is the context in which I conduct the research for this thesis.

2.1 Overview of wireless networks

For the consumer to experience wireless technology, two things are necessary. First, a wireless network is needed for the use of a mobile device. Wireless ICT works by sending information through the electromagnetic spectrum. Using specified frequencies, data is sent back and forth between the network and the interface device used by the consumer. There is a limited amount of frequency spectrum, and when two signals occupy the same frequency, they interfere with each other. To minimize the interference, mobile networks use a cellular architecture in which a user in one cell uses a different frequency than the adjacent cell. That way there will be no interference. But because spectrum space is limited, non-adjacent cells reuse the same spectrum space. The transmission radius of adjacent cell towers overlap in order to provide seamless communication as a user moves from one coverage area to another. While in this overlapping coverage space, the network performs a handoff from one cell tower to another (Hill 2010; Sadeh 2002). Figure 2.1 illustrates a cellular network.

The basic cellular network architecture consists of five basic elements. The user interfaces with the network via a mobile device. A base station located at the center of each cell is responsible for allocating communication channels to mobile devices. Base station controllers transfer the call handling from one base station to another as users move among cells. Mobile switching centers make it possible to efficiently find, authenticate, and bill users as they move from one area to another. The cellular network is connected to the larger wireline telephone network and the Internet. Figure 2.2. illustrates the relationship among the five basic network elements.

Coverage Overlap between cells enables the connection to be handed off from one cell to another

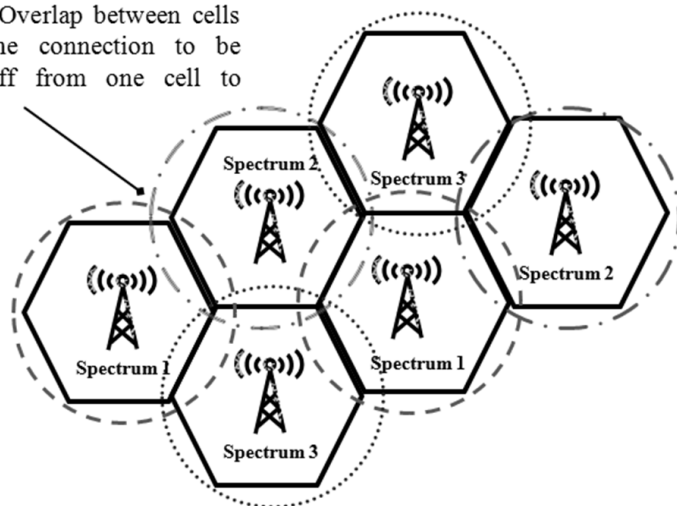


Figure 2.1. The network uses overlapping cells as a way to provide seamless transmission while minimizing interference (Hill 2010)

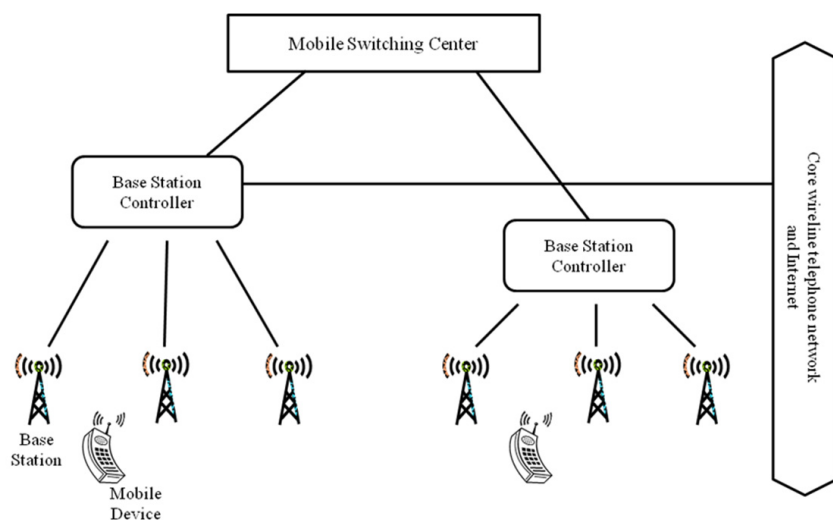


Figure 2.2. The five basic elements of mobile networks (Sadeh 2002; Yoo et al. 2005)

Because the electromagnetic spectrum allocated to wireless communications is limited and shared by all mobile phone users, modern cellular networks employ multiplexing technologies so that multiple users can concurrently use the same spectrum without interference.

2.2 Evolution of wireless standards

In 1982, The United States became the first market to offer cellular phone service (Sadeh 2002). The first generation (1G) of mobile phones used analog transmission, which used a large amount of spectrum space for each phone call (Hill 2010). Within Europe, almost all countries used different standards, making it difficult to use a phone in multiple countries. The desire for phone that could operate across borders as well as the need to manage spectrum space more effectively motivated a second generation (2G) of mobile communications. The 2G networks switched from analog to digital technology. Going digital allowed for greater compression, which used the spectrum more efficiently. It allowed for data encryption, increasing the security of communications. Digital allowed for error correction, which could improve transmission quality. And digital technology enabled the network to deliver both voice and data transmissions (Sadeh 2002). Second generation networks enabled the transmission of brief text-based messages through Short Message Service (SMS), ushering in wide-spread use of brief written messages sent via mobile phone. The Global System for Mobile (GSM) standard operates as a circuit-switched service, which means that it reserves a specified amount of bandwidth for the two sides of a phone call. It multiplexes phone calls using Time Division Multiple Access (TDMA), which divides the frequency into very short time slots that use the same frequency. Although GSM attempted to unite cellular communications under a single standard using, another standard emerged using Code Division Multiple Access (CDMA) that employs a more complex multiplexing method than GSM, but enables more users to share the same spectrum space (Hill 2010; Sadeh 2002).

As the Internet and data services became more important to users, packet-switching technology was overlaid on the GSM network. GSM Packet Radio

Service (GPRS) allowed faster data connections ushering in 2.5G mobile communications. The evolution of data communications continued, with the Enhanced Data-rates for Global Evolution (EDGE) standard squeezing more data into each GSM time slot. While EDGE increased the speed, it was still insufficient for graphical interfaces such as web browsers. Wireless Application Protocol (WAP) was introduced to decrease data flow of wireless applications, often by delivering text rather than graphics (Hill 2010; Sadeh 2002). Even with GPRS, EDGE, and WAP, most users did not use data services beyond phone-specific applications such as SMS and downloading ringtones.

Universal Mobile Telecommunications System (UMTS), a third Generation (3G) mobile standard adopted Wideband CDMA (W-CDMA), which sped up data transmission significantly. Like with the second generation of wireless technology, however, UMTS-based 3G faces a competing standard in CDMA2000 (Dekleva et al. 2007; Hill 2010). Japan launched 3G service in 2001 followed by other markets with varying speed (Sadeh 2002). European 3G service debuted in Italy and England in 2003 (Hutchinson-Whampoa 2010), and it premiered in Denmark in 2006 (Lancaster 2008). China launched 3G in 2008 using its own TD-SCDMA standard, following later with UMTS and CDMA2000 (Farrar 2009). India launched its first 3G services at the end of 2010 (Gupta and Guha 2010). As of 31 December 2010, 11% of the worldwide mobile subscribers worldwide access 3G networks (4gamericas.com).

The next generation of wireless networks are being built. Technologies marketed as fourth generation (4G) wireless use 3G Long term evolution (LTE) or Worldwide Interoperability for Microwave Access (WiMAX). LTE improves the performance of existing 3G networks while WiMAX requires new infrastructure and lacks a world-wide standardized spectrum allocation (Hill 2010; Vilches 2010). While some mobile service providers are launching “4G” networks, the performance of the delivery technologies fall far short of the IEEE specifications for fourth generation wireless technology (peak download 100 Mbit/s - 1 Gbit/s). As such, the technology used to realize the significant improvements required by 4G have yet to be implemented; therefore, the latest

category of network advancements can be classified as Pre-4G networks (Vilches 2010). Table 2.1 compares the different generations of wireless IT.

The Generation	Access Protocols	Key Features	Level of Evolution
1G	FDMA	Analog, primarily voice, less secure, support for low bit rate data	Access to and roaming across a single type of analog wireless network
2G and 2.5G	TDMA, CDMA	Digital, more secure, voice and data	Access to and roaming across a single type of digital wireless network and access to 1G
3G and 3.5G	CDMA2000, W-CDMA, HSDPA, TD-SCDMA	Digital, multimedia, global roaming across a single type of wireless network (underlying technology), limited IP interoperability, 144Kbps to several Mbps	Access to and roaming across digital multimedia networks and access to 2G and 1G
Pre-4G	WiMAX LTE	Digital, multimedia, global roaming across multiple wireless networks, 10Mbps-100Mbps, IP interoperability for seamless mobile internet	Access to and roaming across digital multimedia networks and access to 3G, 2G and 1G
4G	TBD	Global roaming across multiple wireless networks, 100Mbps-1Gbps, IP interoperability for seamless mobile internet	Access to and roaming across diverse and heterogeneous mobile and wireless broadband networks and access to 3G, 2G, and 1G

Table 2.1: Characteristics of wireless technology (Dekleva et al. 2007; Shim et al. 2006; Vilches 2010)

2.3. Mobile devices

While the mobile network infrastructure powers the consumer use of wireless technology, the users access the network through a mobile device. In 2010, the most prevalent instantiation of wireless technology – the mobile phone – is in the hands of the majority of the world’s population (4gamericas.org). Previously disconnected billions are now able to communicate with others all over the world, bringing new society implications and economic consequences. During the 2000s, mobile phone technology has evolved from basic voice communication to increasingly sophisticated digital data communications.

While the unprecedented technology dissemination embodied by mobile phones and associated data services has caught global attention, other important wireless innovations have also launched during the “wireless decade.” For example, with the broadband internet capabilities of 3G, people can use laptop computers to stay connected anytime, anywhere; and desktop computers that previously fell outside areas with wireline broadband can now receive high-speed internet access. This same technology has enabled wireless internet connections to innovative tablet computers, which after years of market experimentation gained significant traction during 2010.

2.3.1. Cellular Phones

In order for me to help shape the future, it is essential that I embrace the past by understanding the progression of mobile phones and the evolution of the smart phone. I have created the following timeline to show key developments in the mobile devices available to consumers since the introduction of mobile services in 1982.

The 1980s

Many of the first generation analog cellular phones of the 1980s were built into automobiles rather than being portable devices. Others were phone handsets attached by cables to large transmission boxes and battery packs. Examples of these are the Motorola Transportable and the Dancall. Early mobile handsets,

such as the DynaTAC and Nokia Cityman were bulky and heavy (Thompson 2005). These mobile voice communication devices were available to businesses and individuals, but were too expensive for the general consumer market. Table 2.2 provides images of the mobile phones typical of this decade.





			
Motorola Transportable	Dancall	Nokia Cityman	Motorola DynaTAC
Images: (Thompson 2005)			Image: Wikipedia Commons

Table 2.2. Images of 1980s mobile phones

The 1980s ended with the introduction of the Motorola MicroTAC, a smaller clamshell phone that set the tone for the next decade.

Image: Wikipedia Commons



The 1990s

Uptake of mobile phones took off in the 1990s, led initially by business users, then followed by consumers. The shrinking size and cost of the phones played a large in spurring mass acceptance of mobile phones. The introduction of second generation mobile technology added additional features, such as SMS, picture mail, direct-download ringtones, and email to mobile devices.

The Nokia 2110, introduced in 1994, is credited as the phone that helped mobile phone tip from being a niche technology to widespread ICT. The 2110 was small, lightweight, and could easily fit in a bag or jacket pocket (Thompson 2005).

Image: <http://www.gsmarena.com/phone.php3?idPhone=24>



Also in 1994, IBM and BellSouth joined forces to release the Simon smart phone, which combined the features of a personal data assistant with a mobile phone. Priced at US\$899 and lacking an easy input interface, the Simon quickly failed in the marketplace (Pegoraro 2000).

Image source: Wikipedia Commons

The cellular phone became more personal two years later in 1996 with the introduction of the Motorola StarTAC, a small flip phone that could fit easily in a clip-on holster or in the pocket of someone's jeans. It is credited with starting the "mobile phone as accessory" trend (Thompson 2005). Image: motorola.com



Mobile phones began to offer more advanced features that utilized more of the technological capabilities of 2G networks. The Nokia 9000 Communicator launched in 1996, including SMS, email, and other features that become common in the smartphones of the mid-late late 2000s (Thompson 2005)(Wikipedia).

Image: Wikipedia Commons (Note: photo is of Nokia 9110)

In 1999, Nokia launched the Nokia 7110, the world's first phone using Wireless Application Protocol with a large screen for reading email and web browsing. Research In Motion (RIM) launched the Blackberry, a two-way pager with a keyboard and pushed email to the user (Thompson 2005). Image: Wikipedia Commons



The 2000s

The 2000s witnessed major shifts in mobile devices. At the beginning of the decade, mobile handset design took two divergent paths. One path continued to shrink the size of the devices, while the other focused on increasing the features on large handsets. In 2002, RIM combined the BlackBerry email device with a phone, creating the BlackBerry 850 smartphone, which would set the standard for smartphones for much of the decade. Other companies joined the smartphone fray and featured a PDA-like phone with a small QWERTY keyboard under the screen. Whether consumers used smartphones or traditional-style cellular phones, they all experienced usage shifts that extended phone use beyond voice calls to include text messaging via SMS, full color screens, and built in cameras and sometimes the option to mail pictures to other phones. Table 2.3 provides release dates, whether they access 2G or 3G networks, and images of this genre of smartphone.





			
Blackberry 850	Handspring Treo 600	Samsung Blackjack	Nokia e61
2002	2003	2005	2005
2G	2G	3G	3G
wikipedia.com	(Pegorano 2005)	(Samsung 2005)	http://www.gsmarena.com/nokia_e61-1322.php

Table 2.3. Overview of select smartphones with QWERTY keyboards on face

While BlackBerry-like front-facing keyboards became a major trend in the mobile device market, other devices featured disappearing keyboards. For example, the T-Mobile Sidekick features a screen that slides up to unveil a keyboard, and the Nokia 9500 Communicator has a clam shell design in which the phone opens to reveal a screen and full keyboard.



T-Mobile
Sidekick
2002 / 2G
(GPRS)
(Weintraub
2009)



Nokia 9500
2004 / 2G (GPRS)
(Nokia 2004)

While the smartphone increased in popularity, only a small percentage of mobile phone users adopted the device and it stayed a niche market for the much of the 2000s. For example, in 2006, an estimated 1.02 billion mobile phones were sold (Cellular-news.com 2007), of which 81 million (approximately 8%) were smart phones (Kessler 2006). The years 2007 and 2008 marked the tipping point for the smartphone. In 2007, Apple Inc. released its first mobile phone – the iPhone. The iPhone capitalized on the immense popularity of Apple’s portable MP3 players among consumers by including

mobile phone functions and targeting the consumer market rather than the business customers who had dominated the smartphone purchases until that time. The original version of the phone was sold only within the United States and it ran on a 2G network, but it offered Wi-Fi connectivity, a feature that first appeared in mobile phones only one year earlier (Mobiledia 2006). However, it offered a multi-touch screen interface, eliminating the need for a keyboard and multiple buttons while increasing the screen size on a standard-sized smartphone handset. It also included a full version of the Safari web browser that ran on Apple's personal computers, promising a computer-like internet experience (Block 2007). The iPhone captured the public's imagination, and more importantly, popularized the smartphone as a consumer technology. After a year of release, Apple released a 3G version on a world-wide basis. At the same time as the 3G release, Apple launched a virtual software store through which applications could be downloaded directly to the 3G iPhone. While applications were available for other smartphones, the Apple AppStore created a new business model. Whereas software for prior smartphones could be purchased from many sources, Apple created a walled garden of software applications. iPhone apps were available only through the AppStore and Apple approved all software before making it available. The iPhone was an international sensation – the smartphone was now both a mainstream item as well as a fashion accessory. Soon other handset makers imitated the iPhone's touch-only interface, leading to an explosion of smartphones at the end of the 2000s. In addition to the device itself, other companies set up app stores, or rebranded the existing ones, in an attempt to capture some of the momentum created by Apple.

In 2009, smartphones accounted for 14.4% of global mobile phone sales (Schonfeld 2010). As phones become more like small personal computers, the operating system and the affiliated network of software developers, manufacturers, etc. becomes an important consideration for consumers. The operating system driving mobile phones and the ecosystem that supports the OS becomes an important attribute of the phone. At present, there are several major operating systems. In 2009, the major operating systems were Symbian,

BlackBerry, iPhoneOS, Windows Mobile, Linux, and Android. Symbian is the operating system that drives Nokia's phones, as well as phones by a variety of handset makers. The Research In Motion operating system is exclusive to BlackBerry Devices. The iPhone OS is exclusive to the iPhone (and Apple's iPad tablet computer). Window's Mobile is available to handset makers for a licensing fee (Schonfeld 2010). (Note that in early 2011, Nokia announced a shift to the Windows Mobile platform for its smartphones (Etherington 2011)). Linux is an open-source operating system available to manufacturers who choose to use it. Google's Android operating system is Linux-based and is openly available to all handset makers; however, Google retains control over certain aspects of the system. Table 2.4 lists the market positions held by competing operating systems (Schonfeld 2010).

Operating System (Company)	2009 Units (in thousands)	2009 Market Share (%)
Symbian (Nokia)	80,878.6	46.9
Blackberry (Research In Motion)	34,346.6	19.9
iPhone OS (Apple Computer)	24,889.8	14.4
Windows Mobile (Microsoft)	15,027.6	8.7
Linux	8,126.5	4.7
Android (Google)	6,798.4	3.9
Other	2,305.6	1.3
Total	172,373.1	100.0




Table 2.4. Market share by mobile phone operating system (Schonfeld 2010)

2.3.2. Notebook Computers

While the mobile phone is the most widely adopted type of wireless device, laptop computers have significant world-wide penetration, making them worthy of study. The notebook computer is a portable computer that can be taken almost anywhere and can run on battery power. While the term notebook computer refers to generation of computers that began once personal computers reached the size of a notebook, I will use the vernacular term "laptop"

computer. Historically, personal computers were perched upon desks, with a CRT monitor, a keyboard, and later, a mouse. But in 2003, laptops began outselling desktops (Bloomberg 2003). Table 2.5 provides an overview to the evolution of the laptop.

By the end of the 2000s, almost all laptops sold integrate Wi-Fi network capabilities, which enable users to connect to a wireless local area network and access network data without using cables to connect computers to the network. This provides the ability to move wirelessly within a short distance, provided that the user is near a Wi-Fi router and has permission to access the network. But laptop computers also offer the potential to be used anytime, anywhere through cellular data connections. While some laptops, the majority of which are smaller, less powerful laptops called netbooks, come with integrated 3G connectivity, most are sold without integrated 3G hardware and require separate hardware. Likewise, most laptop users must purchase a PCI card or a USB

1981	1982	1988
		
Image: computerhistory.org	Image: Wikipedia commons	Image: pc-museum.com
The Osborne I, released the same year as the IBM PC, offered complete system build in a portable housing.	Compaq Computer releases the Portable PC, the first portable IBM-compatible computer.	Compaq introduces the SLT/286, the first fully-functioning laptop.
(www.computerhistory.org)		



1989	1999
	
Image: Wikimedia Commons	Image: computerhistory.org
The Compaq LTE becomes the first notebook computer. (www.computerhistory.org)	Apple iBook is first laptop with built-in Wi-Fi connectivity. (Apple Computer 2000)

Table 2.5. Evolution of the laptop

connector (called a “dongle”) to access a mobile data network. The user must also subscribe to a mobile data service from a cellular network provider. By purchasing a card and cellular subscription, users can access the World Wide Web and access Internet application anytime, anywhere. Wireless service providers are marketing 3G wireless connections for laptops to consumers. Given the wide adoption rate of laptops, mobile wireless internet for the laptop has the potential become a major consumer wireless technology.

2.4 Wireless Trends

In order to look toward the future and to conduct meaningful research, it is important to understand the current wireless trends. Globally, the number of mobile phone and internet users continues to grow. By 2008, more than a billion people were internet users and half the world had mobile phones, eclipsing the number of land-line telephone subscribers. Table 2.6 presents basic telecom statistics.

World population	6.7 billion
Fixed phone lines	1.3 billion
Mobile subscriptions	3.5 billion
Mobile text messages sent	2.3 trillion
Internet users	1.2 billion
Fixed broadband subscribers	380 million

Table 2.6. Global telecom statistics as of 2008 (Buddecomm 2008)

The number of web browser-enabled mobile phones is predicted to reach 1.82 billion by 2013, surpassing the total number of desktop computers, which is predicted to reach 1.78 billion (Walsh 2010). Voice remains the principal mobile phone application; however, people are moving away from traditional voice communication to newer forms such as email, internet chat, and SMS (Buddecomm 2008). As smartphones increase in popularity, the demand for applications grow as well. Mobile apps have become a substantial subset of the software industry. Consumers spent approximately \$6.2 billion on mobile apps during 2010, a 62% increase over 2009 (FitzGerald 2010).

While the global trend shows diffusion and high growth, it is important for me to pay attention to my local research context. Within the European Union, the late 2000s witnessed increased competition as the dominant telecommunications companies underwent structural changes that increased network access (Buddecomm 2008). The European Union has reached the saturation point for mobile phone adoption. In 2008, the 27 EU countries reached a 119% mobile phone penetration rate. The majority of these users utilize pre-paid calling plans in which they “load up” their accounts with credits that are depleted when they use their mobile devices. The alternative to pre-paid plans are post-paid plans, in which the service provider extends credit to the subscriber and the user pays for the use of the service on a monthly basis. Those who use pre-paid plans spend less on mobile services and are less likely to use new and innovative services. Currently, there is a trend in which European consumers are shifting to post-paid subscriptions; however, pre-paid plans still dominate the industry (Husson 2009). Mobile service providers typically offer a reduced price on a

mobile phone handset in exchange for customers signing a long-term service agreement. The terms of the agreement and duration of the contract are governed by national regulations and vary from country to country. For example, Swedish mobile service contracts are limited to 2 years while Danish contracts are limited to 6 months. Within Europe, there is an increasing trend toward SIM-only plans that sell the mobile service without a subsidized handset and related long-term contracts (Husson 2009). With the roll-outs of 3G networks, mobile providers have aggressively marketed mobile broadband to laptop owners. Mobile internet has taken off in England, motivated by penetration pricing strategies, demand from geographic areas without existing broadband connections, and through contractual arrangements that do not require the good credit standing necessary to subscribe to fixed-line broadband service. The Scandinavian countries have launched some of the continent's fastest mobile broadband technologies, enabling them to provide mobile broadband as an alternative to their fixed-line internet connections (Lancaster 2008). By mid-2010, 10% of SIM cards issued in Denmark were for dedicated mobile data subscriptions.

Within Europe, my research centrum Denmark ranked first in e-readiness for years (EIU 2007) at the beginning of my PhD studies, although it recently ceded its leadership to its neighbor Sweden (EIU and IBM 2010). In 2010, Denmark had 5,515,575 million people (CIA 2011) and 2,110,000 broadband connections (Videnskab 2010). There are four companies that own the mobile infrastructure in Denmark: TDC, Sonofon, Telia, and 3, as well as other companies that resell access to those networks (Lancaster 2008). The top three brands of mobile service (TDC, Telenor, and Telmore) control 2/3 of the market. In 2010, Denmark has a mobile phone penetration rate of 136%. (Videnskab 2010). Denmark has experienced strong growth of 3G mobile phone subscriptions since the company 3 launched the service in 2006, followed by others in late 2007 (Lancaster 2008). By mid-2010, dedicated mobile broadband subscriptions reached 744,000, marking a 78% year-over-year increase. These data subscriptions generated an average of 6-8 Gb of data traffic per half year period (Videnskab 2010).

It is within the Danish national context that I conduct the two field studies presented in this dissertation. My work focuses on smartphones and laptop computers that access mobile wireless networks. Both are multi-purpose devices that provide the option to use them for work or play; and both types of devices can be used instead of other types of devices. Within this overall technological landscape, there are choices of wireless network, company/brand selling network access, as well as many types of handsets and laptop computers. It is within this context of competing choices that I search of an answer to the question: why do consumers use a given wireless technology when they have so many options to choose from?

2.5 Summary

During the past two decades, consumer wireless technology has evolved from simple, single purpose devices to complex, multipurpose offerings that are employed for mixed uses (business and personal, utilitarian and hedonic). This multidimensionality necessitates new understandings of the way people use technology.

It is with this understanding of the artifact developments, market trends, and underlying network technology that I embark of making my contribution to information systems research. With this starting platform I can begin to position myself within academic discourse (chapter 3), evaluate theoretical perspectives to guide my journey (chapter 4), and design field studies to pursue new knowledge and insights (chapter 5).

3. Literature Review

Armed with a basic understanding of wireless technology, I took the next step on my PhD journey. I began exploring the question that motivated my move to Copenhagen and multi-year commitment to the DREAMS project: why do consumers use a given wireless technology when they have so many options to choose from? Every journey begins with a first step, so I delved into literature published by scholars within the wireless arena. By learning from those who precede me I gain valuable insights that I can build upon and I also get a feel for underrepresented areas of research where I can add new insights and make a meaningful contribution.

As my research progressed, I added new literature to my knowledge base. While crafting the papers in Part II, I conducted a review of literature relevant to the topics of each paper. But during a long quest such as a PhD, untraveled paths rich with opportunity for groundbreaking research may be forged and even paved over as other researchers break ground and bring illumination to previously unanswered questions. Therefore, as I near the end of my PhD intellectual trek, I take a moment to revisit the body of literature covering the wireless technology phenomenon that pervades our lives and provides increasingly ubiquitous access to information and communication resources.

In this chapter, I revisit the IS literature about consumer wireless technology in order to position the contribution of this thesis (and of several years of my life) to the contemporary understanding of consumer wireless technology represented by journal articles in the past decade, including those published during my time as a PhD student.

3.1. Method

3.1.1. Sample Selection

To make sure that my work remains relevant given recent advances in the study of wireless technology, I queried the SSCI web of science for articles published between 01 January 2000 and 30 September 2010 that address the following

topics: mobile and wireless because they are the focal technologies of the DREAMS project and of my research; m-commerce, because it is the mobile extension of the mainstream PC-based e-commerce; and ubiquitous and pervasive, because wireless technology increasingly is becoming integrated into every aspect of our daily lives. I used the following search string:

TS=mobile OR TS=m-commerce OR TS=ubiquitous OR TS=wireless OR TS=pervasive¹

In an effort to capture a representative sample of mainstream information systems literature, I include the set of journals established by Palvia et al. (2004). I also follow the lead set by Katerrattanakul et al. (2006) and include the Journal of Management Information Systems (JMIS). Because this study looks into understanding of consumer wireless technology within the information systems discipline, I include two journals of the Association for Information Systems: JAIS and CAIS. In addition to each of the specified journals, in an effort to make sure vital research was represented in this review, I filtered all results from the keyword query by journals classified by SSCI as belonging to computer science and information systems. The two journals with the most articles were Electronic Research Commerce and Applications (ECRA) and Decision Support Systems (DSS). I added these two journals to the review because of the contribution they make to wireless research. No article from ISJ matched the search string. Table 3.1 lists the journals included in the study.

Communications of the ACM (CACM) European Journal of Information Systems (EJIS) Information Systems Journal (ISJ) Information Systems Research (ISR) MIS Quarterly (MISQ) Journal of the AIS (JAIS) Communications of the AIS (CAIS) Information and Management (I&M)
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¹ TS is the search string for "Topic"

Table 3.1. Information Systems journals studied

3.1.2. Filtering

Because my research focuses on consumer wireless technology, I reviewed the abstracts of the initial 243 query results and filtered out articles that were about business IT or organizational technology. Articles clearly addressing business technology were excluded from further review. While 4 articles from J_{MIS} matched the database query, my initial review determined that they were not consumer-oriented research and were not included in the final review. I read in entirety the remaining 56 articles and outlined them based on the key elements of the article. I excluded four articles in the final sample from further analysis. Kim et al. (2010) was excluded because the subject concerned general e-commerce and did not have a material wireless aspect to it. Hong et al. (2006b), Frydenberg et al. (2005), and Soh and Tan (2008) were not consumer studies and were therefore dropped from further analysis.

3.2. Analysis and Discussion

During my review of the literature on consumer wireless technology, seven categories emerged as being relevant for the analysis of the existing literature. In this section I analyze and discuss the objects of study, the theoretical approach used by the researchers, the methodological choices taken in conducting the research, whether the research looks at the adoption or use of wireless technology, whether the research focuses on an object in isolation or within the context of the larger consumer marketplace, whether the study considers multiple points of time, and whether the research addresses utilitarian or hedonic factors.

3.2.1. First Category: Objects of study

My survey of the extant literature on consumer wireless technology focuses on a limited selection of focal technologies. Much attention is dedicated to research on the mobile phone. Of the 52 articles reviewed, 9 (17.3%) look specifically at the mobile phone device. An additional 6 (11.5%) articles explore mobile data services for the mobile phone and 8 (15.4%) research financial transactions via mobile phone. These financial transactions include mobile payments, mobile banking, and mobile brokerage services. Mobile commerce, such as shopping and purchasing items from online stores via mobile device, motivates 5 (9.6%) articles. Another 5 articles (9.6%) looked at handhelds other than traditional mobile phones. Four of these studies looked at PDAs while one looked at the Blackberry, a smartphone. Four articles (7.7%) investigate advertising and marketing aspects of mobile communications. Within this broad category of advertising and marketing, however, there is much heterogeneity among the specific focus. Cocosila et al. (2009) study SMS reminder services, Scharl et al. (2005a) look at SMS marketing, Hsueh and Chen (2010) research mobile coupons, and Rondeau (2005) looks at branding strategies for consumer-oriented mobile applications. Two articles (3.8%) examine ubiquitous communication. Waller and Johnston (2009) propose a new way of thinking and designing mobile computers that take into account the natural human environment. Yoon and Kim (2007) explore the adoption of existing technology in order to predict future integration of ubiquitous computing. Other objects of study comprise 7.7% of the articles. These include mobile gaming (Ha et al. 2007), ringtones (Turel et al. 2010), push-to-talk voice communication (Dickinger et al. 2008), and the use of RFID tags and dynamic grocery pricing (Pramatari and Theotokis 2009). See Table 3.2 for a summary of the objects of study within the research sample.

Object of Study	Articles
Mobile phone	11, 17, 18, 19, 25, 30, 34, 35, 43
PDA / Smartphone	2, 5, 13, 16, 49
MDS	4, 8, 31, 38, 48, 53
Mobile internet / web	1, 7, 10, 26, 27, 39, 41, 46, 52
Financial transactions	12, 15, 23, 24, 29, 40, 50, 56
m-commerce	6, 14, 32, 33, 47
Marketing / advertising	9, 37, 44, 54
UbiCom	21, 36
Other	3, 20, 51, 55

Table 3.2. Summary of objects of study

During my review of the literature, I notice that laptop computers, which have become ubiquitous throughout the Western world and whose users recently have been targeted by telecommunications companies as potential subscribers to 3G wireless internet, are absent from my review. Given the recency of 3G broadband for laptops and the review cycle of scholarly journals that can take years (Baskerville and Myers 2009), this absence is not entirely surprising. The low representation of published articles about smartphones in the consumer space is also notable. But like 3G laptop connections, the inflection point at which smartphones entered the consumer space is recent, beginning with the iPhone in 2007 or perhaps with the global iPhone launch in 2008.

While the lack of articles is understandable, it helps establish that the road I have taken on my PhD journey is still less traveled. The still uncharted waters of mobile laptops and smartphones reinvigorates my motivation to research these two wireless technologies. Additionally, the dynamism of the smartphone market makes these artifacts worthy of study. The popularity of smartphones among consumers has displaced the strong market position once held by Blackberry devices, and the dominance of new entrants Apple Inc, and Google

Inc. have dramatically changed the market. Former dominant players in the mobile industry face declining market share and struggle for relevance as the wireless device industry rapidly shifts to the smartphone.

3.2.2. Second Category: Theory

Information Systems is an applied discipline that borrows many theories from other fields. Some of the most important of such theories are the diffusion of innovations (DOI) (Rogers 1962; 1995), the theory of reasoned action (TRA) (Fishbein and Ajzen 1975), and the theory of planner behavior (Ajzen 1985). At the same time, information systems researchers have developed theories within the IS tradition. The technology acceptance model (TAM) (Davis 1989) is the most used and most influential theory (Benbasat and Barki 2007; Lee et al. 2003). The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003a) is also among the most influential theories. To understand the current research on consumer wireless technology, it is necessary to understand the different theoretical perspectives used in contemporary research.

As the most widely-used theory within information systems, it comes as no surprise that TAM is the most frequently used theory within this sample of consumer-oriented research. Fourteen articles (26.9%) use TAM. All of these articles extend the basic TAM by adding new constructs such as trust (Vance et al. 2008), convenience (Yoon and Kim 2007), or perceived playfulness and perceived security (Fang et al. 2005). Three articles (5.8%) use UTAUT constructs, although none of the surveyed articles use UTAUT in its entirety or without incorporating other concepts as well. The diffusion of innovations theory appears in only 2 articles. Constantiou et al. (2007) adapt Rogers' (1995) types of adopters to categorize types of mobile phone users into four groups based on what type of wireless services they use. Mallat et al. (2009) examine the impact compatibility between mobile ticketing and travelers' routines have on mobile ticketing. Five articles (9.6%) utilize other IT theories. These include theories such as the "7Cs of interface design" (Lee and Benbasat 2003), Microsoft Usability Guidelines (Venkatesh et al. 2003b), and Universal

Law of Web Surfing (Halvey et al. 2006). Fifteen articles (28.8%) use theories from other disciplines to investigate wireless phenomena. The theoretical perspectives are drawn from assorted reference disciplines. Examples include behavioral economics (Blechar et al. 2006), perceived value (Kim et al. 2007), market research (Turel et al. 2010), service quality (Lu et al. 2009), and risk (Cocosila et al. 2009). Fourteen articles (26.9%) do not use a theoretical perspective. Some are market reports e.g. (Shim 2005) or articles about technological architecture e.g. (Herzberg 2003). Others present exploratory research (Ondrus and Pigneur 2006) or serve goals that focus outside the theoretical realm. Table 3.3 provides the breakdown of theories used to research consumer wireless technology.

Theory	Articles
TAM	2, 3, 4, 5, 7, 10, 20, 21, 26, 39, 48, 50, 54, 56
UTAUT	23, 37, 51
DOI	34, 56
Other IT theories	16, 32, 33, 35, 41
Non-IT theories	1, 6, 8, 9, 11, 13, 14, 17, 27, 30, 36, 38, 40, 53, 55
No theory	12, 15, 18, 19, 24, 25, 29, 31, 43, 44, 46, 47, 49, 52

Table 3.3. Theories used to research consumer wireless technology

While TAM remains the dominant theory in IS research, researchers have been using many other theoretical perspectives to examine wireless technology within the consumer space. Of the articles that employ a theoretical lens, 39.5% use theories from outside the technology domain. The breadth of perspectives in the literature review shows that the theoretical approach to consumer wireless technology is scattered. This presents the opportunity for researchers to propose a model or theoretical perspective that considers factors from many of the disparate theories so that new research can build upon the rich foundation of existing research.

3.2.3. Third Category: Research method

The design of a scientific study will determine what kind of data is collected and what form new insights will take. While there are compelling arguments for the approaches to research, as a researcher I need to understand what type of research currently is being conducted. Only then can I design a study that can best build upon the solid foundation of existing research. Table 3.4 details the methodological approaches used in the surveyed literature.

Research Method	Articles
Quantitative	1, 2, 4, 5, 6, 7, 9, 11, 14, 20, 21, 23, 27, 33, 34, 35, 38, 39, 41, 48, 50, 51, 52, 55, 56
Qualitative	12, 30, 43
Mixed method	3, 8, 26, 40, 46, 53, 54
Experiment (quantitative)	10, 13, 16, 17
Other	37, 49
Not a field study	15, 18, 19, 24, 25, 29, 31, 32, 36, 44, 47

Table 3.4. Methodological approaches

Quantitative techniques dominate the approach to scientific knowledge within information systems. In my survey, 11 articles (21.2%) were not field studies. Of the remaining research, 61% percent used quantitative methods, 17.1% mixed qualitative and quantitative methods, 9.8% designed experiments that analyzed the results using quantitative techniques. 7.3% used qualitative methods. Two studies (4.9%) used non-traditional methods: Rondeau (2005) uses a method similar to action research and Kwon et al. (2006) employ a prototyping research design.

The quantitative, mixed-method, and experimental research articles all take a positivist stance toward information systems research; whereas the three qualitative articles use an interpretive approach to research. This shows a dominant positivist philosophy within the IS field, something that has been

previously noted by Carlsson (2005) and Goles and Hirschheim (2000). While quantitative research can help shape a useful understanding of the world, qualitative research allows users to document the inner experience of participants, determine how people form meaning, and uncover variables rather than test them (Corbin and Strauss 2008). The potential insights to be gained from qualitative research using interpretivist methods are amplified by the relative absence within the study of consumer wireless technology. Therefore, qualitative studies can make a significant contribution to the topic area by filling this gap.

3.2.4. Fourth Category: Focal activity

During the process of reviewing the literature, the dominant themes of technology adoption and use became apparent. Most of the articles explored adoption of wireless technology or how it was used. Table 3.5 summarizes the articles that address the adoption and / or use of different categories of wireless technology by consumers.

Object of Study	Focal Activity		
	Adoption	Adoption & Use	Use
Mobile phone	34	7	11
PDA / Smartphone	5	2	
MDS			4, 8, 38, 48
Mobile internet / web	1, 7, 26	10	27, 28, 39, 41, 46
Financial transactions	12, 23, 50		56
m-commerce	6, 32		4, 14
Marketing / advertising	9,		
UbiCom	21		
Other	3, 20, 51, 55		

Table 3.5. Articles about adoption and / or use

A large amount of information systems literature has stressed the importance of studying the drivers of technology adoption. An innovation or product will fail unless it finds acceptance among potential users. At the same time, much research seeks to better understand the way in which people use technology. While researchers such as Bhattacharjee (2001) have called attention to the need to understand both adoption and subsequent use, only 3 consumer technology-focused articles within the sample investigate both the adoption and post-adoption use of wireless technology. This suggests that there is a dearth of research that examines both the adoption and subsequent use of wireless technology; providing an opportunity for future research to provide insights into the initial and post-acceptance use of consumer technology.

3.2.5. Fifth Category: Context that Includes Choices

Information systems scholars have called for research to consider real-world situations rather than looking at technology as an isolated phenomenon that can be studied without consideration of the wider context (Blechar et al. 2006; Bouwman and van de Wijngaert 2009; McMaster and Wastell 2005). Similarly, DOI (Rogers 1995) calls for a new innovation to be compared to alternatives when determining whether to use it. The consumer market is an incredibly competitive space. Different technologies and technical standards compete to meet the same needs. Different companies that offer the same technology also compete against each other. As such, the consumer context implies competition (Constantiou 2009). Table 3.6 lists the articles that take into account the existence of alternatives and / or substitutes when research wireless technology for the consumer.

Approximately one-sixth of the articles in the sample touch upon the influence of alternatives and substitutes for wireless consumer technology. The presence of such research indicates its importance; but the low percentage of literature that looks at the competitive consumer context demonstrates the need for a better understanding of consumer wireless technology research that includes the market context of mobile technology.

Object of Study	Technology is Context (Considers Alternatives or Substitutes)
Mobile phone	11, 35, 43
PDA / Smartphone	
MDS	8
Mobile internet / web	7, 27
Financial transactions	12, 56
m-commerce	47
Marketing / advertising	
UbiCom	
Other	

Table 3.6. Articles that factor in the impact of alternatives and/or substitutes

3.2.6. Sixth Category: Time

The literature is dominated by research designs that only capture data at one specific moment of time. In the sample, almost all of the studies used cross-sectional data. Only 4 (7.7%) of the studies employed methods that included a wider time window. Of these articles, Chae and Kim (2003) used time series data drawn from surveys with different participants. Venkatesh and Ramesh (2006) conducted a survey to gauge behavioral intention at T1 and followed up three months later to record actual behavior. Ranganathan (2006) analyzed six months worth of telecom subscriber data to identify consumer churn patterns. Sarker and Wells (2003) look at initial adoption and subsequent usage over a three week period. Three of the articles that cover an expanded timeframe provide a quantitative analysis. Conversely, Sarker and Wells (2003) provide a qualitative analysis of wireless technology. Future studies that employ a longitudinal, qualitative research scheme can help shed new light on this under-researched area of mobile technology.

3.2.7 Seventh Category: Utilitarian and Hedonic Use

My review of the 52 sampled articles found that thirteen articles (25%) include hedonic factors in the research. This indicates the importance of considering hedonic motivation in the research of wireless consumer technology. At the

same time, it suggests that the exploration of hedonic motivation and technology use for pleasure still is under-represented in the literature. With the prevalence of multipurpose devices, such as smartphones and laptops that blur the distinction between tool and toy, it becomes important to include hedonic factors as well as instrumental factors in order to understand the adoption and use of wireless technology.

3.3. Conclusion

In this chapter, I present a review of articles about consumer wireless technology from ten journals within the field of information systems. The analysis of the current literature that addresses wireless consumer technology calls attention to limitations and opportunities within the field. The literature is dominated by TAM and technology-oriented theories; however, there is a strong presence of theory and models from other reference disciplines. This indicates that using theoretical perspectives from other disciplines may be welcomed by IS journals and may make novel and significant contributions to IS research. At the same time, the disparate choice of theory within the consumer wireless literature suggests a scattered field of study that may be made more coherent through the introduction of a theory or model that unites some of the currently-used theories.

The near absence of qualitative research that does not employ a positive stance raises the prospect that a more interpretive approach to research may provide new insights and a different understanding of the technology. At the same time, little research investigates both adoption and subsequent usage, something that I strive to research in this thesis. By engaging in longitudinal, qualitative research I can contribute to filling gaps that currently exist due to the limited use of qualitative techniques and longitudinal studies that examine both the adoption and use. Finally, because only a quarter of current research looks into emotional and other non-instrumental influences on behavior, I can make an incremental contribution by studying of both hedonic and instrumental aspects of wireless technology. In particular, I can conduct inclusive studies that look at

both aspects, a focus I originally set out to investigate as I observed the blurring of those distinctions in the technological world around me.

These areas for further development have been identified and motivate my research choices represented in this thesis. The research questions, theory selection, and methodological choices all serve to fill the gaps. Chapter 4 presents the research questions and the choice of theoretical perspectives and chapter 5 details the philosophical and methodological decisions that I have made in my effort to answer the research questions.

Literature Review Papers

Overview of the papers analyzed. For further information, see reference section.

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
1	(Kim et al. 2007)	Value-based adoption of mobile internet: An empirical investigation	DSS	mobile internet	Y		perceived value, TCV, PT	Y		N	Quant
2	(Wakefield and Whitten 2006)	Mobile computing: a user study on hedonic/utilitarian mobile device usage	EJIS	Blackberry	Y	Y	TAM, cognitive absorption, playfulness	Y		N	Quant
3	(Dickinger et al. 2008)	The role of perceived enjoyment and social norm in the adoption of technology with network externalities	EJIS	Push-to-talk	Y		TAM, perceived enjoyment, social norm	Y		N	mixed
4	(Hong and Tam 2006)	Understanding the adoption of multipurpose information appliances: The case of mobile data services	ISR	MDS	Y		TAM, social influence, service availability, monetary value, enjoyment, uniqueness	Y		N	Quant
5	(Fang et al. 2005)	Moderating effects of task type on wireless technology acceptance	JMIS	PDA	Y		TAM, perceived playfulness, perceived security	Y		N	Quant

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
6	(Sheng et al. 2008)	An Experimental Study on Ubiquitous commerce Adoption: Impact of Personalization and Privacy Concerns	JAIS	u-commerce	Y		personalization, privacy			N	Quant
7	(Venkatesh and Ramesh 2006)	Web and wireless site usability: Understanding differences and modeling use	MISQ	websites (standard & wireless)	Y		TAM, MUG	Y		Y	Quant
8	(Blechar et al. 2006)	Exploring the influence of reference situations and reference pricing on mobile service user behaviour	EJIS	MDS	Y		reference price		Y	N	mixed
9	(Cocosila et al. 2009)	Early Investigation of New Information Technology Acceptance: A Perceived Risk - Motivation Model	CAIS	SMS (Reminders)	Y		risk	Y		N	Quant
10	(Vance et al. 2008)	Examining Trust in Information Technology Artifacts: The Effects of System Quality and Culture	JMIS	mobile websites	Y	Y	trust, eou			N	Exp
11	(Ranganathan et al. 2006)	Switching behavior of mobile users: do users' relational investments and demographics matter?	EJIS	mobile phone (churn)		Y	relationship investment, demographics		Y	N	Quant
12	(Ondrus and Pigneur 2006)	Towards a holistic analysis of mobile payments: A multiple perspectives approach	ECRA	mobile payments	Y		exploratory		Y	N	Qual
13	(van der Heijden 2006)	Mobile decision support for in-store purchase decisions	DSS	smart label reader			effort & accuracy trade-off			N	Exp

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
14	(Lin and Wang 2006)	An examination of the determinants of customer loyalty in mobile commerce contexts	I&M	m-commerce		Y	trust, perceived value, customer satisfaction, habit			N	Quant
15	(Hwang et al. 2007)	A new mobile payment scheme for roaming services	ECRA	mobile payments			algorithm			N	N/A
16	(Junglas et al. 2008)	Task-technology fit for mobile locatable information systems	DSS	PDA with LBS			TTF			N	Exp
17	(Urbaczewski and Koivisto 2008)	The Importance of Cognitive Fit in Mobile Information Systems	CAIS	mobile phone			CFT: Cognitive fit theory			N	Exp
18	(Shim 2005)	Korea's lead in mobile cellular and DMB phone services	CAIS	mobile phone , DMB			N/A			N	N/A
19	(Nickerson 2008)	Whither Wireless? Future Directions in Mobility	CAIS	mobile phone			N/A			N	N/A
20	(Ha et al. 2007)	Determinants of adoption of mobile games under mobile broadband wireless access environment	I&M	mobile games	Y		TAM, flow experience, perceived enjoyment, perceived attractiveness, perceived lower sacrifice	Y		N	Quant
21	(Yoon and Kim 2007)	Convenience and TAM in a ubiquitous computing environment: The case of wireless LAN	ECRA	WLAN	Y		TAM, convenience (time, place, execution)			N	Quant

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
22	(Frydenberg et al. 2005)	Upgrading IT101 with handheld computers	CAIS	Pocket PC with Wifi		Y	anxiety, playfulness, enjoyment, performance	Y		Y	Exp
23	(Luo et al. 2010)	Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services,	DSS	mobile banking	Y		trust, risk, self-efficacy, performance expectancy			N	Quant
24	(Hertzberg 2003)	Payments and banking with mobile personal devices	CACM	mobile payments			N/A			N	N/A
25	(Palen 2002)	Mobile telephony in a connected life	CACM	mobile phone			N/A			N	N/A
26	(Malhotra and Malhotra 2009)	A Relevancy-Based Services View for Driving Adoption of Wireless Web Services in the U.S.	CACM	wireless web services	Y		TAM, flat-rate pricing			N	mixed
27	(Chae and Kim 2003)	What's so different about the mobile Internet?	CACM	mobile internet		Y	risk, synchronous vs asynchronous, low vs. high intensity		Y	Y	Quant
28	(Hong et al. 2006b)	Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet	DSS	mobile internet		Y	TAM, ICT, extended ICT (includes TAM)			N	Quant
29	(Mallat et al. 2004)	Mobile Banking Services	CACM	mobile payments			N/A			N	N/A

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
30	(Sarker and Wells 2003)	Understanding: Mobile Handheld Device Use and Adoption	CACM	mobile phone (data-capable)	Y	Y	Grounded theory			Y	Qual
31	(Yan 2003)	Mobile data communications in China	CACM	MDS			N/A			N	N/A
32	(Lee and Benbasat 2003)	Interface design: for Mobile Commerce	CACM	m-commerce	Y		7Cs of interface design			N	N/A
33	(Venkatesh et al. 2003b)	Understanding usability: in Mobile Commerce	CACM	m-commerce			MUG	Y		N	Quant
34	(Constantiou et al. 2007)	The Four Incremental Steps Toward Advanced Mobile Service Adoption	CACM	mobile phone	Y		DOI			N	Quant
35	(Gebauer and Ginsburg 2009)	Exploring the Black Box of Task-Technology Fit	CACM	mobile phone, PDA, laptop			TTF, technology performance, context-related fit		Y	N	mixed
36	(Waller and Johnston 2009)	Making Ubiquitous Computing Available	CACM	ubiquitous computing (conceptual)			Heidigger's availability			N	N/A
37	(Rondeau 2005)	For mobile applications, branding is experience	CACM	mobile applications (branding)			attractiveness, usefulness, usability			N	Other
38	(Hong et al. 2006a)	Mobile data service fuels the desire for uniqueness	CACM	MDS	Y		uniqueness			N	Quant
39	(Cyr et al. 2006)	Design aesthetics leading to m-loyalty in mobile commerce	I&M	mobile websites		Y	TAM, perceived enjoyment, visual design aesthetics	Y		N	Quant

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
40	(Lu et al. 2009)	A multidimensional and hierarchical model of mobile service quality	ECRA	mobile brokerage service			Service quality, corporate image		Y	N	mixed
41	(Halvey et al. 2006)	Mobile Web Surfing is the SAME as Web Surfing	CACM	WAP portals		Y	Universal Law of Web Surfing			N	Quant
42	(Soh and Tan 2008)	Mobile gaming	CACM	mobile gaming			N/A	Y		N	N/A
43	(Page 2005)	Mobile research strategies for a global market	CACM	mobile phone		Y	contextual research	Y	Y	N	Qual
44	(Hsueh and Chen 2010)	Sharing secure m-coupons for peer-generated targeting via eWOM	ECRA	mobile coupons	N	N	None - conceptual paper			N	N/A
45	(Kim et al. 2010)	An empirical study of customers' perceptions of security and trust in e-payment systems	ECRA	e-payments							
46	(Wu and Wang 2006)	"Development of a tool for selecting mobile shopping site: A customer perspective	ECRA	mobile websites		Y	practical model: merchandise, enabling functions, assurance			N	mixed
47	(Sumita and Zuo 2010)	The impact of mobile access to the internet on information search completion time and customer conversion	ECRA	information search (PC & mobile) - e-commerce		Y	generalized cumulative shock model			N	N/A

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
48	(Lu et al. 2008)	Determinants of accepting wireless mobile data services in China,	I&M	MDS	Y		TAM, personal innovativeness facilitating conditions, social influences, trust, security, privacy, reliability, functionality, interface			N	Quant
49	(Kwon et al. 2006)	ubiES: Applying ubiquitous computing technologies to an expert system for context-aware proactive services	ECRA	PDA & context-aware shopping DSS			ubiES (mobility, invisibility, nomadicity, embeddedness, proactiveness, portability). Propose new model: CKDD (context-knowledge-dialogue-data)			N	Other

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
50	(Schierz et al. 2010)	Understanding consumer acceptance of mobile payment services: An empirical analysis	ECRA	mobile payments	Y		TAM, perceived security, perceived compatibility, subjective norm, individual mobility, attitude			N	Quant
51	(Pramatari and Theotokis 2009)	Consumer acceptance of RFID-enabled services: a model of multiple attitudes, perceived system characteristics and individual traits	EJIS	RFID / dynamic pricing	Y		attitude, effort expectancy, technology anxiety, privacy concern			N	Quant
52	(Okazaki 2006)	What do we know about mobile Internet adopters? A cluster analysis,	I&M	mobile internet (on phone)	Y		cluster analysis of demographics			N	Quant
53	(Choi et al. 2007)	Contribution to Quality of Life: A New Outcome Variable for Mobile Data Service	JAIS	MDS			Maslow, bottom-up spillover theory	Y		N	mixed
54	(Scharl et al. 2005b)	Diffusion and success factors of mobile marketing	ECRA	SMS marketing			TAM/exploratory research (TAM constructs are part of emergent model)			N	mixed

ID	Author and year	Title	Journal	Study Object	Adoption	Use	Theory	Hedonic	Among choices	Over time	Method
55	(Turel et al. 2010)	User acceptance of hedonic digital artifacts: A theory of consumption values perspective.	I&M	Mobile ringtones	Y		Theory of Consumption Values	Y		N	Quant
56	(Mallat et al. 2009)	The impact of use context on mobile services acceptance: The case of mobile ticketing	I&M	Mobile ticketing		Y	TAM, DOI		Y	N	Quant

Table 3.7 Literature review papers

4. Research Questions and Theoretical Positioning

In my search for answers, I committed myself to the DREAMS project and ventured to a far away land. I prepared myself for my quest by familiarizing myself with the technological aspects of wireless and by learning the macro-level trends within the market. I studied the work of those scholars who precede me, and now I face the crossroad of how to proceed on my quest.

While the existing literature contributes to the understanding of why consumers use a given wireless technology when they have so many options to choose from, gaps remain in our understanding of the process by which consumers decide whether or not to use mobile technology. Questions remain about the limited research that addresses technology decisions in context of a wireless landscape that includes alternative and substitute choices.

Therefore, in section 4.1, I propose questions that will narrow my research from a broad inquiry to more specific questions that will guide my search for answers to why consumers use a given wireless technology when they have so many options to choose from. These questions arise from the dearth of research that covers both adoption and use, the limited study of hedonic factors relating to consumer choices, and the limited amount of extant literature that considers alternatives and substitutes in the decision process. Because my research focuses on consumer ICT, I am going to view the use of wireless technology as consumption of the artifact and/or wireless service. In section 4.2, I discuss the need for alternative theoretical perspectives while keeping in mind that such theories should help unify the scattered theoretical approaches to consumer wireless research rather than increasing the entropy of consumer wireless research. In order to gain fresh insights, I propose employing two theories that I borrow from other disciplines.

4.1 Research Questions

In real-world situations, consumers make both the decision to buy or try something new as well as the decision whether to use something they already

have in a given situation. Studying adoption provides an essential, but incomplete understanding of consumer technology appropriation. Likewise, investigating technology use yields useful insights but does not consider the factors that initially get the technology into the hands of the consumer, ignoring a critical piece of the technology appropriation puzzle. Very few studies examine both the initial adoption as well as the subsequent use of consumer wireless technology.

Of the three studies in the literature review that look at both adoption and use (consumption), none make the distinction a focal point of the study, nor do they analyze the differences between the initial acceptance and later use. Vance et al. (2008), for example, conduct an experiment to understand how trust effects m-commerce use. They do not distinguish between post-adoption usage intention and the intention to adopt after the initial experimental trial. While the concepts in the paper can apply to both adoption and use, the paper can be classified as an adoption-only study as indicated by the authors' discussion: "The results of our analysis confirm that the extent to which trust (or lack of trust) in the IT artifact manifests itself will likely affect the users' intention to adopt the IT artifact."

Wakefield and Whitten (2006) study the use of an m-commerce site, but the participant sample has not adopted it. The study is about how they *will* use it and the drivers of that *anticipated* use. As such, the article is about adoption rather than use or the combined perspective. Venkatesh and Ramesh (2006) investigate post-trial mobile website use by looking at whether participants adopt or abandon the websites after the initial experience, how they use travel sites, and how usability affects their decisions.

Of the three articles that span adoption and use, none focus on adoption and use as distinct concepts; and two are adoption-centric and could be arguably be reclassified as adoption articles. Such a reclassification would result in 2% of the literature surveyed addressing both adoption and use. So, *why do consumers use a given wireless technology when they have so many options to choose from?* Because I have a stronger foundation upon which to shape my research

then when I began my PhD, I am able to address more specific research questions that will provide more particular insights than the more general purpose that motivated my PhD investigation: to provide an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology. To provide insight that views technology use as decisions about both adoption and consumption of an experiential good, I will use the following, more specific, research questions will guide my research:

RQ1: How do consumers decide to adopt a wireless technology?

RQ2: How do consumers decide whether to consume a wireless technology?

While viewing technology use from both an adoption and consumption perspective, the purpose of my participation in the DREAMS project is to investigate why consumers choose a given technology over another. The existing literature provides some insight into the consumer context that includes multiple choice sets. In the sampled literature, Page (2005) finds that the way in which people use mobile services depends on the variety of technologies available to them. Gebauer and Ginsberg (2009) find that how well a mobile technology fits with the task at hand plays a part in determining the user preferences. Chae and Kim (2003) find that the preference for mobile shopping over traditional e-commerce for low-risk commodity items like books, but will use personal computers for shopping for other products. Ondrus and Pigneur (2006) examine payment solutions and compare payment cards, mobile phones, and other payment methods and find that the mobile phone-based solutions do not perform well in the market -- using them presents too many challenges compared with other payment solutions. Rangathan et al. (2006) investigate user choice of cellular service provider and find that the level of service usage and length of time with the current provider influence the decision whether to switch providers. Blechar et. al (2006) find that people compare new mobile phone-based data services to computer-based internet services when deciding whether or not to use advanced mobile services. Venkatesh and Ramesh (2006) compare mobile and computer websites and found that emotional factors play a

smaller role in the use of wireless sites than conventional sites. The literature establishes that the consumer choice context is important and creates a solid foundation for further research, but it does not provide a generalized understanding or theoretical perspective that can be applied to the broad category of consumer wireless technology.

While the literature addresses consumer wireless technology choice, the market is ever-evolving, and much of the research is specific to the focal object and not necessarily generalizable to broader decisions within the consumer wireless context. To gain insight into smartphones and mobile broadband for the laptop; as well as to provide a more general understanding of how consumers make technology choice decisions when they are confronted with multiple options, I will use the following questions to guide my research:

RQ3: In situations of choice, how do users decide to adopt one technology over another?

RQ4: In situations of choice, how do users decide to consume one technology over another?

These four questions provide a multidimensional approach to understanding why consumers use a given wireless technology when they have so many options to choose from. The questions examine two dimensions: 1) initial adoption and consumption, and 2) whether the technology was studied in isolation or a context that included multiple choices. Table 4.1 reiterates these dimensions of technology usage decisions.

	Technology in isolation	Technology in context
Consumption	Explores the values that drive consumption behavior of a wireless technology by focusing on the technology under investigation.	Explores the drivers of consumption by focusing not only on the technology or service, but on the context around the use. This consideration looks at what gives the focal technology greater value than alternative technologies that are available to the user. Focuses on decisions in situations of choice.
Adoption	Explores the values that drive the adoption (initial appropriation / use) of a specific ICT by focusing on the technology under investigation.	Explores the drivers of adoption (initial appropriation / use) by focusing not only on the technology or service, but on the context around the use. This consideration looks at what gives the focal technology greater value than alternative technologies that are available to the user. Focuses on decisions in situations of choice.

Table 4.1. Dimensions of technology usage decisions

Each of the four research questions addresses one of the dimensions of consumer technology choice. (See Table 4.2.)

	Technology in isolation	Technology in context
Consumption	RQ2: How do consumers decide whether to consume a wireless technology?	RQ4: In situations of choice, how do users decide to consume one technology over another?
Adoption	RQ1: How do consumers decide to adopt a wireless technology?	RQ3: In situations of choice, how do users decide to adopt one technology over another?

Table 4.2. Research questions

4.2 Theoretical Perspectives

In this subsection, I discuss the current information systems perspectives that were uncovered during the Chapter 3 literature review. While the theories and models provide useful tools for understanding the topic, they are not the most appropriate theories for answering my research questions. Therefore, in sections 4.2.2 and 4.2.3 I propose the theory of consumption values (Sheth et al. 1991a; 1991b) and behavioral economics respectively as theoretical lenses to employ in the search for answers to my research questions.

4.2.1 Current Perspectives

The search for the answer to why consumers use a given wireless technology when they have so many options to choose from leads to four research questions. In order to search for answers to these research questions, I need a sound theoretical perspective that will guide my research. My review of the extant literature presented in Chapter 3 suggests that the study of consumer wireless technology lacks a coherent approach that can provide a shared understanding of the phenomena in the different studies. A significant research contribution can be made through the use of a perspective that can provide new insights while incorporating or consolidating the scattered theoretical approaches. At the same time, the choice of theory should fill knowledge gaps revealed during the literature review, lest it imitate prior research and therefore be limited to a small incremental contribution. Because consumer technology use includes both initial acceptance and later consumption, a theory must be applicable to both dimensions of use. Not only will the broad applicability help capture the realities of the consumer choice decision, it will be able to answer the research questions driving this thesis while filling a pronounced gap in the literature. Because consumer decisions involve both instrumental and hedonic motivation, the selected theory must include both functional and emotional considerations. By applying a theory that includes non-utilitarian drivers of decisions, the selected theoretical perspective can help reduce the current gap in including hedonic factors in consumer wireless technology research.

The majority of the papers in the literature review use theories within the information systems tradition. Of the theories, Microsoft Usability Guidelines (Nielsen 1999) and the 7Cs of Interface Design (Lee and Benbasat 2003) relate to device design and the Universal Law of Web Surfing is specific to one activity (Huberman et al. 1998). The other theories more widely applicable theories, TAM, DOI, UTAUT, and TTF can provide useful analysis of why consumers use a given wireless technology.

The Technology Acceptance Model is the most widely used approach to investigate consumer wireless technology. The model originated within a workplace environment as a tool to predict whether office workers would voluntarily begin using graphing software or electronic mail. TAM posits that the acceptance of new technology is predicated by two constructs, perceived usefulness, which is “the degree to which as person believes that using a particular system would enhance his or her job performance,” and perceived ease of use, which is “the degree to which a particular system would be free of effort” (Davis 1989). TAM provides a parsimonious and easy-to-understand method for predicting technology acceptance. Researchers effectively leveraged these strengths and applied the model to many situations and many technologies. A Google Scholar search (08 Jan 2011) indicates that the model has been cited in 8590 articles, attesting to the model’s power and significant contribution to our understanding of technology adoption. As the literature review presented in chapter 3 indicates, TAM has moved from its office-centric origins and is being applied to the adoption of consumer technology through extensions that make the model more relevant to consumer technology. The UTAUT (Venkatesh et al. 2003a) uses four criteria to predict technology adoption: performance expectancy, or the degree to which a potential adopter believes a technology will improve job performance; effort expectancy, which is the perceived ease-of-use; social influence, which is the perception that “important others” want the decision-maker to use the technology; and facilitating conditions, which represent a person’s belief that the organization will support his or her use of the new technology. Similar to TAM, UTAUT’s principal focus is on workplace technology. Despite the contributions these

theories have made, an approach designed specifically to investigate consumer decisions may be more appropriate for my research than ones designed around job performance. Additionally, TAM and UTAUT are designed to evaluate one technology at a time (McMaster and Wastell 2005), whereas my thesis focuses on a consumer context that potentially includes multiple choices.

The diffusion of innovations theory (DOI) (Rogers 1962; 1995) takes into account many different factors, including the existence of the choices that existed prior to the new innovation. DOI has been used effectively in virtually countless studies and continues to make a strong contribution to research within many disciplines (30,798 citations per Google Scholar on 06 January 2011). The theory focuses on the utility of an innovation and the characteristics of the person adopting it. It includes considerations such as the relative advantage of a new innovation over existing tools, ease of use (complexity), how the new option matches the needs and values of the potential user, the ability to observe others using it and form vicarious impressions, and the ability to try a new technology before committing to it.

Task-technology fit (TTF) (Goodhue 1995) is used in two of the reviewed articles (Gebauer and Ginsburg 2009; Junglas et al. 2008) and takes into account the specific attributes of the IT artifact. The theory argues that the “fit” between the task to be completed and a given technology determines whether the technology will be used.

Table 4.3 compares compares the key concepts of influential theories used in ICT research. While the list is far from exhaustive, it presents a summary of the most influential theories.

While the lexicon of theories used within IS research have contributed greatly to the understanding of adoption and post-adoption usage, the multi-purpose, open-ended, always available nature of modern wireless technology warrants an alternative approach. Today’s technology landscape is filled with choices. For most tasks, there are multiple ICT choices that can be used to complete the task. With the exception of DOI’s consideration of how a new innovation offers an

Theory	Decision Drivers	Explanation
Diffusion of Innovations (DOI) (Rogers 1962) (Rogers 1995)	Relative advantage	Perception that an innovation is better than the currently used technology.
	Complexity (ease of use)	Perceived difficulty in using an innovation
	Compatibility	How consistently a new technology matches the needs, values, and experiences of the potential user.
	Trialability	Ability to experiment with an innovation before fully committing to it.
	Observability	Degree to which a potential adopter can see others using the technology and thus the ability to vicariously evaluate it
Technology Acceptance Model (TAM) (Davis 1989)	Perceived usefulness	The degree to which a person believes a technology will improve job performance
	Perceived ease-of-use	The perceived effortlessness of using a new technology.
Unified Theory of Acceptance and Use of Technology (UTUAT) (Venkatesh et al. 2003a)	Performance expectancy	Degree potential adopter believes the technology will improve job performance
	Effort expectancy	Perceived easiness of using the new technology
	Social Influence	Perceived desire of "important others" (p. 451) for the potential adopter to use the new technology
	Facilitating conditions	Perceived organizational ability to support the use of the new technology.
Task-technology fit (Goodhue 1995)	Fit	Appropriateness of the technology for performing a given task

Table 4.3. Influential theories for studying technology adoption and use

advantage relative to the one currently in use, the theories do not account for the availability of alternatives and substitutes. Even task-technology fit, which evaluates the suitability of a technology for a given task, was not designed as a comparative evaluation of whether one technology is a better fit than another.

In the modern ICT landscape, it remains important to understand what makes a technology desirable for a task; however, given the plethora of choices and competing technologies, research must consider context (McMaster and Wastell 2005). In the case of wireless technology, studies must not only consider whether a technology is desirable to users, but also to explore whether it is more desirable than other ICT in a given context because competing wireless and non-wireless technology will most likely be part of the choice set. By researching the choice among technologies, this thesis helps fill this gap and answers calls to look at technology acceptance decisions in context rather than in isolation (Looney et al. 2008; Mallat 2007; McMaster and Wastell 2005; Venkatesh 2006).

Besides acknowledging and accounting for a complex market in which multiple technologies can fulfill similar needs, consumer IT includes supports both utilitarian and hedonic usage. With the prevalence of multipurpose devices, such as smartphones and laptops, that blur the distinction between tool and toy, it becomes important to include hedonic factors as well as instrumental factors in order to understand the adoption and use of wireless technology. Scholars have called for the inclusion of hedonic drivers in ICT adoption (Bagozzi 2007; Magni et al. 2010; Van der Heijden 2004; Venkatesh and Brown 2001), drawing upon the work of Hirschman and Holbrook (1982), who argue that emotive aspects of product usage should be considered in order to get a true understanding of the consumer behavior. My review of consumer wireless literature review includes articles that include both instrumental and hedonic considerations, e.g. (Dickinger et al. 2008; Hong et al. 2008; Wakefield and Whitten 2006), an approach to research that I believe will be necessary to emulate as I seek answers to my research questions.

The extant literature on consumer wireless technology is scattered and uses a variety of theories from the IS tradition as well as many borrowed from other traditions. In my search for the most appropriate theoretical perspective(s) to investigate my research questions, I want to do as much as I can to keep from further scattering the field. As such, I will try to follow Bagozzi's (2007) advice that new perspectives should provide a unifying approach that brings together many elements already used in existing research. In order to answer my research questions, my theoretical choices must enable me to consider decision making in a consumer context that includes multiple choices and it must look at both instrumental and hedonic factors that influence the decision process. In order to answer my research questions, I will apply the theory of consumption values (TCV) (Sheth et al. 1991a; 1991b) and behavioral economics. I have chosen to employ two perspectives because TCV specifically looks at consumer choice decisions; while behavioral economics specifically looks at how people decide among choices. Therefore, I propose TCV to answer RQ1 and RQ2 by determining the value of adopting or consumer a wireless technology, and I propose that behavioral economics be used to investigate RQ3 and RQ4, which look specifically at making decisions among alternatives. Taken together, the theories can provide insight into why consumers use a given wireless technology when they have so many options to choose from. I will go into more detail about my selection of these theories and explain the principles of both theories in sections 4.2.2 and 4.2.3

4.2.2. Theory of Consumption Values

The theory of consumption values (TCV) (Sheth et al. 1991a; 1991b) offers a tool for researching consumer wireless technology. It includes many of the concepts that underlie the disparate perspectives currently employed within IS adoption and use research. TAM is based on the theory of reasoned action (TRA) (Fishbein and Ajzen 1975) and UTAUT is partially based on TAM, TRA, and DOI. Sheth et al. (1991a; 1991b) proposed TCV to integrate different consumption models and frameworks, including both the TRA and DOI. By capturing elements represented in TAM, TRA, UTAUT, and DOI, the TCV

incorporates the foundational concepts of the dominant IS adoption traditions while at the same time offering a new perspective to understand technology acceptance and use. It also includes conditional value based on the fit between task and the object of choice, similar to task-technology fit. TCV also explicitly incorporates the work of Hirschman and Holbrook (1982) that inspired IS scholars to call for the consideration of hedonic motivations; and it includes social and emotional constructs that were called for by Bagozzi (2007). The theory argues that decisions are made based on perceived value, thus incorporating value, a theoretical concept used by wireless researchers such as Kim et al. (2007) and Lin and Wang (2006). Finally, TCV has been used for many kinds of purchase decisions as well as abstract decision processes such as voting choices and church attendance (Sheth et al. 1991a). The theory was designed specifically for the use of practitioners to understand specific factors that drive consumer decisions and so that they can develop actionable strategies. Therefore, using a practice-focused theory such as TCV provides a analytical lens designed to address real market conditions.

Consumption values address extrinsic and intrinsic reasons and motives that drive decisions such as to buy or not to buy; and they help form the cornerstone of consumer research. A number of models, frameworks and theories have emerged that explain and describe consumer choices, including TCV (Sheth et al. 1991a; 1991b), experiential value (Mathwick et al. 2001) and the Holbrook value typology (Holbrook 2006). In the past, consumers were considered rational economic decision-makers who process information in order to maximize value (Sheth 1979), and consumer value was primarily conceptualized as a trade-off between price and quality (Holbrook 2006). In the early 1980s, however, researchers began to question the assumption of the economically rational person and the belief that consumers evaluate purchase and usage decisions with a calculator-like approach (Holbrook 2006). Holbrook and Hirschman (Holbrook and Hirschman 1982) proposed the experiential approach and introduced new concepts such as feelings, fantasies and fun (Holbrook 2006). Since its introduction, consumer research has evolved from simplistic assumptions about the consumer decision process to embrace more

complex motivation that includes both intrinsic and extrinsic values (Holbrook 2005; 2006). The TCV is based on the synthesis of literature from many research traditions. It includes five different types of values that underlie consumer choice, providing an encompassing understanding of the consumer experience. According to the theory, a particular choice may be determined by one value or influenced by several values. The values are as follows:

(1) *Functional value* stems from an alternative's perceived utility for accomplishing a specified task or achieving a practical goal. It follows economic utility theory and assumes economic rationalism (the trade-off between cost and performance). Consumer decisions to buy or use a product or service are based on the attributes of the focal object and how well they fulfill the consumers' utilitarian needs. For example, someone may use the web browser on a mobile phone to check movie listings. In this instance, the goal is to see a film and the phone is means for the consumer to achieve that end.

(2) *Social value* involves highly visible products and services or objects to be shared with others (such as gifts). According to the theory, such an item may be chosen more for the perceived social image it conveys than for functional performance. Essentially, social value is derived from the symbolic importance of an artifact. Consider someone who waits in line all night to be the first to get an iPad so that he will be held in high regard by his friends as a tech savvy trendsetter.

(3) *Epistemic value* applies when consuming or experiencing new products or services, such as buying a new computer or mobile phone. Epistemic value stems from curiosity, the desire to learn, or the urge to experiment with something new. For instance, beta testers of the new Google netbooks running Chrome OS volunteer because they want to experience something novel.

(4) *Emotional value* influences decisions because of a product's potential to arouse emotions that are believed to accompany the use of a product. Aesthetics, such as beauty and artistry, can add emotional value to a product. A traveling businessperson may derive emotional value from a mobile device that

enables her to experience the joy of reading bedtime stories to her children when she is away.

(5) *Conditional value* applies to products or services of which the value is strongly tied to use in a specific context. A temporary functional or social value arises when the circumstances create a need. For example, a 2G CDMA phone may provide functional value in the United States, but it will offer no value in EU countries that use the incompatible GSM standard.

According to TCV, the five values make differential contributions to the decision process. The weight of each value can be different, and not all values will drive every decision. See Figure 4.1 for an overview of the five values.

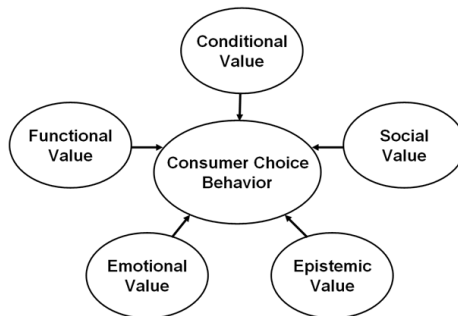


Figure 4.1. Theory of consumption values (Sheth et al. 1991a; 1991b)

The application of TCV has been demonstrated in technology decisions. An early technological application from Alpert (1994) appeared in marketing literature and analyzed the decline in value of software over time. At present, TCV's appearance within information systems literature is limited, appearing as non-focal arguments (Kim et al. 2008; Kim et al. 2007), or else selected values have been used to research internet banking (Ho and Ko 2008) and ringtones as hedonic IT artifacts (Turel et al. 2010). To my knowledge, the first applications of the full theory within IS literature appear in the papers presented in Part II of this dissertation.

While TCV provides a useful tool for understanding consumer behavior and how users determine the value of a technology, a fundamental part of my PhD research examines how decisions are made in the presence of multiple choices. Therefore, while TCV provides a framework for answering RQ1 and RQ2, I will also employ a theory specifically designed to understand how people make decisions when presented with choices in order to answer RQ3 and RQ4.

4.2.3. Behavioral Economics

This section introduces several concepts from behavioral economics that explain the way people process information in order to decide among various choices. The behavioral economics tradition includes various preferences and biases that result in suboptimal and potentially irrational decision-making. The goal of behavioral economics is to understand the decision process as it is made by real people in real situations.

In addition to providing a theoretical tool for understanding why consumers use a given wireless technology when they have so many options to choose from, prospect theory addresses uncertainty and risk, aspects of the decision process explored by several articles in the literature review. Chae and Kim (2003), Cocsila and Archer (2009), and Luo et al. (2010) study the influence risk has on consumer decisions to adopt or to consumer wireless technology; while Lin and Wang (2006) and Vance et al. (2008) investigate the role trust, which reduces the perception of risk, plays in the consumer choice process.

Risk and uncertainty arise because people cannot gather or analyze every bit of information. As a result, people innately simplify the decision process and seek satisfactory, but not necessarily optimal solutions. Building on this concept of Bounded Rationality (Simon 1955), Kahneman and Tversky (1979) proposed prospect theory, a behavioral economics approach to decision-making in the presence of choices and risks. They argue that decisions are not made in isolation, but that decision outcomes are contingent upon comparisons to a referent. People judge value by gains or losses relative to a reference point, not in terms of absolute monetary value (Kahneman and Tversky 1979). For

example, people perceive a €5 price change on a €25 item as greater than a €5 change on a €100 item, even though the differences have the same absolute financial value (Thaler 1980). The way in which people process information is irrational and cannot be separated from its context (Kahneman 2003). A choice becomes acceptable when the value of its advantages is greater than the value of the disadvantages (Kahneman and Tversky 2000). The differences, however, are not only relative but they are unequally weighted: people irrationally place more emphasis on losses than gains. This unequal evaluation of outcomes creates loss aversion among decision makers (Kahneman et al. 1986; Kahneman et al. 1991; Kahneman and Tversky 1979; Kahneman and Tversky 2000).

The desire to avoid losses results in a phenomenon in which, when faced with a likely loss, people will actually make higher-risk decisions and, ironically, become risk-seeking. For example, when people face the 100% prospect of an €800 loss (an €800 weighted loss), people often will prefer an alternative that offers an 85% chance of losing €1000 (an €850 weighted loss). This irrational preference results from the desire to reduce the certainty of loss with the hope that they will return to their initial position (Kahneman and Tversky 1979; 2000). Such risk-seeking behavior can be observed during instances of IT escalation. When a large amount of resources have been expended on an unsuccessful project, the best decision is to abandon the problem. However, in many instances managers will escalate the project by committing more resources in an attempt to make it successful. Rather than accepting current losses (which would be 100% likely), the managers risk additional resources for the prospect that they can salvage the process and avoid the loss. Such irrational decisions often lead to increased losses on the project (Keil et al. 2000).

Decision making usually involves constructive preferences, or determining preferences when presented with a choice rather than drawing upon a priori preferences. Because preferences are determined when confronted with a choice, the context and the framing of the choice affect the decision (Bettman et al. 1998; Tversky and Simonson 1993). The point of reference is usually based

on the decision-maker's current position (Tversky and Kahneman 1991). Decisions are often made without exhaustive thought (Kahneman 2003), and part of the decision-making process is to maximize the ease of justifying a decision (Bettman et al. 1998). When comparing choices against a reference point, people disregard shared traits and focus on the salient differences value (Kahneman et al. 1991).

Thaler (1999) builds upon the analogical reasoning of prospect theory to include transaction value, which is the price of an option relative to a referent. If a price is lower than the chosen point of reference, it is a good value; if it is higher than the referent, then it is a poor value. Therefore, reference pricing, or the comparison of the cost of a choice to an established price, plays a material role in decision making (Thaler 1999). Out-of-pocket expenses are viewed as losses and opportunity costs are viewed as foregone gains, making people prone to consider a price higher than the referent (loss) more heavily than the additional benefit received (gain) when making decisions (Kahneman et al. 1991; Thaler 1980). Accordingly, willingness to pay is based on whether a price is lower or higher than the reference price (Tversky and Simonson 1993).

Consumers use "mental accounting" to frame purchasing decisions by assigning them to an expense category. They use these mental distinctions as a frame of reference to measure changes to reference prices. Decisions about which category, and whether to combine categories, impact the perceived value of the choice. Loss aversion strongly influences how people organize financial transactions in their mind. People favor mental accounting practices that minimize cognitive effort (Thaler 1999). Ambiguity adds more potential choices to the choice process, which complicates decision making (Fox and Tversky 1995). People do not want to continually make cost-benefit calculations, which leads to a preference for payment options that eliminate the need for subsequent decision-making (Thaler 1980). Accordingly, "consumers don't like the experience of having the meter running. This contributes to what has been called the 'flat rate bias' in telecommunications. Most telephone customers elect a flat rate service even though paying by the call would cost them less" (Thaler

1999). The convenience of flat rate plans enables consumers to avoid the “taxi meter effect,” which requires constant attention to variable expenses. Additionally, flat rate plans take the risk out of service usage. Although the customers could potentially save money by paying for actual uses, the potential gain is valued less than the perceived loss that may occur by going over-budget (Lambrecht and Skiera 2006).

Status quo bias refers to the tendency of people to stay with the current state unless there are strong forces which oppose staying with the present (Kahneman et al. 1991; Kahneman and Tversky 1979; Samuelson and Zeckhauser 1988; Thaler 1980). This bias has been shown to impact decisions, such as the propensity for people to accept default website and software settings rather than changing them to match their preferences (Goldstein et al. 2008). Because preference construction is contingent on the framing of the problem, the method of elicitation, and the context of the choice; contrast effects play a strong role in decision making by influencing the reference point that is used to gauge value. Since losses loom larger than corresponding gains, loss aversion suggests that disadvantages are more salient than advantages (Tversky and Simonson 1993). In an identical situation, a different decision can be reached depending on whether the choice is framed to indicate a gain or a loss (Kahneman 2003). Perception is reference-dependent and people notice and evaluate changes as percentages rather than the whole value, creating a phenomenon in which people assign a higher value to something that they view as theirs to be lost; while they assign a lower value to something they see as a gain. Take for example the person who is unwilling to pay more than \$200 for a new mobile phone yet is unwilling to sell the same model phone he already owns for \$250. The loss aversion associated with this “endowment effect” contributes to status quo bias (Kahneman et al. 1991). Samuelson and Zeckhauser (1988) found that status-quo bias not only plays a material part in decision making, but that the bias increases with the number of alternatives within the choice set. The more choices must be evaluated, the more mental effort must be used to make the decision. Deciding to remain in the current position reduces the need to evaluate other options, and thus reduces the transaction costs involved with decision-

making. Uncertainty about a new alternative, combined with potential losses being more salient than potential gains, also contributes to the likelihood of avoiding change. As such, people often avoid making a choice. Often they do not want to know that alternatives are available because the mere knowledge of alternatives creates decision-making costs (Thaler 1980). This results in less search than would lead to optimal decisions (Samuelson and Zeckhauser 1988).

In the purchase decision process, acquisition utility refers to the value of a good or service and transaction utility refers to the difference between the reference price and the price paid (Thaler 1999). People determine value through an accuracy-effort approach in which they base their decisions on a compromise between accuracy and minimizing the mental effort needed to make the decision (Bettman et al. 1998). People evaluate different choices by the expectations of subjective value (with losses looming larger than gains and a status-quo bias) of the outcome. As such, options become acceptable if the perceived advantages outweigh the perceived disadvantages relative to the referent (Kahneman 2003; Kahneman and Tversky 1979). Contrast effects play a vital role in determining relative value. Contrast effects cause something to appear attractive when compared to a less attractive product or to appear unattractive against a background of a more attractive alternative (Kahneman 2003; Tversky and Simonson 1993). The assessment of whether something is better or worse is carried out quickly (Kahneman 2003). People disregard common attributes of choices and consider the more salient differences. They edit the choice set by creating simplified representations of the competing choices then make an evaluation based on the simplified prospects. Decision makers then choose the option with the highest value relative to the other choices (Kahneman and Tversky 1979).

Behavioral economics concepts have been applied to adoption research within the information systems domain; however, its use is in its infancy within the IS discipline. Few articles use these theoretical concepts to investigate consumer technology. Blechar et al. (2006) examine how the reference technology of PC-based internet weakens the likelihood that consumers will adopt mobile data

services. Kim et al. (2007) argue that the perceived value of mobile internet is based on perceived gains and losses relative to a reference point. Constantiou (2009) studies the role reference points play in the adoption of telecommunications services.

4.3 Summary

The unique characteristics of consumer wireless technology, namely its multi-purpose, open-ended, and always available nature, motivate me to employ alternative theoretical approaches to understand the process by which people decide to use technology. By using behavioral economics to answer RQ3 and RQ4 and employing TCV to answer RQ1 and RQ2, I should be able to answer the research question that motivates my thesis: why do consumers use a given wireless technology when they have so many options to choose from?

5. Methodology

Up until this point, my PhD journey has been based on studying existing knowledge and insights. But for me to provide new insights into why consumers use a given wireless technology when they have so many options to choose from, I must conduct original primary research. As I set out to gather original data, I must make methodological choices regarding the best way for me to answer my four research questions:

RQ1: How do consumers decide to adopt a wireless technology?

RQ2: How do consumers decide whether to consume a wireless technology?

RQ3: In situations of choice, how do users decide to adopt one technology over another?

RQ4: In situations of choice, how do users decide to consume one technology over another?

In this chapter, I will discuss the philosophical beliefs that influence my approach to research, provide an overview of the DREAMS project, detail the reasons I decided to focus on qualitative methods to answer my research questions, and why I decided that my thesis would include a longitudinal component. I also revisit the two field studies detailed in the papers comprising Part II of my thesis, using the advantage of hindsight to reflect upon the methodological decisions I made during my fellowship with the DREAMS project.

5.1 Philosophical Approach

While researchers may attempt to be as objective as possible, our research will always be subject to various biases. As human beings, we researchers have our beliefs and ways of interpreting the data. The rules guiding our research and chosen techniques are embedded with background beliefs and assumptions (Kuhn 1996). Because social science research is inherently laden with values, it becomes important for researchers to identify the philosophical views that

underlie their approach to research (Mingers 2001). I believe it is imperative for me to reflect upon my own philosophical beliefs and to disclose them to those reading this thesis. Only by knowing my view of the world and of science, can others truly understand my PhD adventure.

In this dissertation I explore the way people make decisions; therefore, the study falls within the social sciences domain. Because social science differs from natural sciences, it faces specific types of limitations because it cannot be as highly controlled as natural science (Mingers 2004; Pather and Remenyi 2004). My research examines the process by which people form attitudes that they use to make decisions. Because attitude formation is inherently unobservable (Morgan 1997), a positivist approach that relies on the recording of observable events (Hirschheim 1985) is not appropriate for this study.

While positivism dominates information systems research (Carlsson 2005; Goles and Hirschheim 2000), interpretive research has been gaining acceptance within the discipline (Walsham 1995; Walsham 2006). According to Burrell and Morgan (1979), the philosophical differences between these two paradigms are incommensurable – both ontologically and epistemologically. Philosophically, I do not see the world as offering only a binary choice between purely objective and wholly subjective reality. Therefore, I believe that critical realism (CR), a relatively new philosophical approach introduced by Bhaskar (1975), can bridge gap between the positivist and interpretivist paradigms (Pathar and Remenyi 2004).

Critical realism recognizes both the reality of the natural world and the events within the social world (Wikgren 2004). CR asserts that there is an objective natural and objective social world (Smith 2006) in which reality exists independent of human observation and interpretation (Dobson 2001). It takes a realist ontological position, similar to positivism. At the same time, CR accepts that knowledge is relative and socially conditioned, similar to interpretivism (Mingers 2004; Smith 2006). CR defends the possibility to explain causality (Wikgren 2004) and takes unexplained observable events and proposes hypothetical mechanisms as possible causes of the phenomena (Mingers 2004).

Like positivists, critical realists acknowledge the existence of an objective reality that is external to people's perception of it (Goles and Hirschheim 2000). Unlike positivism, which believes that the researcher can be objective and results are replicable (Pather and Remenyi 2004), CR acknowledges that observation is fallible (Pather and Remenyi 2004) and value-laden (Dobson 2002). CR also recognizes that researchers face difficulties isolating values from facts (Carlsson 2005). Critical realism shares a belief in the ability to generalize, but CR views generalization as the abstraction of a tendency rather than replication of events in different contexts. Consequently, CR identifies tendencies rather than makes predictions (Dobson 2002). While identifying tendencies falls outside the philosophical constraints of interpretivism, CR shares with interpretivism the primary goal of explaining and an aversion to prediction (Dobson 2001; Pather and Remenyi 2004).

Critical realists are concerned with identifying causal mechanisms that capture answers to the underlying question of "why" events occur (Smith 2006; Wikgren 2004). In order to explain why events transpire, critical realists hypothesize structures and mechanisms that shape observable events (Pather and Remenyi 2004). Helping to bridge the philosophical divide between positivism and interpretivism, critical realism tempers the interpretivist belief that things only can be explained based on an individual's subjective beliefs (Mingers 2004). CR allows an interpretivist agenda by focusing on meanings, interpretation, and context as causal influences without rejecting the independent existence of the object of study (Smith 2006).

Unlike the nominalism-interpretive and realism-positivism philosophical paradigms identified by Burrell and Morgan (1979), critical realism decouples ontology from epistemology (Wikgren 2004). The structures and generative mechanisms that objectively exist in the world are separate from the events that they produce (Smith 2006). Philosophically, critical realism prioritizes ontological assumptions over epistemological beliefs (Dobson 2001). Critical realists place more emphasis on explaining what the world must be like in order to generate a specific event or action than it places on questioning how people

acquire knowledge. CR takes the philosophical position of ontological realism and epistemic relativism (Smith 2006) by adopting the position that our knowledge of reality is a result of social conditioning and cannot be isolated from the people involved in the knowledge sense-making process (Dobson 2002).

The critical realism ontology stratifies reality into three domains: real, actual, and empirical (Dobson 2001). The *real* is what exists. These are the mechanisms that produce patterns of events. At the same time, these mechanisms are independent of the events they cause. The *actual* consists of events and behaviors. The *empirical* domain consists of what we observe and experience (Carlsson 2005). According to this ontological stratification, the *real* includes all of reality, whether perceptible or not: i.e. mechanisms, events, and experiences. The *actual* includes events, including unobserved events. The *empirical* includes human experiences, and is limited only to observable events. See figure 5.1.

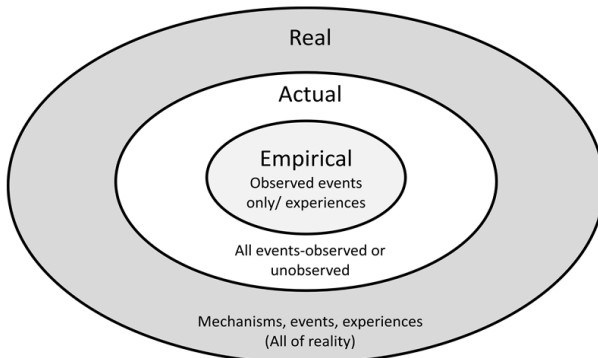


Figure 5.1. Critical realism ontology (Mingers 2004)

The critical realist epistemology makes a material distinction between reality, which is intransitive and exists independently of human understanding and perception; and the observation of reality, which is transitive and framed by our experience and scientific theory/paradigm (Dobson 2002; Smith 2006). The transitive dimension can change as our understanding changes; whereas the

intransitive domain involves relatively enduring hidden mechanisms that are outside of human control (Mingers 2004).

To the critical realist, non-deterministic causal tendencies reside at the level of the real and not the empirical (Smith 2006). The aim of CR is to develop a better understanding of enduring mechanisms and structures and the related causal tendencies. Therefore, the intransitive dimension will be the driver for methodological choices because the goal of critical realists is to unearth the real structures and mechanisms that underlie observed events (Dobson 2002).

5.2 DREAMS Project

The Development, Realization and Exploitation of Advanced Mobile Services (DREAMS) project is funded by the Danish Program Committee for Nanoscience Technology, Biotechnology and IT (NABIIT). The envisioned scope of DREAMS was to develop new advanced mobile services and test them in a set of experiments, ranging from small to large scale. A principle objective was to identify emerging trajectories that would enable business to commercially exploit advanced mobile service and to create new revenue streams. The project was a collaboration among Copenhagen Business School and four industry partners: Børsen, Forbrug, Euman, and Danish Radio (DR). Børsen is Denmark's leading daily business publication. Forbrug was the Danish agency charged with disseminating public information to Danish residents, Euman is a technology company focusing on the development in pervasive computing and wireless information services. Danish Radio is the publicly-funded national broadcasting corporation. The government-sponsored grant provided the cash resources for the project and the industry partners agreed to provide in-kind resources.

Funded in December 2004, the DREAMS project was originally scheduled to begin in August 2005. However, organizational restructuring at Copenhagen Business School delayed the project until it relocated within the newly formed Center for Applied ICT. During the transition, the two PhD students originally hired to assist with the project, as well as a veteran researcher, did not make the

move. Additionally, a DREAMS member who was a PhD student in the Department of Law exited the project to return to industry. At the same time, during the time between the initial grant and the commencement in earnest of the project, several changes transpired at the industry partners that materially impacted the direction of the project. A new director headed Børsen. Forbrug ceased operating as an independent entity and fell under the purview of different leadership. DR also changed senior management, which marked the departure of the DREAMS project point-of-contact. Euman proceeded with their intended development of mobile phone applications without the DREAMS researchers.

Because of the structural changes at CBS, researcher turnover, long delays, and the changes within the industry partners, the DREAMS project underwent what essentially amounted to a project reboot. The project started its current incarnation in 2007, and I joined the project at the beginning of 2008. While the original project proposal envisioned close collaboration with the industry partners for hands-on development of new services, the changed relationship between the researchers and the partners shifted the project focus by deemphasizing the original goal of exploiting new services that were designed as part of the project. Rather, the project focused on ways to exploit the new innovations in wireless that were poised to enter the market en force, with a particular the emerging multipurpose devices such as smartphones. Although one research stream (of which I was not part) focused on developing software applications for mobile devices, the primary research focused on understanding these new technologies and providing guidance to practitioners and for future research.

The redirected research activities consisted of secondary research, multiple small-scale field studies consisting of independent or small teams of researchers, and a larger 6-month study that was designed and executed by the DREAMS project leader and four researchers, including me. The DREAMS project drew strength through the collaboration of several wireless technology researchers who worked together closely, while it also enabled a wide scope of

investigation through the smaller research projects, which enabled the team members to explore their own particular interests.

During the iUse study, the DREAMS project formed a new, emergent alliance with Telia, the cellular service provider with the exclusive license to offer the iPhone during its first half year in Denmark. The alliance provided Telia with data and customer perspectives outside of their normal metrics; and Telia provided spreadsheets with details about the participants' usage activities. Although Danish radio experienced multiple changes in senior management, DREAMS researchers built stable relationships with mid-level managers, whose work agenda and employment were more stable. The recent DREAMS-DR relationship has become highly collaborative. While I attended early meetings regarding the new collaboration, I needed to focus my efforts on this dissertation; and therefore have I not played an active role in the recent DR-related research.

Although the academic-industry relationships changed from the original vision, the project continued with the objectives of both making substantial contributions to information systems research and providing actionable guidance for practice. As such, the research was designed to be rigorous enough for major academic journals while also addressing timely issues relevant to practice. It also influenced the knowledge dissemination strategy of producing conference papers to communicate insights in a timely fashion, followed later by journal articles that would potentially have a stronger, but less immediate impact.

While the scholarly research was able to continue despite the smaller-than-predicted role of the industry partners, the sudden changes at companies and the resulting shifts in priorities provide valuable lessons. Research projects can evolve, and if the project mission is too rigid, it may not be able to adapt to extenuating circumstances. Also, it exposes a potential drawback to close collaboration with industry, especially given that the mission of the partners is likely to be dynamic and subject to change. Had the changes in our industry partners occurred after the DREAMS project had greater sunk-cost

commitments in specific service designs and had our research been reliant upon co-development of services with our partners, the entire project could have been derailed as leadership changes translated into new priorities for our partners. Another lesson learned concerns the choice of contact points within partner organizations. In the case of the DREAMS project, industry liaisons resided at the top of the organizational hierarchy. These positions faced high turnover, whereas lower levels of management showed much more constancy. Therefore, while it may seem advantageous to gain support and enthusiasm from top management, an academic-industry project may face less risk if the key relationships are built at a more operational level.

I am fortunate to have started after many of the delays and organization changes had already taken place. As such, my research did not face major disruptions from changes within the partners. Although the academic-industry relationships changed from the original vision, the project continued with the objectives of both making substantial contributions to information systems research and providing actionable guidance for practice. Overall, while I would welcome future opportunities for research collaboration with industry, I would approach the collaboration with lessons learned from my PhD project experience. I would try to make create a research design that includes related research that could continue without working directly with the partner. That way, if the partner's priorities changed, part of my research would be able to continue. Additionally, I would do my best to bridge collaborative relationships at different levels within the partner organization so that the project would not be tied to a single individual, who for one reason or another might leave the organization. (At the same time, I realize that I may be overestimating my ability to shape the exact nature of an academic-industry collaboration.)

Finally, as part of the DREAMS project, I learned the value of being part of a research team whose research was focused around a unified goal. As a junior researcher, I was able to tap the knowledge and experience of the other team members, which enabled me to conduct better research and apply more rigorous methods than if I were working on my own project. As part of a team, I was

able to coordinate my research with others, leveraging our individual strengths while combining our resources into a focused agenda. As a newcomer to academic research, my participation in the DREAMS project enabled me to work closely with other team members and to build strong co-authorship relationships that helped me to create publishable research and begin to make my contribution to the information systems community. To date, the aggregate output from the DREAMS project includes 14 conference papers, 4 journal articles, 1 book chapter, 3 journal articles under review, and several articles in the draft stage.

5.3 Methodological Approach

While it is important for me to acknowledge the philosophical beliefs that influence my research, the research questions guided the selection of research methods. While the specific methods I used in my two field studies vary, I made two methodological choices for the approach to my thesis as a whole. First I decided to write a qualitative thesis. Second, I decided that my thesis needed to have a longitudinal component. In subsection 5.2.1 I explain why I chose a qualitative approach. In subsection 5.2.2 I explain why I wanted my research to contain a longitudinal component.

5.3.1 Qualitative Methods

Looking at the research gaps within the literature, there is very limited methodological application of qualitative research about consumer wireless technology that does not take a positivist philosophical stance. My study focuses on *why* consumers use a given wireless technology when they have so many choices, making a qualitative approach that “allows researchers to get at the inner experience of participants” (Corbin and Strauss 2008) a suitable research approach, while at the same time the choice helps fill a methodological gap. I seek to gain insights into a phenomenon that is relatively new. To accomplish this task, my work employs constructs that are new or only used to a limited extent within IS research. Without a long history, the study takes a somewhat exploratory approach. Qualitative research allows me to focus on the

complexity of human sense-making in these emergent situations. I use interpretive methods because they can help me understand human thought and action and produce rich insights into the phenomena of wireless technology (Klein and Myers 1999), and CR allows an interpretivist agenda that focuses on meanings, interpretation, and context as causal influences (Smith 2006).

This dissertation examines the process by which people form attitudes that they use to make decisions. Because attitude formation is inherently unobservable (Morgan 1997), a positivist approach that relies on the recording of observable events (Hirschheim 1985) is not appropriate for this thesis. Additionally, a qualitative approach suits the theoretical perspectives I have elected to use. The theory of consumption values requires qualitative interaction with a sample of the population in order to identify potential value drivers (Sheth et al. 1991a). Many behavioral economics concepts, such as prospect theory provide an “unabashedly descriptive” explanation and understanding about why people make decisions rather than attempting to generate probabilistic predictions (Tversky and Kahneman 1986).

Philosophically, my critical realist investigation of consumer wireless technology is concerned with answering the underlying question of “why” events occur (Smith 2006; Wikgren 2004). Since CR is not bound to any particular method of research (Mingers 2004), the methodological approach I choose should be determined by the nature of what I investigate (Dobson 2002). Because understanding rather than falsification is the primary aim of critical realist research (Dobson 2002), my critical realist approach “gives a solid ontological grounding for interpretivist research affirming the importance for a focus on meanings, interpretation, and context as causal influences without unnecessarily denying their existence” (Smith 2006).

5.3.2 Longitudinal Research

Cross-sectional studies can provide a wealth of insights, as evidenced by the strong use of the method within information systems research. Alternatively, investigating a phenomenon over an extended period of time can provide

insights and understanding that may go unnoticed with the exploration of only one point in time. In this thesis, I examine both the initial acceptance and post-adoption use of consumer wireless technology. In order to understand whether they are different, and whether the factors that motivate adoption and use are alike or dissimilar, it makes sense to follow the same research participants through the lifecycle of a consumer wireless technology: the initial adoption stage, the subsequent usage stage, and the point at which the technology is replaced. Furthermore, a longitudinal study will help me study overall technology appropriation. Rogers (1995) argues that initial use of an innovation may only be a trial, after which the user abandons it rather than adopts it. Similarly, Bhattacharjee (2001) creates the information technology continuance model (ITC) to draw attention to the substantive differences between acceptance and continuance behaviors, and he argues that post-adoption use needs to be studied in order to determine whether a technology is adopted or abandoned. Bhattacharjee's research samples two periods of time to measure the satisfaction with a technology, arguing that the disconfirmation between a priori expectations and ex post experience will determine whether a person will continue. A longitudinal approach with rich contact with participants can not only test expectation-confirmation, but can also witness changes in beliefs and gain understanding about how and why technology use may drift over time (Ciborra 1999; Jensen and Aanestad 2007).

My thesis is comprised of two studies. Study I is cross-sectional and Study II (iUse) is longitudinal. The iUse study employs a longitudinal design that follows the lifecycle of consumer wireless technology, beginning shortly before acquiring a new device until the time comes when another adoption decision must be made. In doing so, it helps answer my research questions that address both initial acceptance and subsequent use. In addition to providing a suitable method for answering the research questions, it answers the recent calls by Lee (2010) and Hsieh and Wang (2007) for longitudinal research within the information systems discipline.

5.4 Wireless Internet Study (Study I)

Details about the methodology can be found in part II of the thesis by reading Paper I, “Decisions Models and the Adoption of Wireless Technology.” Rather than restate the methodology, I am going to reflect upon the choices I made in the study. At the same time, however, I include methodological details that were omitted from Paper I due to page limitations. In section 5.3.1, I discuss my motivation for using the focus group format for collecting the data from a practical, philosophical, and theory-based perspective. In section 5.3.2, I revisit the choices I made in recruitment, analysis, etc. and contemplate the lessons learned from the experience.

5.4.1 Study 1: Choosing the Focus Group Format

I employed focus group research techniques for scientifically-motivated reasons. For example, the attitudinal-based nature of the research question and propositions makes the focus group interview the logical choice of research formats (Kitzinger 1995; Krueger and Casey 2000; Morgan 1997) because the processes of attitude formation and decision-making are inherently unobservable (Morgan 1997). When researching such topics, focus groups provide access to data than cannot be easily obtained by direct participant observation or open-ended interviews (Morgan 1997) and focus groups offer a method that enables the researcher to “uncover factors that influence opinions, behavior, or motivation” (Krueger and Casey 2000). Also, focus groups data can provide theoretical insights that have a sufficient degree of generality or universality to allow their projection to other contexts or situations that are similar that of the original study (Sim 1998).

At the same time, many practical considerations motivated my choice of focus groups for data collection. I designed the study approximately one month into my PhD studies. As my first field study, I wanted to utilize an approach with which I had some experience. Additionally, a marketing colleague of mine specialized in focus group research, providing me with a source of expertise that I could tap to refine my research guide. Because I had recently relocated to

Denmark, the use of the focus group method provided useful tool for me to learn more about my research environment and to minimize the influence of my a priori assumptions that primarily were based on secondary research I conducted to familiarize myself with Denmark and its wireless market. By facilitating a discussion rather than interviewing the participants, I was able to find learn about the local perceptions, cultural attitudes that affected decisions, etc. By acting as facilitator rather than interviewer, I could better allow such elements to emerge as the participants explained their decision process, attitudes about wireless broadband, and their understanding of their choices in the market. Because people make decisions based on their understanding of the different options, it was as important to know what the perceptions of the participants (and more generally those in Denmark) as it was to know the objective market data and specification data about the different technologies.

As part of the larger DREAMS project, I had been advised that the project would be undertaking a larger field study in the near future, so I wanted to complete the data collection for my first field study prior to commencing the second field study. Therefore, I wanted my study design to capture a useful amount of data within a limited timeframe. This practical consideration also influenced my methodological choice because the group interview research technique can be a self-contained methodology that can generate principal data that can be the basis for a complete study (Morgan 1997). Therefore, I anticipated that by conducting a series of focus groups would constitute the entire field study, from which I could make a contribution to IS research. Also, focus groups are efficient because they can generate a large amount of data from relatively high numbers of people within a relatively short time (Denzin and Lincoln 2005).

Focus groups allow for multiple meanings, perspective, and the interaction between the two (Denzin and Lincoln 2005). A critical realist perspective does not argue for a single perspective as the only proper explanation for a phenomenon; however, it does adopt the position that one argument may explain more than others (Dobson 2001). The multiplicity of ideas present in

focus group data can provide a richness of data that can illuminate the process by which consumers decide whether to adopt wireless broadband service. By exploring the multiple viewpoints, it may be possible to determine which theoretical perspective can explain the process better. As such, the ability to capture many viewpoints provides a suitable philosophical fit with the overall approach I take in my thesis. Research within the critical realist tradition seeks to go beneath the surface and explain why things are the way they are (Pather and Remenyi 2004). Because participants can question each other, the method provides the ability to get deep understanding of the participants and helps reduce the interpretation bias of the researcher. For example, the facilitator and other participants can drive the focus group conversation into a deeper level of discussion by inquiring why a participant holds a certain attitude, why a person has a given preference, etc. Because people's perception of reality may not reflect objective reality (Goles and Hirschheim 2000), critical realists acknowledge that people are free to act on false beliefs (Smith 2006). The importance of the perception of reality makes the focus group a suitable forum for understanding what are consumers' beliefs – including both subjective viewpoints and potentially mistaken facts – and the ways those beliefs influence their decisions about wireless technology.

Consistent with the critical realist philosophy, my goal was to gain insight into empirical, actual, and real domain. Focus groups allow me to gain insight into the empirical domain when the participants share their experiences. Because focus group discussions provide a forum for revealing the unobservable process of attitude formation, the method enables me to gain insight into both observed and the unobserved aspects of the decision process. My goal was to analyze the data about the empirical and actual domains in order to make generalized conclusions/propositions about the underlying mechanisms of the technology decision process. My goal was to provide an abstraction of tendencies, rather than provide a probabilistic explanation.

While scientific, practical, and philosophical issues support the choice of focus group research, some researchers may question my choice of focus groups for a

study that uses behavioral economics. The influential studies used to develop these theories did not use focus groups. The foundational article by Kahneman and Tversky (1979) utilized a survey that presented hypothetical scenarios and asked participants to pick which choice they preferred as a solution. Many of the other studies conducted experiments. Research into the “endowment effect” simulated trade markets (Kahneman et al. 1986; Knetsch and Sinden 1987). Samuelson and Zeckhauser (1988) investigated the impact of status quo bias by creating hypothetical situations in which people make investment decision and changing the details in order to record the respective decisions. Thaler (1980) researched loss aversion by phrasing equal outcomes differently to test whether choices expressed as gains or losses yielded different results.

While aware of the methods used to develop many of the behavioral economics principles, I made my decision based on the research question of the study: *what do people think about when deciding to buy broadband internet?* as well as the research question (thesis RQ3): *in situations of choice, how do users decide to adopt one technology over another?* An experiment did seem as appropriate as facilitating a discussion among potential adopters of wireless internet. Besides, my objective was to use behavioral economics to explain the consumer decision process. My goal was to contribute to information systems research rather than to build new behavioral economic constructs; and the theoretical perspectives I chose are well established, as evinced by the Nobel prize awarded to Daniel Kahneman for the work he did with Amos Tversky (Kahneman 2003).

5.4.2 Study 1: Methodology in Retrospect

Study 1 was my first field study as a PhD student, and I now have the benefit of additional years of theory, training, and experience with which to revisit my methodological choices. I will reflect upon scientific and practical aspects arising from my choice of participants. I will include additional details about the coding process I used to analyze the data, which was omitted from the paper due to page limitations, and I will revisit my approach with the benefit of hindsight. While I found the focus group format suitable for the research before

I commenced the field study, I will discuss the use of focus groups based on my experience with this field study.

I had compelling reasons to choose my participant sample from “college-aged persons living or working in Denmark.” Focus group participants must have a degree of similarity in order to feel comfortable sharing their thoughts and to be able to engage with each others in active dialogue. At the same time, successful focus groups have sufficient diversity among the participants to draw out many different viewpoints and attitudes (Barbour 2005). I chose young people in the university setting to provide a sense of commonality among the participants, while I avoided other criteria such as field of study, national origin, etc. in order to allow for heterogeneity. Additionally, I wanted my research to focus on a phenomenon and wanted to control for extraneous variables that could confound my analysis and findings (when possible). Prior studies show that age affects individual technology adoption (McFarland 2001; Morris and Venkatesh 2000; Yang and Jolly 2008), so by limiting the age range, I limited the confounding influence of age. I realized that the decision would limit the generalizability of my findings, but my goal was to generalize toward tendencies, and to uncover real mechanisms; not to generalize to the entire population. I also selected college-age participants because they have lived their entire lives since the introduction of mainstream personal computing and related technologies (Prensky 2001). They make heavy use of ICT; particularly internet use, have therefore incorporated it into their daily lives, and consider technology to be part of the landscape (Oblinger 2003). Networked for most their lives (Prensky), they are generally unaware of the pre-internet era (Rickard and Oblinger 2003). These people represent the future of technology acceptance; and I decided that I wanted my findings to be as long-lived as possible. I concluded that collecting data from an older sample would reflect the past and present; whereas my chosen sample reflects the present and future.

While I had a defensible rationale for choosing “college-aged persons living or working in Denmark,” I was new to the country and did not understand that students in Denmark can be an *inconvenience sample* for qualitative research.

My choice of participants presented many challenges due to the nature of the research venue. Whereas students in many other countries are easy to attract with a small cash stipend, such cash payments are illegal in Denmark. Additionally, students receive a generous monthly cash allowance from the government while they attend a university, so the allure of a small cash payment would be less attractive than elsewhere. Students have no obligation to “volunteer” for research each semester as they often do in countries like the United States. I scheduled the focus groups around lunch time and provided a food, drinks, and snacks to make the study more attractive to prospective participants. Methodologically, a researcher needs to have a minimum of three focus groups (more if data saturation is not achieved after three). Convening a single group would not have been difficult, but recruiting three or four groups provides some major challenges. In hindsight, I believe the focus groups provided a rich data set; but I underestimated the difficulty in recruiting the candidates. In the future, if I deemed focus groups comprised of student-aged persons to be the most suitable research technique, I would weigh the possibility of conducting the study in another setting in case I needed a fourth or fifth group to reach data saturation; or if I were comparing types of participants, which would require at least three groups for each category of participants (Krueger and Casey 2000).

While my paper “Decisions Models and the Use of Wireless Technology” provides details about participant selection, it only provides a cursory description of the coding process due to the page limitations of the conference. I am going to take the opportunity to provide a more elaborate description of the coding process, followed by a reflection upon it.

I used both the field notes and focus group transcripts in my analysis. I analyzed the data were analyzed at the group level and as on a comprehensive level using Atlas.ti to code the data. At times many statements contained similar information; and other statements were short statements that required the context of the surrounding conversation to convey a point. The coding schema included basic information such as participant and group number. The coding of

the content used an iterative approach, beginning with the general categories of pricing, usage behavior, technology, and wired vs. wireless. Subsequent refinement created subcategories that provided more specific codes as well as the addition of a “role” code to classify the participants’ input into the choice of their current service. The code “wired vs. wireless” reflects participant perceived differences between fixed line and wireless broadband served as a distinction among data within other codes. The general code “technology” was renamed “service selection,” with technology becoming a subordinate code. At times many statements contained similar information; and other statements were short statements that required the context of the surrounding conversation to convey a point. Figure 5.2 shows the coding schema I used for the analysis in this paper.

A series of propositions drove this study. Based on theory and prior literature, I anticipated certain findings and I designed the research guide to ensure that I captured information relevant to the behavioral economics theories I was investigating. At the same time, my goal was to gain insights from the data that would contribute to our understanding of why people pick among different technologies in an environment offering multiple choices. I was open to emergent concepts, as well as to considering other theories that the data suggest be appropriate. For this reason, I decided to code the data based on conversational topics as they were discussed. This decision results in a coding scheme that starts practical and, in some branches, moves into the theoretical or conceptual. I believed that this would provide an opportunity to capture insights that might go unnoticed, and I believe it provided a broader understanding of the data than if I had limited myself to only coding according to the theories related to my three propositions. At the same time, after I completed the coding, my data were organized by discussion topics rather than by theoretical perspective, which required me to perform additional review of the data when I was building the theoretically-based arguments that appear in Paper I. Had my primary organization been around my propositions and secondarily around other conversation points, writing the paper may have proceeded much more quickly

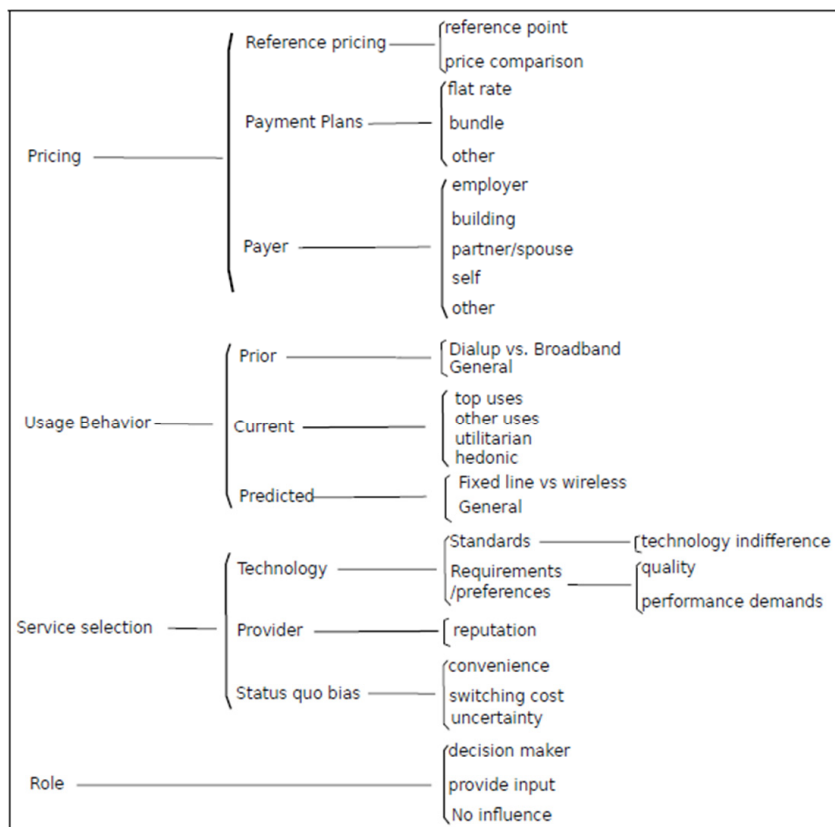


Figure 5.2 Schema used to code the focus group data

and I would have still captured the benefits of remaining open to new insights that might emerge from the data.

Having completed Study I, I have the chance to reflect upon my choice to use the focus group method. In this study, the focus group format provides a method to learn the thought process of the test subjects. The interplay of the different participants during discussions provides rich data for analysis. The open-ended nature of the format allows participants to introduce new ideas into the group and therefore provides insight not attainable through surveys. During the first focus group, for example, participants introduced a theme that received

significant attention and generated much discussion. Therefore, a new question explicitly asked subsequent focus groups about their perceptions regarding the theme, enabling more elaborate data collection. While the focus group format provided a dataset that was extensive, relevant, and rich with qualitative detail, during the writing of this thesis I have faced many challenges from reviewers who 1) are unaware of generally accepted focus group protocols, 2) contest the legitimacy of a study that uses a small sample, and 3) expect studies to use random sampling, a technique that is not useful in focus group research (Morgan 1997). I believe that much of this has to do with the large number of quantitative researchers in the field who are only partly familiar with qualitative methods. I have been able to assuage the reviewer concerns and questions that have arisen thus far, but I anticipate similar questions in my future qualitative research studies.

5.5 iUse Study: Methodology in Retrospect

The methodological details used to conduct Study 2, the iUse project, can be found in Papers II-V. Paper V, “The Adoption of Hyped Technologies: A Qualitative Study” presents the most detailed account of the study’s research methods. Rather than repeat the details available in Part II, I am going to reflect upon the overall study design, as well as strengths and challenges that arose from the methodological choices.

The DREAMS project team collectively designed the iUse study. We had both shared goals and individual research objectives. We decided to recruit participants from a team members’ graduate-level class because of the frequent touch points the participants would have with my colleague. Due to the longitudinal nature, we believed it was important to maximize the likelihood that participants would attend all scheduled interviews and engage in the various tasks that accompany the study. Additionally, we sought a degree of commonality (same graduate course) that would be balanced by a degree of diversity. The group, consisting of mixed gender (seven men and eight women) and nationality (five different nationalities) ranged in age from 22 to 51 and all were working full- or part-time. They had diverse undergraduate degrees and

practiced a variety of professions. We sought the balance between similarities and differences in order to ensure richness in data collection (Barbour 2005; Kitzing 1995; Krueger and Casey 2000; Morgan 1997). We selected participants at the beginning of the semester and they remained active participants after the conclusion of the course.

The longitudinal structure of the study provided many benefits that would not have been realized with a cross-sectional approach. First, we had the opportunity to expand the theoretical scope of the study as it progressed. When we announced the study, I was still finalizing my choice of theoretical lenses, including the use of TCV, which features so prominently in the iUse study and in my thesis. We were able to make the necessary adjustments to the field study to include TCV with our first instance of data collection. Had we just given an open-ended survey (quantitative or qualitative) at the time of recruitment, we would have been limited only to the items asked at that time. Second, by studying the initial acceptance of the iPhone and subsequent six months of behavior, we were able to determine important differences in the drivers of adoption and the drivers of later use. By capturing data from the same participants at multiple periods of time we were able to analyze the evolution of behavior, and to determine that adoption and use are distinct categories of behavior. The longitudinal timeline also enabled an iterative process of analysis and data collection. After each point of data collection, we were able to review the information and identify points that needed clarification, such as statements that suggested certain tacit assumptions that were not explicitly disclosed. At the next interview, we were able to ask for clarification. We also used earlier data to build latter research guides. Figure 5.3 illustrates how we used collected data to inform subsequent interviews.

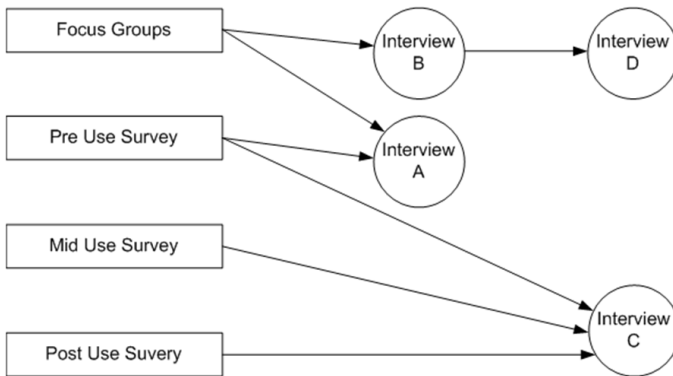


Figure 5.3 How the data was used to inform subsequent interviews

We designed a survey instrument that collected basic information about ICT knowledge and captured aspects of the way the participants used various technologies. The survey provided a baseline understanding of each participant's savvy, experience with different technology, and behavior. The survey was administered a second time at the mid-point of the study and again at the conclusion of the study, shortly before the final round of interviews. The survey provided a consistent instrument for us to be able to track changes over time. It also provided the opportunity to follow up during the interviews. For example, during the first set of one-on-one interviews, I asked: "In the survey at the beginning of the study, we asked 'What would you like to do with a mobile phone that your current phone cannot?' You indicated... [different answers from each participant]. Since the iPhone can do all of those, please let me know how much you use those features and how that compares to what you expected?"

For the final interview I conducted at the conclusion of the field study, I reviewed all surveys from each participant and discussed with them noticeable changes in attitudes and behavior that were reported during the study. This provided the opportunity to explicitly discuss changes rather than relying upon conjecture by myself and the other researchers. I was also able to review the

collected data and formulate questions that would help fill any apparent gaps in the data that needed to be filled to make a sound analysis.

Our multiple interviews, as well as the combination of focus groups, one-on-one interviews, and surveys provided a rich data set and enabled us to validate much of the data through triangulation and follow-up clarification, the study design also presents some important limitations. In the focus group sessions, we called attention to the five consumption values (see Appendix 1 in Paper IV). While intended to shed light on the values driving their technology decisions, it also focused attention on the purpose of the focus groups, which may have biased the participants' comments. Another limitation stems from the choice of iPhone participants. Although the sample was diverse in age, gender, nationality, professional background, and technology expertise, they were all enrolled in a graduate e-business program, which might reflect stronger interest in technology than the public at large. Providing free iPhones made the study attractive to the participants, but by providing the phones and the basic-level service at no cost to the participants, we fostered an environment with extreme facilitating conditions that may have resulted in behavioral choices that the participants otherwise would have made differently. Additionally, due to EU public procurement regulations, we were required to reclaim the iPhones at the conclusion of the study. One participant expressed that he was not interested in downloading iPhone applications that cost money because he knew he would not be able to use the device (and downloaded program). While repossessing the phones created potential limitations, it also provided the opportunity for me to explicitly ask what they were going to do upon returning the phone, which shed light on the impact that using a new technology had on their future decisions.

I was out of the country at the conclusion of the study, so I conducted my final series of interviews via Skype. This seemed the best alternative because all participants were experienced Skype users and it required the participants to be at a computer where they would be less likely to have distractions than if I called them on their mobile phones, which would allow them to partake in the interview in any place and context. In order to approximate a traditional

interview, I used a webcam so that participants could see me. Only a few of the participants, however, used webcams; and during two interviews I was forced to turn off my webcam due to bandwidth / transmission issues. An advantage of in-person interviews is the nonverbal communication such as body language, gestures, and facial expressions. For the interviews conducted without two-way video, I lost that extra level of communication. At the time I conducted the interview, I was unable to record my conversations; whereas I would have recorded a face-to-face interview. While I took detailed field notes, an audio recording and transcript would have provided additional data to analyze.

Some methodological choices resulted in challenges during the publication process. The notable problems resulted from a lack of understanding about the nature of qualitative research among some reviewers. For example, given the sample size of 16 participants (15 after one dropped out due to a broken iPhone), the survey was never intended for statistical analysis. However, during the review process of Paper IV we received repeated demands for statistical results from the survey by reviewers who were unfamiliar with qualitative techniques. We also faced reviewers who did not consider qualitative research legitimate science, as demonstrated by one reviewer who expressed his position that qualitative studies are only a form of pre-research and that without a survey-based study and statistical analysis, the research was incomplete.

By employing multiple qualitative methods and a longitudinal research design, the iUse study provided a data set that enabled me to answer 3 of my 4 operational research questions and to better understand why consumers use a given wireless technology when they have so many options to choose from. The experience revealed methodological strengths that I will be able leverage again in future research as well as limitations that I can try to overcome in the design of subsequent studies.

6. Findings

As I near the end of the my journey as a PhD candidate, I have gained insights that can help me formulate an answer to the research question that set in motion my three-year odyssey. So, with the benefit of my field studies and post-graduate education, I draw upon my field findings that appear in five research papers to answer the question: *why do consumers use a given wireless technology when they have so many options to choose from?*

In Chapter 4 of this thesis, I raised four specific research questions that I would use to answer my overarching, central question. The questions were organized along two dimensions: 1) initial adoption and usage (consumption), and 2) whether the technology was studied in isolation or a context that included multiple choices. Table 6.1 reiterates these dimensions of technology usage decisions.

	Technology in isolation	Technology in context
Consumption	Explores the values that drive consumption behavior of a wireless technology by focusing on the technology under investigation.	Explores the drivers of consumption by focusing not only on the technology or service, but on the context around the use. This consideration looks at what gives the focal technology greater value than alternative technologies that are available to the user. Focuses on decisions in situations of choice.
Adoption	Explores the values that drive the adoption (initial acceptance / use) of a specific ICT by focusing on the technology under investigation.	Explores the drivers of adoption (initial acceptance / use) by focusing not only on the technology or service, but on the context around the use. This consideration looks at what gives the focal technology greater value than alternative technologies that are available to the user. Focuses on decisions in situations of choice.

Table 6.1. Dimensions of technology usage decisions

Each of the four research questions addresses one of the dimensions of consumer technology choice. In this chapter, I use the findings from the five research papers to answer my research questions. (See Table 6.2.)

	Technology in isolation	Technology in context
Consumption	RQ2: How do consumers decide whether to consume a wireless technology?	RQ4: In situations of choice, how do users decide their preference for consuming one technology over another?
Adoption	RQ1: How do consumers decide to adopt a wireless technology?	RQ3: In situations of choice, how do users decide their preference for adopting one technology over another?

Table 6.2. Research questions

By answering the four research questions, I hope to be able to answer the main question of this thesis and explain why consumers use a given wireless technology when they have so many options to choose from. In keeping with the critical realist perspective that has shaped my research, my goal is to provide understanding, not prediction; and I intend to generalize my findings in order to provide abstraction of a tendency in technology decision-making by consumers rather than suggest immutable rules that will be replicable across contexts.

This chapter proceeds as follows. In section 6.1 I provide a brief summary of the five research papers and highlight which research question is addressed by each. (The complete papers are available in Part II of my thesis.) I visit each of the four research questions in Section 6.2, using the findings of the five papers to answer them. In section 6.3, I use the answers to the four research questions to formulate an answer for my main research question: *why do consumers use a given wireless technology when they have so many options to choose from?* Section 6.4. Section 6.5 recaps the contributions of this thesis, which I reflect upon in Chapter 7.

6.1 Research Papers

As I previously mentioned, this thesis is comprised of five research papers that provide insights that I use to answer the four research questions, which in turn help me to answer the central question that has driven my work for the past three years. In this subsection, I present a brief description of each paper followed by a figure that indicates which research question(s) the paper helps answer. The papers are presented in the order in which they were written; which mirrors the order in which they appear in Part II of my thesis. Because my PhD journey has been built around these research papers, I will use the findings of the papers later in this chapter to answer the four research questions as well as the main question that has driven my search for understanding.

6.1.1 Decision Models and the Adoption of Wireless Technology

Gimpel, Gregory, “Decision Models and the Use of Wireless Technology,” Proceedings of the 17th European Conference on Information Systems, Verona, Italy. 2009. 14 pp. 8 June – 10 June 2009.

This paper uses behavioral economics to explore technology adoption in an environment in which different technologies fill a similar need by focusing on wireless internet access. In many markets, consumers can choose among competing technologies to connect to the internet. This paper uses a series of focus group interviews to analyze the use of cognitive referencing in the form of reference prices, situational (status quo) framing, and mental accounting as potential determinants of technology adoption. The findings in this paper suggest that adoption decisions are reference-dependent and that researchers should consider users’ referents when studying adoption in the wireless broadband market.

	Technology in isolation	Technology in context
Consumption	RQ2	RQ4
Adoption	RQ1	RQ3

Figure 6.1. Question addressed by Paper I

6.1.2 The Values of Using Smart Phones

Bødker, Mads, Gimpel, Gregory., Hedman, Jonas, “The Values of Using Smart Phones,” Selected Papers of the 32nd Information Systems Research Seminar in Scandinavia (IRIS32), Molde, Norway, 9 August 2009 - 12 August 2009. Tapir Academic Press.

The purpose of this paper is to complement previous research on the adoption and use of smart phones by introducing theories from consumer research and media use. The focus is on both the intrinsic and extrinsic values user experiences when possessing, interacting and using smart phones as well as media use behavior. As such, it shows how the theories of consumption values and its five value categories: functional, social, emotional, epistemic, and conditional are useful supplements to traditional conceptualizations and explanations of smart phone adoption. Using concepts from consumption values theory to explain the user’s activities and experience of the iPhone, we show how the smart phone can be usefully articulated as in terms of consumption. It also implies that the use as such is an end by itself and not only a mean to reach some other objectives, e.g. calling or surfing. In addition, we portray the smart phone use as a question of fit. These can be beneficial perspectives 1) when designing smart phones and wireless devices in the future and 2) when describing, explaining, and predicting the diffusion and adoption of smart phones and other technologies in general.

	Technology in isolation	Technology in context
Consumption	RQ2	RQ4
Adoption	RQ1	RQ3

Figure 6.2. Questions addressed by Paper II

6.1.3 Technology Use as Consumption: A Longitudinal Study of Smart Phones

Bødker, Mads, Gimpel, Greg, Hedman, Jonas, “Technology Use as Consumption: A Longitudinal Study of Smart Phones,” International Conference on Information Systems 2009, Paper 88, Phoenix, USA, 16 December 2009 – 18 December 2009. (Research-in-progress paper)

This paper investigates technology use as consumption behavior instead of using innovation/ diffusion/ acceptance frameworks. Building on consumer research we introduce the Theory of Consumption Values (TCV) to understand the underlying values and motives of technology usage. Data were collected through interviews, focus groups, and surveys from smart phone users during a six month period. We have adopted a narrative approach to analyze our empirical data and present the data as a dialogue between two smart phones. The story presented in the dialogue shows how different consumption values, including functional, epistemic, emotional, social, and conditional values, drive technology use how they evolve over time. In the beginning, epistemic, emotional, social values drove the use. Later, functional value – particularly conditional functional value – became the key driver of use.

	Technology in isolation	Technology in context
Consumption	RQ2	RQ4
Adoption	RQ1	RQ3

Figure 6.3. Question addressed by Paper III

6.1.4. The Adoption of Hyped Technologies: a Qualitative Study

Hedman, Jonas and Gimpel, Gregory (2010). The adoption of hyped technologies: a qualitative study. Information Technology and Management, 11(4), 161-175.

The introduction of new consumer technology is often greeted with declarations that the way people conduct their lives will be changed instantly. In some cases, this might create hype surrounding a specific technology. This article investigates the adoption of hyped technology, a special case that is absent in the adoption literature. The study employs a consumer research perspective, specifically the theory of consumption values (TCV), to understand the underlying motives for adopting the technology. In its original form, TCV entails five values that influence consumer behavior: functional, social, epistemic, emotional and conditional. The values catch the intrinsic and extrinsic motives influencing behavior. Using a qualitative approach that includes three focus groups and sixty interviews, the results of the study show that emotional, epistemic and social values influence the adoption of hyped technologies. Contrary to expectations, functional value, which is similar to the widely used information system constructs of perceived usefulness and relative advantage, has little impact on the adoption of technologies that are surrounded with significant hype.

	Technology in isolation	Technology in context
Consumption	RQ2	RQ4
Adoption	RQ1	RQ3

Figure 6.4. Question addressed by Paper IV

6.1.5 Choices, Substitutes, and the Smartphone: A Comparative Task-Technology Fit Perspective

Unpublished journal article that expands a conference paper published in the Proceedings of the Eighth International Conference on Mobile Business. Co-authored with Mads Bødker and Jonas Hedman.

Drawing on data from a longitudinal field study, this paper investigates the influence of existing, better and stand-alone technology substitutes on the use of smart phones. By applying prospect theory, task-technology fit, and media

richness theory, this paper improves our understanding of the role substitutes, relative fitness, and media richness play in ways consumers use technology. The data suggest that context has a profound influence upon the perception of the usefulness and appropriateness of smartphones. The fit-for-purpose of advanced mobile devices and related services change during the course of a day and over time.

	Technology in isolation	Technology in context
Consumption	RQ2	RQ4
Adoption	RQ1	RQ3

Figure 6.5. Question addressed by Paper V

6.2 Revisiting the Research Questions

In this subsection, I revisit the four research questions that were introduced in Chapter 4. I have organized this subsection into four parts, one for each question. I draw upon the relevant findings from the research papers in Part II to answer the questions. In Chapter 7, I use these findings to propose a new model in order to provide an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume technology.

6.2.1 How do consumers decide to adopt a wireless technology?

In order to answer this question, I look at the decision process while focusing on the technology without consideration of the context of competing choices. I draw upon Papers II, III, and IV for insights.

The iUse field study provides rich insight into this research question. For the consumers in the study, the iPhone represented a new genre of technology, which is important for the study of technology because it enables us to look at adoption of new technology, rather than merely looking at acceptance of

incremental changes. In the study, we looked at the consumer technology adoption phenomenon through the lens of the TCV's five consumption values: functional, social, emotional, epistemic, and conditional (see chapter 4). We found that the adoption of the iPhone was driven by several values, most notably the non-instrumental social, emotional, and hedonic values.

We found that the individual user's desire to learn and explore new things, or epistemic value, is an important driver of new consumer wireless technology adoption. The curiosity among participants suggests that new consumer technologies are important not only for what outcomes can be achieved by using the technology, but also for the process of learning about the new technology. Technology is important by itself. The adoption of consumer wireless technology involves a strong desire to explore and discover the artifact. This is not driven by the functionality of the different applications, but based more on the individual's desire to understand the advantages and limitations of the device. The novelty of consumer wireless technology is a key driver of adoption. The curiosity factor motivates pre-adoption behavior as well. Because wireless technology has a release date, many people began researching the new wireless device by visiting online discussion boards and visiting news sites that specialized in information and communication technology. In the case of the iUse study, which used the 3G iPhone as the artifact of study, the limited prelaunch availability of concrete, verifiable information about the device further stoked the interest of several participants; thereby increasing their curiosity and the device's novelty factor. As such, the epistemic value grew even stronger, increasing the desire to adopt the technology. For consumer wireless technologies that are not only artifacts, but also part of a closed ecosystem that comes bundled with other services, curiosity about both the device and its ecosystem fuel the desire to adopt the technology.

Social value also plays a major part in the adoption of consumer wireless technology. First and foremost, the technology conveys an image to others in a way similar to many fashion items. Therefore, people covet new wireless technology that will project something about themselves to others. In the iUse

study, for example, many participants wanted to get an iPhone to convey that they are leaders at the forefront of the latest trends. One participant captured this motivation when he explained: *“It must be high tech, cutting edge and fashionably designed. This is important because it tells my surroundings about me, my interests and my preferences.”* In the case of expensive consumer wireless technology such as the iPhone, the high price of ownership gives the technology a special social caché that reflects a position of affluence and elite social status. In the study, a participant explains this type of social value: *“It’s like golden chains or expensive cars. It’s a fashion icon. Look, I can afford this iPhone. I have money.”* Social value drives the to adopt technology, whether the desired social elevation is to be perceived as more stylish, wealthy, tech-savvy, or to be perceived as highly professional manager.

Emotional value heavily influences the adoption of consumer wireless technology. Sheth et al. (1991a) posit that emotional value can be based on the anticipated emotional value that will be realized after a person makes the choice decision. In our research, we found that both aspects of emotional value – anticipated emotions and real, strong emotions that exist a priori adoption – drive behavior. Although the participants in the iUse study had no experience with the iPhone, many held an affinity for it that aroused emotions such as excitement, covetousness, and appreciation for its aesthetic beauty. These emotions motivated the desire to adopt the iPhone among many of the participants. In addition to existing emotions, people believe that possessing wireless technology will bring them emotional benefits and the desire to realize these emotions drive their desire to adopt the technology. Participants in our research expressed emotional reasons that drove them to want the iPhone. Many believed the device would help them stay connected to their friends and family. This belief created powerful emotional value because it taps into the Maslowian need for belonging (Maslow 1946), which the constant connectivity of a wireless device could help fill. One participant explains: *“Connections to other people. It is obvious that whenever we switch off our phones we are not important anymore.”* Wireless consumer technology helps fill this emotional desire to stay connected because it enables many different ways of

communication such as access to social networks, email, voice communication, SMS, and more. Other anticipated emotional value also created the desire to own the focal artifact. For example, it provided a sense of security for some participants, be it from the constant connectivity or from the ability to carry thousands of photographs with them, thereby enabling them to “take a little bit of home with you.”

During the focus groups and interviews of the iUse study, participants discussed the values that drove their interest in the iPhone smartphone. Much of the discussion about functional value focused on what the participants perceived to be drawbacks that they would encounter when they replaced their current phones with the iPhone. Heavy SMS users were familiar with the T9 phone keypad, which they could use without focusing their attention. These users believed that the virtual QWERTY keyboard would require much more effort and be disruptive because they would have to look at the keyboard while typing. One participant succinctly framed the foreseen drawback: “You cannot walk and SMS at the same time.” While the Web browser option elicited the interest of the participants, many expected poor performance because they knew 3G coverage was unavailable in many parts of the city. Few (none, actually) were impressed by the 2 megapixel camera; and several lamented the absence of a video camera function.

While the participants expressed reservations about some of the features of the iPhone, they did express functional attributes that they expected to be both positive and important. The attribute that universally drove the utility value was the phone feature. Many predicted value from the MP3 player; however, prior to adoption, several participants did not view it as an important smart phone feature. One participant was afraid that if she carried it with her MP3 player with her at all times (as part of her wireless device), she was more likely to lose it; and thus lose her music library. Another participant remarked that 8 GB of storage was insufficient storage space and therefore was not attracted by the MP3 feature. During the study, the participants who indicated that they found the MP3 player valuable, elaborated that the music features of the phone were

attractive not for their usefulness, but for the emotions that music elicits. Similarly, as mentioned earlier, the phone mobile phone features – voice communication and SMS – may be functions of the phone, but derive most of their consumption value from the emotional desire to be connected to others rather than for the functional ability to make calls and send short messages. While the consumer wireless device offered many functional attributes, the iPhone derived negligible value from its perceived functional usefulness during this initial adoption decision stage.

Sheth et al. (1991a) define conditional value as a temporary functional or social value that is tied strongly to use in a specific context. According to TCV, conditional value is an antecedent to the decision to purchase or consume. Since the participants viewed the consumer wireless technology under study as something new and innovative, they did not think much about its potential conditional value prior to adoption. The discussion was limited to “snacking,” or the use of a mobile technology to kill time during short periods of idleness, such as waiting in queue or riding on the bus. But the potential to “snack” did not materially raise the value of the wireless device in the minds of the participants.

These findings suggest that utilitarian attributes (represented by functional and conditional value) may not be the primary drivers of the adoption of consumer wireless technology. Rather, other factors drive the interest, such as curiosity generated by the novelty of a new wireless technology (epistemic value), the passion for and emotions elicited by the device (emotional value), and the social image attached to the device (social value). The values that serve as drivers of consumer wireless technology adoption are highlighted in figure 6.6.

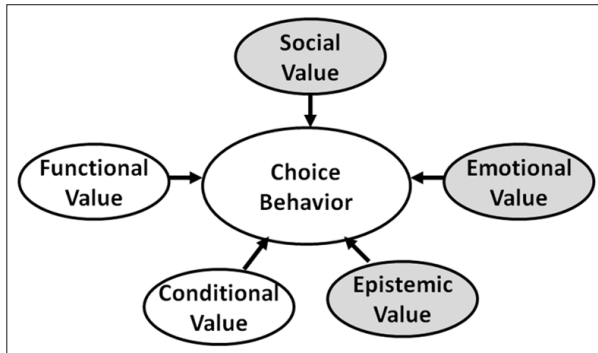


Figure 6.6. Consumption values that drive adoption

6.2.2 How do consumers decide whether to consume a wireless technology?

Similar to RQ1, I look at the decision process while focusing on the technology without consideration of the context of competing choices in order to answer this question. Papers II, III, and IV detail the findings relevant to this question.

Adoption refers to the initial acceptance of technology, a phenomenon that does not necessarily stop at the first use, but may also include an initial period of trial during which the consumer may decide to not accept the technology. Once a potential user deems the technology appropriate for possible future use, and even if he or she does not use it regularly, the adoption stage can be considered complete. Once the user has accepted the technology, how does he or she decide to use the technology? What drives the decision to use it rather than keep it idle? Do the same drivers that motivate adoption also drive consumption decisions?

In order to answer these questions, I will employ a longitudinal perspective that follows the lifecycle of consumer wireless technology, beginning shortly before acquiring a new device until the time comes when another adoption decision must be made. As detailed in the previous subsection, hedonic values (social, emotional, and epistemic) play an important role in the adoption of consumer wireless technology, whereas instrumental values (functional and conditional)

exert a much smaller influence on consumers' decision to adopt wireless technology. Which values drive consumption?

Social value, a key driver of consumer wireless technology adoption, changes over time. When a technology is new and therefore uncommon, its rarity and newness extends a certain social caché to its owner. As the technology becomes more common and its value as a status symbol fades because its initial rarity created much of the value and as time passes ICT is considered less cutting-edge. One participant explains: *"When it came out it was cool. Now it is common."* Additionally, adoption was driven by the anticipated social value envisioned by those acquiring the technology. Social value can decline post adoption, as it did in the iUse study, when the consumer learns that others did not hold the wireless device in the high esteem that he or she did.

Like social value, emotional value dropped over time. Much of the excitement and passionate feelings for the smartphone declined in the weeks after adoption. The change in affect can be compared to a romantic affair. One participant says: "It's like a girlfriend. In the beginning, it's fun and sexy, but after half a year, the excitement is gone." Another participant paints a similar picture: "It's like being in love. You have to touch it all the time, but then it's just part of your everyday life."

Of the five consumption values in this study, epistemic value experiences the greatest decline over time. As indicated by the literature, curiosity and novelty are key drivers of epistemic value. Consequently, as familiarity with a device grows the epistemic value declines. In the beginning, participants explored their device features and downloaded applications simply to experiment with something new. This tinkering declined as the study progressed.

The hedonic values that motivated the initial adoption faced rapid, marked declines after adoption. Within a few weeks, the epistemic value had evaporated, and by the midpoint of the study (3 months) social and emotional factors no longer contributed to the value of the wireless technology in a meaningful way and therefore became immaterial to the consumption decision

process. Conversely, functional and conditional value, which both played only minor roles in the decision to adopt consumer wireless technology, became important drivers of technology use.

When making the decision whether to adopt a technology, the focal consumer wireless technology did offer utilitarian attributes that were of value; however, they were overshadowed so strongly by the hedonic attributes ascribed to the phone by the consumers that they became immaterial to the adoption decision. But as the influence of the hedonic values waned, functional and conditional value – specifically conditional functional value – motivated smartphone consumption.

While the degree of functional value varied depending on the personal preferences and technological maturity of each user, the participants decided to use the phone for what it could do, rather than for novelty effect or how it made them feel. Some users began utilizing advanced smartphone features, such as the calendar, email, web browsing, etc. Others abandoned many of the “smart” attributes and only used their smartphones for standard mobile phone purposes such as phone calls and SMS. Of those using the more sophisticated features, they used them for instrumental purposes – as a means to an end. For example, they would check email to keep abreast of important information, but they rarely typed email, and if they did, they only responded to work or school-related messages. They accessed the World Wide Web using a targeted approach with the goal of finding the information they needed and then getting offline. Surfing for fun was minimal. What started as a sexy, fun toy evolved into a tool.

Many of the functional attributes that drove consumption could be categorized as providing the device with conditional value. In general, the conditional preference for the iPhone was based on convenience-related measures. The smartphone’s omnipresence significantly raised the usefulness and hence the value of the smartphone. Users always had their phone with them, and as a multipurpose device, it enabled them to do many things anytime, anywhere. The ability to stay on top of one’s schedule, read important email, access the

internet, etc. regardless of their location was a key driver for their consumption decisions.

The findings indicate that instrumental factors which create functional value and conditional value motivate the consumption of wireless technology by consumers. At the same time, although the hedonic factors that provide social, emotional, and epistemic value may drive consumption shortly after adoption, the influence of such motivation drops rapidly and stops playing a significant role in consumption decisions. Figure 6.2 illustrates the drivers of consumption decisions.

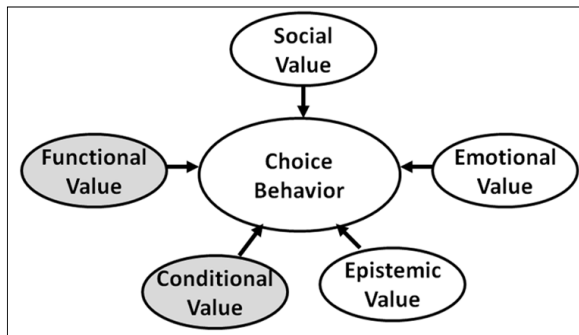


Figure 6.7. Values that drive consumption

6.2.3 In situations of choice, how do users decide to adopt one technology over another?

The answer to this question takes into consideration the consumer technology context which includes alternatives and substitutes and the impact they have on the decision making process. To answer this question I draw upon Paper I, which finds that consumers use referential reasoning when making the decision whether or not to adopt a new wireless technology. In other words, people compare a new, innovative wireless technology to something with which they are already familiar. For example, when considering whether to adopt 3G or WiMAX for their laptops, they compare the delivery technology to their current internet connection. The data show that they determine the value of the new

technology based on whether the benefits exceed the disadvantages. While the concept may seem obvious and common sensical, the process by which they make the evaluations is not a straightforward, purely rational process that can be relied upon to make decisions that maximize the value of their decision.

When faced with competing choices that can provide similar results, the reference point that the consumer uses to make a comparative decision will significantly determine the outcome. The choice of referent occurs subconsciously. In Study I, all of the participants evaluated wireless broadband by comparing it to their current service, which was a fixed-line connection delivered via DSL or cable modem.

They unconsciously simplified the evaluation process by disregarding characteristics that their current service and wireless internet shared in common (e.g. access to the World Wide Web and search engines, ability to download files, send email, talk via Skype, etc.). They focused on the differences between the technologies. But they did not focus on all of the differences, just the ones that they deemed important. For instance, people who played online videogames looked at the latency, or the delay between sending and receiving data, because longer delays would impede game play. Gamers believed the latency in wireless internet to be worse than that of fixed-line broadband service, which made the technology unacceptable for their needs. At the same time, latency did not matter to some people with less speed-intensive computer usage patterns. The study participants believed 3G internet was less secure than their fixed-line connection, which made the wireless technology look comparatively less attractive. The most salient attribute the participants compared was price. They compared the wireless technology cost to what they currently paid; however, price is not a straight-forward or simple calculation. The participants did not simply make decisions based on which technology had a higher price. Rather, they viewed value as a ratio of price to performance. While the subjective requirements and desired performance levels varied among the individual participants, they viewed a technology that is twice as good and costs twice the price as equal in cost to the referent. Of course, the participants

had limits regarding minimum performance levels and at a certain point, their performance needs were satisfied and additional performance did not provide additional value. They also had certain financial limitations based on their budgets, etc. As such, even if the technology they considered adopting were priced lower than their current fixed-line internet, if it offered disproportionately lower performance, they would consider it a bad value. At the same time, they had become accustomed to a performance level and a small drop in performance would be unacceptable unless it had a very large drop in price. The loss of performance loomed more heavily than the financial gain received through the lower price. The data show that the reference price of their current technology, which in this study was fixed-line internet, determined the participants willingness to adopt wireless internet for their laptops. If the price of wireless internet was more than they currently paid, and unless the performance was notably superior, it would be highly unlikely that they would adopt wireless internet.

The comparison of prices not only considers whether a new technology costs more than their current technology, but also compares the pricing scheme. Participants want to avoid uncertainty. They want the decision process to be as straight forward as possible, and they want to be able to make relevant comparisons. Pricing schemes that are ambiguous or uncertain will be at a disadvantage to straight-forward plans. Given the choice between a flat-rate price that includes unlimited usage and a pay-per-use plan, the flat-rate plan will be valued much more highly. It reduces the risk of occurring costly overruns. Even if the flat rate plan is likely to be a little more expensive than the measured price plan, the extra cost is preferred to the risk that they may face an unpleasant surprise. Additionally, consumers want to minimize their cognitive effort. Flat rates free them from having to make financial decisions each time they are faced with the decision of whether or not to consume the technology or service. One participant explains:

“...if there is a new opportunity to get like TV access or somebody tells you to go watch this or do this, I don’t have to worry about whether it is worth it to do

this transaction; whether I want to spend the extra money on the download. I like the – that flexibility of being able to do whatever I want.”

The decision process also factors in a risk premium to any change in technology. A change from the current position adds a perceived switching cost. The consumers in Study I factored in non-monetary transaction costs to their decisions. They perceived the act of switching as effort and inconvenience that adds a transaction cost to the process of adopting a new technology. The cost included the risk of using a service and technology with which they had limited experience. Even if participants are unhappy with their current service, and even if the price to performance comparison is attractive, the participants exhibit a strong status quo bias that will offset some of the potential advantages offered by the new wireless technology. One participant explains why the fear of making the wrong decision can offset the advantages gained by switching:

“It’s changing the paperwork and the bank details and whatever it is. But it’s also the fact that you know what you have. You know that it works or that it doesn’t work or that whatever else you *don’t know* about the other....”

Beyond the risk considerations, even those who acknowledged that the effort involved in establishing a wireless internet service account was minimal still admitted that they would be hesitant to change.

Points of reference not only factor into quality and price assessments. Reference situations also play a strong role in the decision whether or not to adopt consumer wireless technology. When consumers are evaluating an innovation, they compare it to a technology they understand. When they are evaluating the potential gains and losses of the new technology compared to their reference point, their decision process also conjures reference situations. They compare whether the new technology will provide greater benefits for the same situations and uses as an existing technology. If a consumer must envision an unfamiliar situation in order to see the most salient benefits of a new wireless technology, there is a good chance that the potential benefit will not be considered because people’s reliance on reference points includes the

situations in which their referent technology could be used. In Study I, for example, the participants all use fixed-line internet connections routed through a Wi-Fi transmitter. Thus by subscribing to wire-line technology, they can still access the internet without plugging in their laptops. They can move freely around their home, office, school, and even coffee shops while surfing the web. The biggest advantage 3G broadband provides is the ability to access the internet from almost anywhere, and not to be confined to a coverage zone that is only a few meters wide. However, because consumers have become so accustomed to their reference situation (Wi-Fi) and have developed their behavior based on the situation, many are satisfied with their reference situation and do not see the value of a new technology that enables new behavior. In Study I, most participants did not see much value in being able to use their laptops to access the internet everywhere. They were accustomed to using their laptops at home, work, and school. They didn't want to use it in places where they didn't already have Wi-Fi access. The participants spoke about opening their laptops and accessing the internet while visiting a park or sitting at the beach; however, these situations were so different from their reference situation, that the participants did not envision that the new capabilities enabled by the new, innovative 3G laptop modems would provide a meaningful benefit to them.

The data from Study I, which is presented in Paper I, provides insight into how users decide their preference for adopting one technology over another in situations of choice. The key finding that provides a salient answer to the research question is that people compare technologies against each other when making decisions. If they are faced with two new technologies, they will compare the differences between them and determine which one is superior. When considering a single new technology, which is often the case when a consumer is deciding whether or not to adopt a new wireless technology, he or she will compare it to something familiar. It is this selection of a referent that ultimately determines the adoption decision. If the overall value of the new technology is greater than the referent, then the user will adopt it. The value assessment, however, is heavily anchored by the referent (which in this study is

the current position or status quo), so that the price, performance, and other attributes must be notably better in order to overcome the perceived switching cost resulting from a subconscious status quo bias.

Figure 6.8 draws upon Study I data to illustrate the referential, comparative process used to make decisions about the adoption of consumer wireless technology. The figure helps illustrate why the participants were not enthusiastic about adopting wireless internet for their laptops by comparing the wireless technology to fixed-line internet technology routed through a Wi-Fi modem.

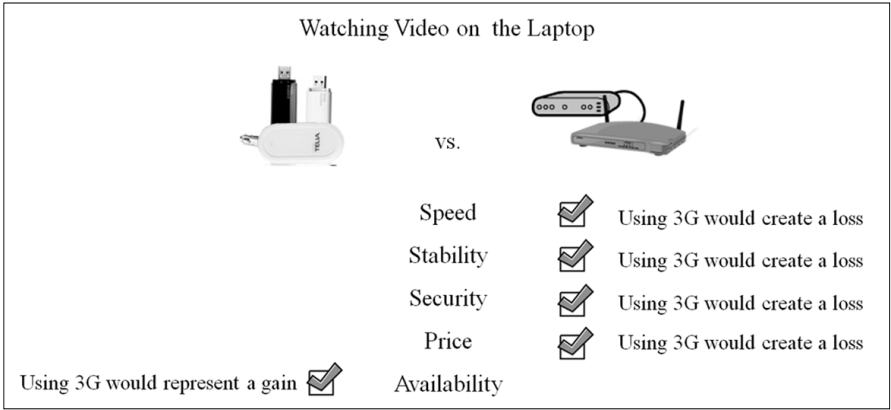


Figure 6.8. Illustration of referential decision making by consumers

6.2.4 In situations of choice, how do users decide to consume one technology over another?

In order to answer the fourth research question investigated in my thesis, I look at the process by which people decide to consume technology in a context that includes multiple choices and substitutes. Specifically, I look at the decisions process involving multipurpose devices such as smartphones. I base the answer to this question on the information contained in Papers II, III, and V.

When consumers have multipurpose wireless technologies such as smart phones, they continually make decisions about which of the technologies

available to them they should use. As such, when confronted with the opportunity to use the technology, the decision is not simply based on whether they have adopted it. While adoption adds the wireless technology to their set of potential choices, they make a decision whether to use it or to use another device each time they are presented with a consumption situation. In the case of the multipurpose smartphone device, many technological features were redundant to other devices already in use by the iUse study participants. Many of the devices within the participants' choice set were stand-alone devices that were dedicated to a single function (e.g. digital still camera, music player, video camera, video game console). At the same time, the laptop computer, another multipurpose IT device, was also part of the choice set.

After acquiring the new smart phone participants did not indiscriminately replace their existing devices. Rather, they undertook a discernment process to construct new preferences given their new utilization choices. They considered which devices were more appropriate for use in given situations. In the process, they considered not only whether the smartphone was suitable for the task at hand, but whether it was a *better* choice than another device within their pool of technological resources. When making a decision whether to use their smartphone, the decision process factors in the other technologies they had at their disposal. Therefore, the decisions were made by comparing a given smartphone feature to a reference technology. Because the smartphone can perform so many different functions, the referent used by the participant to make the decision varied based on the situation. Table 6.9 provides an illustration of some of the referents involved in making the decision whether to consume the smart phone or an alternative technology.

They considered not just the task, such as taking pictures, but also the context within which the decision was made. For example, the iPhone might offer a convenience-based advantage over a standalone digital camera for taking casual snapshots, but it might present a material disadvantage for taking important, more meaningful pictures. One study participant gave an example of the trade-off between having a camera integrated in her wireless device, which she

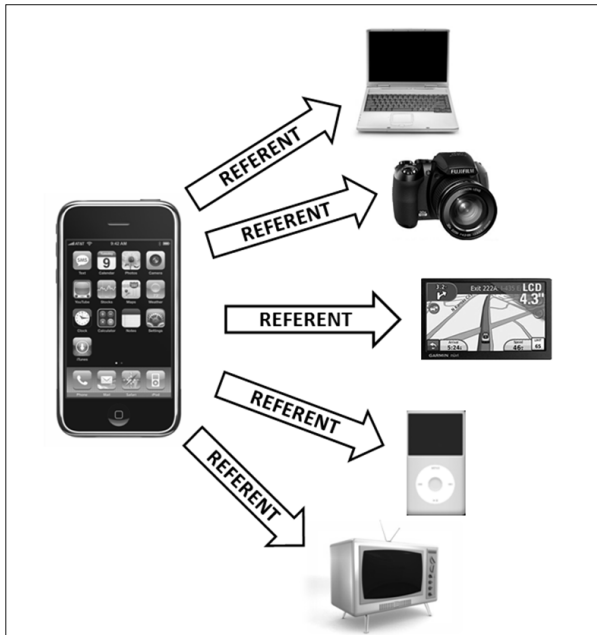


Figure 6.9. Smartphone referents depend on situation

believed took mediocre pictures, versus equipment dedicated to photography: “I just used the [smartphone] camera in Egypt. It’s always good weather, and my boyfriend has a ‘real’ camera.” If her boyfriend were not taking high-quality photos, then she would have opted to use a better camera herself. As evinced by the example, the participants used a comparative evaluation process in which they determined their preferences based on whether the iPhone was more advantageous for a given use within a specific situation.

The preferences constructed by the participants did not always determine the usage. For example, many participants indicated that they preferred their former mobile phones for sending SMS; but they were unable to use their preferred alternative because they had transferred their mobile phone service to the iPhone. In this circumstance, the choice situation may have been limited to a binary use/non-use decision. At the same time, the relative preference for a different device, even though it was unavailable, impacted the utilization of the

new smart phone. The participants used the less preferred device by default; however, they used much less frequently than they had used their previous device. Thus, even though it no longer may be part of the choice set, a referent technology can still influence consumption decisions.

Because the consumers in the iUse study make consumption decisions by comparing the functions integrated in their wireless devices to referent technologies and use the one that offers the better overall value, it becomes important to understand the advantages and disadvantages of smartphones. The integrated tools, such as camera, MP3 player, and other applications add value to the iPhone. However, participants view many features as inferior substitutes to single-purpose devices. All believe the smartphone to be a satisfactory, not optimal, device for many of its uses. Participants articulated that smart phones do many things, but they do not do many of them well.

In general, study participants derived conditional value from their smartphones based on convenience-related measures. The participants almost always have their iPhone with them and are always connected to the internet through the 3G and EDGE. Much of the value participants derived from their smartphones was conditional depending on whether their preferred, single-purpose device was readily available. When their preferred devices were unavailable in emergent contexts, they would be likely to utilize their multipurpose wireless device by default. In anticipated contexts in which participants made a choice in advance of the technology consumption, such as deciding whether to bring a camera or MP3 player with them, they would weigh the advantages and disadvantages of the different devices, with inconvenience being viewed as a cost that was added to the decision process. (The all-in-one nature of the smartphone was considered a convenience.) Still, when presented with the opportunity to use the stand-alone devices or their smartphones, participants often chose the stand-alone devices because they perceived them to be superior and if they used their

smartphones instead of the other device, they would be making a sacrifice, or at a minimum, they would be satisficing².

Because the smartphone is a multipurpose wireless technology, consumers draw upon many referents when making consumption decisions, given that the environment affords them many alternatives and substitutes to choose from. The most common referent, however, is the laptop computer. To provide insight into the key reference technologies, during the final one-on-one interviews I asked: “How do you define a smart phone. If you had to describe it to someone by putting it in a category they would understand, what would that be?” While one participant indicated the MP3 player was the primary referent and two others focused on the internet, participants most frequently compared it to a computer with statements such as the following:

”It’s like a small computer.”

“It’s a phone with an inbuilt computer”

“It’s a combination of a very small mobile computer and a mobile phone.

“A smart phone is a very small laptop.”

“A smart phone is a phone with a computer built into it.”

“It is like a small laptop or computer.”

Because the laptop was so often the referent, much of the value the participants derived from their smartphones was conditional and depended upon the availability of a laptop computer with an internet connection. Generally, when a computer was close and connected to the internet, the computer was the preferred device. When time was limited, a computer’s long boot up time added conditional value to the smartphone, which was ready for use. When a Wi-Fi or landline internet connection was unavailable, the conditional value of the smart phone rose dramatically because it was the only alternative. While some preferred reading email on their smartphone, even when the computer was

² *Satisficing* is the selection of an option that satisfied a need in an adequate manner, rather than choosing the optimal solution (Simon 1955).

ready-at-hand, none saw much value in typing email on the smartphone unless a computer was unavailable, the message could be conveyed in a few words, and it must be sent immediately.

When choosing to adopt the iPhone, participants compared it to their standard mobile phones. Based on that comparison, the iPhone offered significantly greater value. But once they adopted the phone, the number of potential referents grew substantially. As a result, the study participants reconstructed their preferences after they adopted the phone. When they were faced with the option of using their smartphone or an alternative technology, they would construct the preference based on their situation and the available choice set. Convenience, and the omnipresent character of the smartphone added value when they weighed their options. At the same time, participants often chose to forsake their smartphones and use different technologies for their task at hand.

There is a key finding regarding the question: “In situations of choice, how do users decide to consume one technology over another?” Similar to the way individuals make consumer wireless technology adoption decisions, when making consumption decisions, they compare the wireless technology to another technology (the referent) and decide which offers greater value given the situation and the alternatives and substitutes that are available within their choice set.

6.3 Summary

In this chapter, I draw upon the two studies comprising this dissertation (and the five resultant papers that comprise Section II) in order to answer my four research questions. By answering the four research questions, I gain valuable insights that help me answer the thesis question that has been my motivation for writing the thesis: *why do consumers use a given wireless technology when they have so many options to choose from?* In Chapter 7, I answer the question, and in the process provide an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology.

7. Contribution

When I embarked on my PhD journey, I set out to make a contribution to information systems scholarship. I have made contributions through many of my choices: the choice of laptops and smartphones, which are cutting edge technologies that have yet to make it through the publication review cycle; the choice of qualitative methods in order to collect data, an underrepresented technique in IS that enables me to add new information and new understanding to the discipline; the inclusion of a longitudinal study through which I am able to look at both the adoption and the consumption of technology rather than just looking at one aspect of use; and my use of novel theories – the theory of consumption values and behavioral economics – in order to gain fresh insights into the consumer wireless technology phenomenon.

The findings presented in Chapter 6, through which I answer my four research questions, provide new insights into the adoption and use of wireless technology. The data collected in order to answer the four research questions provide me with a sufficient understanding to answer the thesis question that has driven my work during the past three years: *why do consumers use a given wireless technology when they have so many options to choose from?* By answering this question, I convey the primary contribution of this thesis by providing an understanding of the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology.

This chapter proceeds as follows. In Section 7.1 I answer the main thesis question by proposing a new model to understand the adoption and consumption of technology. In Sections 7.2 – 7.4 I discuss the theoretical validity of the model using Glaser's (1978) three properties of integration, relative explanatory power, and relevance. I delimit the scope of the new model in Section 7.5. Ultimately, I bring the chapter to a close in Section 7.6.

7.1 The ACT Model

In the process of answering the four research questions in Chapter 6, I have gained valuable insights that provide an answer to my thesis question. So, why do consumers use a given wireless technology when they have so many options to choose from?

The simple answer is that people decide to use a given technology because it provides them with superior value than other options. While the general, simple answer seems straightforward, theory and study data suggest that the process by which people determine the value of technology is multifaceted and contingent upon contextual factors. To explain the subjective, potentially irrational, value judgments and cognitive decision processes that guide the decision to adopt and consume wireless technology, I introduce the *adoption and consumption of technology (ACT) model*, which is depicted Figure 7.1. According to the model, people compare the consumption value of a new technology to a referent technology, placing greater emphasis on losses than gains, and then pick the one with greater relative value, provided that the value is greater enough to overcome status quo bias.

The validity of the proposed ACT model can be assessed by three properties: the integration of the model (logical coherence), its relative explanatory power, and the theoretical and practical relevance (Glaser 1978).

7.2 ACT Model Logical Coherence

To understand the integration of the model, I use the findings detailed in Chapter 6 to explain how the different constructs within the model logically fit together. I will take a step by step process to illustrate the ACT model detailed in figure 7.1. The steps follow a logical progression as follows:

Step 1: The decision to use wireless technology is driven by how well the technology satisfies their functional, social, emotional, epistemic, and conditional consumption values.

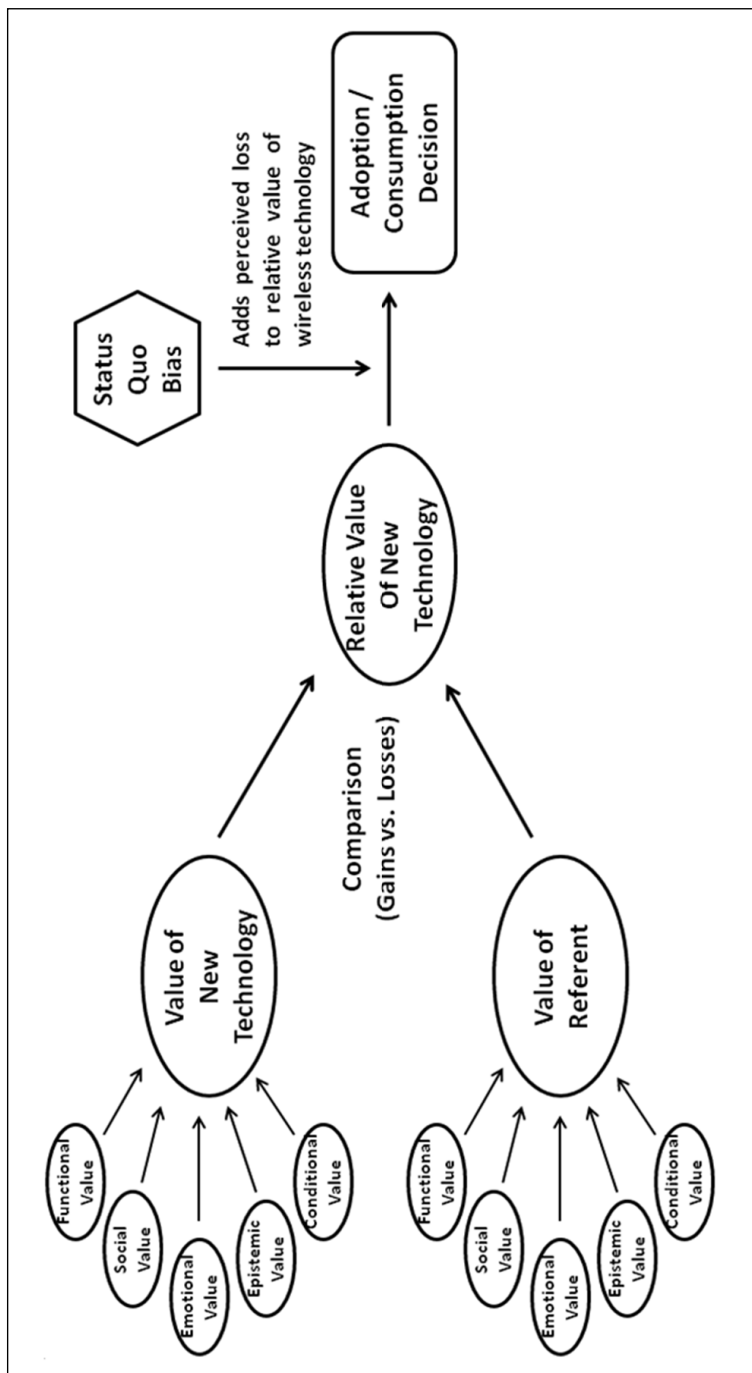


Figure 7.1 Adoption and consumption of technology (ACT) model

Step 2: People make the decision to use a given wireless technology by comparing it to a referent technology and often to a referent situation. People decide to adopt or use the technology that provides the greatest consumption value by looking at the gains (benefits) versus the losses (disadvantages) of their choices. They place more value on avoiding a loss than obtaining a gain.

Step 3: Once they have determined which technology provides the greatest value, status quo bias adds an additional perceived loss to the decision-making process.

In subsections 7.2.1-7.2.3, I provide a more detailed articulation of each step in the ACT model.

7.2.1 Step 1: Decision Drivers

The decision to use wireless technology is driven by how well the technology satisfies their functional, social, emotional, epistemic, and conditional consumption values.

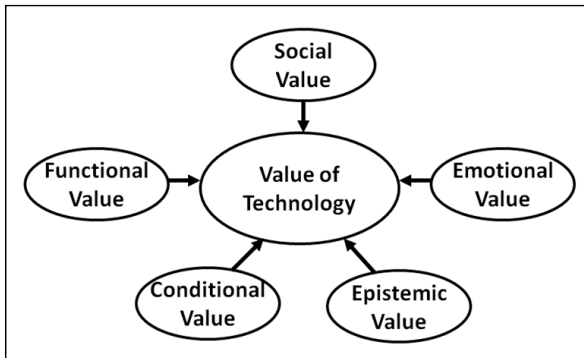


Figure 7.2 Values-based decision drivers

7.2.2 Step 2: Relative Value

People make the decision to use a given wireless technology by comparing it to a referent technology. Consumers will compare one technology against another in order to make their usage decision. The way they envision using a new

wireless technology will be based on the way they are accustomed to using technology. Therefore, they may undervalue the benefits of a new technology because they have formed their usage behavior (and thus their perceived usage needs) around their current behavior and choice set.

Decisions about the value of using a specific wireless technology is determined by the five consumption values, but value of that technology relative to others in the set of potential choices is determined by comparing the technologies to a referent, as illustrated in Figure 7.3.

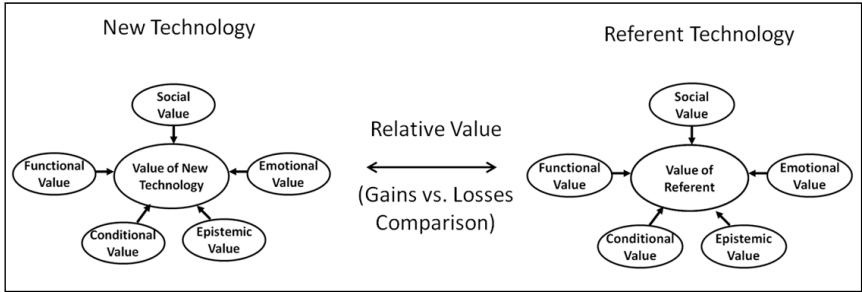


Figure 7.3 Comparative determination of value

The consumption value of the wireless technology *relative* to the referent drives the decision. Accordingly, the referent against which consumers compare a wireless technology will determine the outcome of their decision process. If they choose a referent that is inferior to the wireless technology, then the wireless technology will have greater value. If, however, they choose a referent that is superior to the wireless technology, then the referents will offer greater value.

7.2.3 Step 3: Final decision

While a comparison between the consumer wireless technology and the referent determine which choice has greater relative value; the decision is confounded by status quo bias, which adds an additional cost to the decision process. If a consumer is considering adopting a new wireless technology, then the technology must offer sufficiently more relative value to overcome the

additional perceived loss that results from status quo bias. Similarly, if consuming the wireless technology requires a shift from the status quo, then the wireless choice must offer value great enough to overcome the bias. At the same time, status quo bias must not always discourage the use of wireless technology. For example, if someone routinely uses a smartphone for taking snapshots, then the decision to use a single-purpose digital camera may have to overcome status quo bias. The increased perceived loss of convenience by having to carry another device, break from routine behavior, etc. may bias the user against the stand-alone device and toward consumption of the multi-purpose wireless technology. Figure 7.4 illustrates how status quo bias influences the final decision.

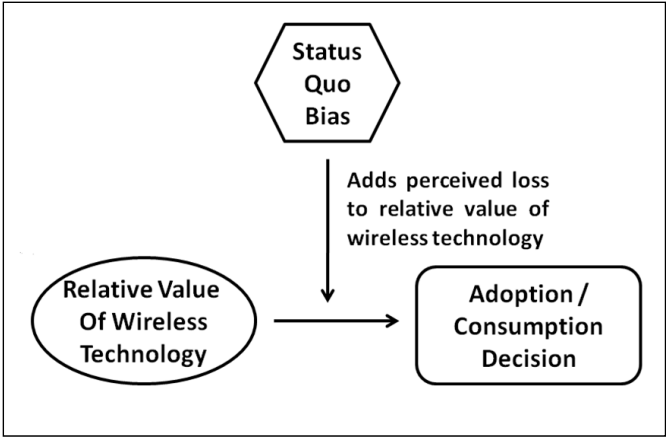


Figure 7.4 The technology use decision process

7.3 ACT Model Relative Explanatory Power

The adoption and consumption of technology model provides different explanatory power than the dominant theories used within IS literature. Table 7.1 provides an overview of the explanatory power provided by the diffusion of innovations theory (DOI), technology acceptance model (TAM), unified theory of the acceptance and use of technology (UTAUT), task-technology fit theory (TTF), and the adoption and consumption of technology model (ACT).

	DOI	TAM	UTAUT	TTF	ACT
Usefulness	✓	✓			✓
Ease-of-Use	✓	✓	✓		✓
Performance Expectancy			✓		✓
Social Factors			✓		✓
Facilitating Conditions			✓		
Trialability	✓				
Compatability	✓				✓
Observability	✓				
Task fitness				✓	✓
Emotions					✓
Hedonic Factors					✓
Non-Work Use Decisions					✓
Work Use Decisions	✓	✓	✓	✓	✓
Considers Competing Technology	✓				✓
Relative Advantage	✓				✓
Considers Irrationality					✓
Adoption	✓	✓	✓	✓	✓
Consumption				✓	✓

Table 7.1 Overview of theoretical explanatory power

TAM, UTAUT, and TTF were designed to explain IT acceptance within the workplace and DOI explains the use of technology to improve existing processes. They provide strong explanatory power for technology decisions in a professional context. On the other hand, the ACT model explains technology decisions made by consumers. Whereas TAM, UTAUT, and DOI provide valuable insights into performance-boosting technologies, ACT takes a different approach by providing a more general understanding that includes hedonic factors such as social considerations, emotional drivers, and curiosity factors. As evinced by the data from the two studies comprising this thesis and by prior studies, hedonic factors can overshadow and/or render insignificant the explanatory power of perceived usefulness in technology decisions usefulness (Cocosila et al. 2009; Cyr et al. 2006; Dickinger et al. 2008; Fang et al. 2005; Ha et al. 2007; Hong and Tam 2006; Venkatesh and Brown 2001). By including hedonic factors in addition to utilitarian considerations, the ACT model provides a more elaborate understanding of the motivations that drive

technology adoption and use. TAM's straightforward two-construct structure enables it to be extended to include hedonic factors such as perceived enjoyment or playfulness. The extensions add versatility to a powerful model, but the expanded TAM models can vary among studies; and as a consequence the explanation of the technology decision process may vary as well. By including a broad spectrum of hedonic drivers, ACT can capture non-instrumental motivation without ad-hoc changes to the model. As such, the ACT offers theoretical consistency in its application, and thus a consistent lexicon for explaining technology decisions by consumers. While offering extra explanatory power, the ACT's additional considerations may not necessarily offer a superior explanation in workplace technology decisions, especially when the technology use is a required part of the job function or when there are no alternative or substitute technologies available to the user.

TAM, UTAUT, and TTF provide insight into decisions regarding a focal technology in isolation. These perspectives have demonstrated strong explanatory power when applied in work environments where employees are presented with a single technology. In the modern consumer ICT landscape, people have many choices of technologies that can fulfill their utilitarian needs and hedonic desires. Therefore, it becomes important to understand how people make technology decisions within a verisimilar context that includes multiple technological choices. This is where the ACT provides a distinct advantage over the perspectives that have proved to be so influential to information systems. The ACT has the power to explain not just the use of a given technology, but to explain why the technology is used rather than another technology that may also be suitable for the purpose at hand. It also has the ability to explain why, even if a technology is deemed useful, it may go unused, an aspect unaccounted for by TAM. While TTF explains the relationship between perceived task fitness and use, ACT can explain not just whether a technology is a good "fit" but why it is a better fit – and therefore more likely to be used – than another option that is also fit for the task at hand.

Whereas the dominant theories have a single dimension to the dependent variable (Bouwman et al. 2007; McMaster and Wastell 2005), ACT considers two dimensions: 1) the use of the wireless technology under investigation and 2) the use of an alternative. By applying behavioral economics concepts to explain the choice between potential technologies, the ACT provides important theoretical insight into the process by which consumers decide to adopt and consume wireless technology in situations of choice.

The ACT model derives additional explanatory power relative to TAM, UTAUT, DOI, and TTF because it does not assume a straightforward, rational decision process. While moderating variables, such as age, gender, etc. are often applied, mainstream IS theories assume a deterministic relationship between independent and dependent variables. According to TAM, for instance, if an ICT is considered useful and easy to use, then a person will use it. Similarly, TTF posits that if a technology is a good fit for a particular task, then it will be used. But as lay observation and the data from the two studies comprising this thesis evince, useful technologies go unused and people sometimes prefer devices with inferior performance to more powerful ICT. ACT's inclusion of irrational cognitive processes, such as the comparison to a referent that potentially may not be very comparable, the unequal emphasis on disadvantages versus advantages, and the influence of status quo bias all offer another explanatory dimension to the technology decision process than models that assume rationality on the part of human decision makers.

The ACT model offers an additional usage dimension: consumption. TAM, DOI, and UTAUT are designed for the study of technology adoption, not for explaining the determinants of use of ICT after it has been accepted by the user. DOI takes a longer view of technology acceptance by considering the potential for abandonment, in which a user tries an innovation and subsequently decides against adopting it. Task-technology fit looks at the level of utilization, which is not necessarily limited to the choice between adopting and not adopting, but focuses on the degree to which a user accepts a new information technology. The ACT model differs because it offers strong explanatory power for the study

of both the initial adoption of a technology as well as for the examination of usage decisions after the ICT has been adopted. Therefore, while the ACT joins TAM, DOI, UTAUT, and TTF in explaining technology adoption, it also provides a strong tool for explaining the consumption of technology, which may have different drivers.

Therefore, the proposed adoption and consumption of technology model offers strong explanatory power relative to the theories used within mainstream information systems research. While the traditional models have provided great insights and advanced the understanding of technology acceptance, recent developments in ICT and the corresponding shift from technology decisions as business decisions to personal decisions have necessitated new theories and tools for understanding technology use. Within this new context, the ACT provides very strong relative explanatory power.

7.4 ACT Model Relevance

The ACT model offers theoretical relevance to information systems research. As discussed in the previous subsection, the model increases the power of researchers to the explain information technology adoption and consumption. By providing a theoretically-based model that takes into account contextual factors present in real world decision situations, and by including well-established cognitive patterns that can account for irrationality in decision processes, the ACT model provides a analytical perspective that is highly relevant to the contemporary ICT landscape. Therefore, the model arms researchers with a tool for investigating the process of consumer technology adoption and use (consumption) decisions, which takes into the contemporary technology landscape and the additional decision drivers of technology that has personal as well as business uses. Additionally, the ACT model provides a foundation for investigating the multipurpose information and communication technologies that are reshaping the consumer ICT landscape.

The model increases our understanding of what drives technology use and which considerations are more impactful than others. It contributes to this

stream of research by looking at the categories of factors that influence the decision process. At the same time, it contributes to our understanding of technology adoption and use (consumption) by researching not only whether utilitarian and hedonic factors influence technology decisions, but by exploring what makes a particular ICT useful and how hedonic factors influence the decision process.

The theoretical relevance of the ACT model becomes more apparent after noting the calls by scholars to fill gaps within information systems research. ACT explains how individual consumers decide to adopt and use (consume) a particular wireless technology given that they have many choices to pick among. This places it within a special niche in the technology adoption / use domain by focusing on technology decision making in situations of choice. The ACT is theoretically relevant to information systems research because it addresses the influence that multiple choices exert on technology decision making, an under-researched area that has received prominent calls for research (Mallat 2007; McMaster and Wastell 2005; Venkatesh and Ramesh 2006).

By including non-instrumental social, emotional, and epistemic motivations of use, the ACT model also answers calls from scholars to address the gap in IS research that examines hedonic drivers of technology acceptance and use (Bagozzi 2007; Magni et al. 2010; Van der Heijden 2004; Venkatesh and Brown 2001). At the same time, it also addresses the instrumental motivations of technology acceptance and use, in keeping with the well-tested models within IS research.

The ACT model provides strong practical relevance. As the technology landscape becomes increasingly crowded with technological alternatives and substitutes; and as more devices become increasingly versatile, practitioners can no longer focus attention on a single technology with the hope of gaining an understanding of technology decision making. Practitioners developing new consumer-oriented ICT and those charged with launching new, innovative products into the mainstream must be able to use a theoretical perspective that can help them navigate within a crowded ICT space. ACT enables practitioners

to design new ICT with a value-centric focus so that the new offerings will provide superior value compared to competing technology. It also enables those managing the launch of market-ready technology to assess the likelihood that the technology will be accepted by consumers; and provides a conceptual framework to guide the positioning of the new technology to maximize the likelihood of acceptance within the competitive consumer ICT environment.

7.5 ACT Model Scope

While the ACT provides a theoretically relevant model that can be useful for both research and practice, it has limits to its scope and applicability. The model emerged as the answer to the question driving this dissertation: *why do consumers use a given wireless technology when they have so many options to choose from?* As indicated by the question, the model provides a vehicle for studying the decision by individual consumers to use a given technology. While born from research on consumer wireless technology, ACT can be applied to other types of consumer information and communication technology because it brings together the versatility of the theory of consumption values and general decision processes of behavioral economics. While the theoretical generalizability extends beyond wireless technology, the model focuses on decisions by individuals regarding information and communication technology that they will personally use. As such, the ACT model is not intended to investigate technology decisions made by groups or decisions made by one person on behalf of another. While further research may establish wider applicability, the model is not expected to provide an advantage over other models when studying single-purpose technology designed to improve workplace performance. Finally, the ACT model captures the process by which people choose among ICT available to them. Accordingly, in situations of mandatory use or in situations in which alternative technologies are unavailable – situations which sometimes occur in the workplace – the ACT may not be an appropriate research tool.

7.6 Summary

Based on the research conducted as part of this thesis, the findings of which are presented in Chapter 6, this chapter provides an answer to the research question: *why do consumers use a given wireless technology when they have so many options to choose from?* The simple answer is that people decide to use a given technology because it provides them with superior value than other options. While the general, simple answer seems straightforward, theory and study data suggest that the process by which people determine the value of technology is multifaceted and contingent upon contextual factors. The detailed answer to the question explains how people make the decision by introducing the adoption and consumption of technology (ACT) model. The validity of the proposed ACT model is assessed using the three properties proposed by Glaser (1978): the integration of the model (logical coherence), the theoretical and practical relevance, and its relative explanatory power. The scope and delimitations of the consumer technology model are noted. The development of the ACT model in response to the thesis question marks the primary contribution of this dissertation.

In this chapter, I have discussed the contribution of this thesis to information systems research. Because this dissertation represents the output of my PhD journey, I take a final look at my voyage in Chapter 8.

In Chapter 8, I discuss and reflect upon my work. I discuss how this thesis compares with prior works that explore hedonic adoption and use, value-driven technology decisions, and picking among IT choices. I also discuss the implications the work represented in this thesis offers to practitioners. I discuss the limitations of the research upon which this thesis is built. I provide a final reflection upon my PhD journey and propose avenues for future research.

8. Discussion and Reflection

The development of the ACT model marks the primary contribution of this dissertation. In Chapter 7, I validate the model using Glaser's (1978) properties of integration, relative explanatory power, and relevance. In the process, I discuss how the ACT model relates to the widely accepted TAM, UTAUT, DOI, and TTF. In the next section of this chapter, I discuss how the findings of this thesis relate to existing information systems literature that takes into account hedonic factors, uses the concept of value, and looks at decisions in situations of choice.

In section 8.2 I discuss the implications for practitioners who design consumer wireless technology and for those who manage its introduction. I also take the opportunity to reflect upon my PhD journey. I ruminate upon the limitations of my work and look at the challenges I faced during my PhD studies in section 8.3. In section 8.4 I contemplate areas of potential future research. And in section 8.5 I end my journey as a PhD student with a brief epilogue.

8.1 Placement within IS Discourse

While my work and the resultant ACT model adds to our understanding of IT adoption and use, I must acknowledge that I am not the first to look at hedonic factors, nor am I the only one to use the concept of value. And while the amount of literature looking at technology decisions in the context of choice is limited, mine is but one contribution within a small but growing stream within the literature. Because my use of hedonic factors, value, and the multiple choice context, I believe it is necessary to look more closely at how my work builds upon the previous research in these areas. In section 8.1.1, I discuss my work in relation to IS literature that includes hedonic as well as instrumental factors in the study of adoption and use. Because I explore the value-based IT decisions, I will reflect upon how my work compares to prior works that address value-driven technology decisions in section 8.1.2. Since my thesis question explores the process of technology decisions made in situations of choice, I

examine how this thesis relates to prior work on technology choices made in the context of multiple choices in section 8.1.3.

8.1.1 Hedonic Adoption and Use

Much of the information systems literature examines the use of workplace ICT by focusing on the likelihood that the technology will improve an individual's job performance. While this research has provided rich insights into technology use by individuals within organizations, the exploration of consumer technology use requires other factors because its use can be an end in itself (Bagozzi 2007). To better understand consumer use of technology, it becomes necessary to investigate the role that non-utilitarian, hedonic factors play in the decision to use ICT (Magni et al. 2010; Van der Heijden 2004; Venkatesh and Brown 2001). The study of hedonic drivers of ICT use is still a nascent research stream. Prior research has opened the door to the study of non-utilitarian decision drivers and brought consumer technology into information systems research by extending the dominant TAM theory by adding hedonic constructs such as perceived enjoyment (Cyr et al. 2006; Dickinger et al. 2008; Ha et al. 2007; Hong and Tam 2006; Van der Heijden 2004) and perceived playfulness (Fang et al. 2005; Wakefield and Whitten 2006).

Many studies that investigate both usefulness and hedonic factors find hedonic factors play a much stronger role in the decision to adopt or use consumer ICT than usefulness (Cocosila et al. 2009; Cyr et al. 2006; Dickinger et al. 2008; Fang et al. 2005; Ha et al. 2007; Hong and Tam 2006; Venkatesh and Brown 2001). Regarding adoption motivation, Kim et al. (Kim et al. 2007) find that anticipated enjoyment outweighs perceived usefulness, albeit only by a small margin. Similarly, my research suggests that hedonic values drive adoption to a much greater extent than utilitarian motivation. In respect to use (as opposed to adoption), Cyr et al. (Cyr et al. 2006) find that usefulness and enjoyment drive consumption, with the hedonic factor exerting more influence. To the contrary, my research shows the opposite: that functional, utilitarian drivers more strongly motivate the consumption decision. Reconciling this discrepancy can fuel further research.

My research, along with the other adoption and use studies that include hedonic considerations, helps to fill a gap in the literature by broadening our understanding of the drivers of technology adoption and use. What separates my research from much of the other research that incorporates hedonic factors?

Recent research has broadened our understanding of technology decisions by individuals by adding new categories of drivers. Much of the research has focused on the level of testing whether certain types of considerations (e.g. perceived usefulness, ease of use, or enjoyment) impact the decision to use ICT (Cocosila et al. 2009; Cyr et al. 2006; Dickinger et al. 2008; Fang et al. 2005; Ha et al. 2007; Hong and Tam 2006). This work has increased our understanding of what drives technology use and which considerations are more impactful than others. My research contributes to this stream of research by looking at the categories of factors that influence the decision process. At the same time, I contribute to our understanding of technology adoption and use (consumption) by researching not only whether utilitarian and hedonic factors influence technology decisions, but by exploring what makes a particular ICT useful and how hedonic factors influence the decision process. In this respect, my work follows the example set by Venkatesh and Brown (2001), who look not only at what type of drivers motivate behavior, but also explore the underlying attitudes and beliefs that explain why that category is important. By exploring two dimensions – the category of motivation as well as the underlying motivations within the category type – my work helps both broaden and deepen our understanding of technology use. In doing so, my research helps answer calls for *deepening* our understanding of technology adoption and use (Benbasat and Barki 2007; Benbasat and Zmud 1999; Lee et al. 2003).

8.1.2 Value-Driven Technology Decisions

My thesis adds to the small but important body of information systems literature that looks beyond specific technology characteristics and instead focuses on the value that technology can bring to its users. The concept of value enables a researcher to capture a broader understanding of behavioral determinants that can include subjective and affective assessments of technology that in turn

influence behavioral intentions. As I look back on my research legacy represented within this thesis, it is important to reflect upon how my research into value and IT behavior compares to that of other scholars.

The term value does not have a standard meaning within the IS literature. In my research, I use the theory of consumption values, which includes both instrumental and hedonic drivers of value. By its nature, TCV provides a flexible framework because one or many of the five consumption values can determine individuals' choices. This enables the framework to be used outside of the research confines set for this thesis. While other researchers have found, similar to my research, that value is a significant determinant of technology decisions, some define value as a very specific construct that may face difficulty if used in a different study. For example, Kim, Lee, and Kim (2008) take an instrumental approach to understanding perceived value as a driver of wireless services use. By focusing on utilitarian aspects, their definition of value may not be suitable for understanding the value people derive from a technology used for fun. Their value construct is more specific to wireless services than the TCV and includes constructs like usefulness, usability, system quality, and ubiquitous connectivity. Such specific constructs can be measured more precisely than the TCV's more general functional, social, emotional, epistemic, and conditional values. However, the purpose my research is to provide understanding, so the broader categories are better suited for my research, although Kim et al.'s (2008) framework may be more appropriate for prediction.

Like Kim et al., other research takes a more specific and quantifiable approach does my work. Lin and Wang (2006), for example, define their value construct as purely monetary, which while much more straightforward, lacks other considerations that may be present in consumer decision making. Kim and Kankanhall (2009) take a specific and quantifiable approach that includes measurements for overall value. They look at value as influenced by transition costs, switching costs, sunk costs, and uncertainty costs, with consideration for risk aversion. They investigate perceived value as a factor that influences employee resistance to new, large-scale information systems. Their value is

economic, which may be appropriate for a major IT systems in an organizational setting, but it may not capture the value of consumer technology, especially something as personal and multi-purpose as wireless ICT. At the same time, Kim and Kankanhall also look at value as an affective measure of worthwhileness and beneficialness. They operationalize these considerations to include a more subjective understanding of perceived value. Therefore, like the TCV, their definition includes more general aspects of value. What differentiates their approach from mine is that their affective constructs capture an overall impression of value, whereas the TCV enables researchers to not only find out the overall affect and whether people believe that using a technology will add value; but the incorporation of TCV values also enables researchers to root out the different drivers that create the affective perception.

While much of the limited research on value within IS focuses on utilitarian drivers of value, my work considers how a technology derives value by satisfying the instrumental and hedonic needs of the user. The work of Kim, Chan, and Gupta (2007) also explore the value-driven adoption of technology with utilitarian and hedonic considerations. Like my work, they argue that value is not absolute but relative based on comparison to another point. They use value as an overall evaluation of a mobile technology. With the ACT model, the use of consumption values includes two dimensions rather than one: the dimension of value creation at the level of the five consumption values and the aggregate value that reflects the overall value perception. While similar, with findings that are mutually supporting of the importance of the integral role value plays in technology decisions, our research seeks different ends. Their goal was to validate that value plays a central role in adoption decisions. I too sought to find support for the centrality of value as a motivator for technology decisions, but I also sought insight into the antecedents of the overall value of an offering. Therefore, much of my research, as well as the resultant ACT model, is concerned with understanding what gives ICT technology value.

8.1.3 Deciding Among IT Choices

Having looked at how my work with consumption value fits in with other value-based approaches to approaching information technology decision, I now take a moment to retrospect upon how my thesis and the work during my PhD journey fit in with the exploration of the choices of technology. I revisit articles that I first discussed in my literature review. I also discuss IS articles which address the specific theoretical concepts that I use during my exploration of why consumers use a given wireless technology when they have so many options to choose from. By doing so, I hope to better understand how I fit within discourse about technology decision making in situations of choice.

Much of the literature about information technology use intentions looks at whether a user is likely to adopt or to use a technology without considering the influence that alternative choices exert on the decision process. After three years of research, I still find myself surprised by the limited attention paid to the context of multiple choices that exists within the contemporary ICT landscape. When Mallat et al. (2008) investigated mobile ticketing, they found that the choice to adopt mobile ticketing is not a one-time replacement decision. Rather, people add m-ticketing to their choice set and decide whether to use it or another method when buying tickets. Mallat et al. found that consumers used m-ticketing only when alternatives were unavailable, such as a closed ticket booth or when the situation (long queues, etc.) made the traditional method undesirable. The findings discussed in my thesis are similar to those of Mallat et al. For instance, in my research the participants utilized advanced smartphone features only when a laptop computer was unavailable. What my work contributes is a way to understand this phenomenon that can be generalized toward a tendency rather than limited to a discrete event. As posited by this thesis, a person's status quo influences his or her decision, adding a cost that makes wireless technology less valuable and therefore unused; unless the conditional value (no laptop or a closed ticket booth) raises the value of the wireless option. Because of the general decision theories used

in this thesis (TCV and behavioral economics), the tendencies generalized in this thesis can be applied to many technologies and contexts.

Study I finds that reference situations impact the decision to use technology. Likewise, Page (2005) finds that wireless technology consumption is impacted by the larger technology choice set, and that the availability of computers in so many places diminishes the likelihood that young people will use SMS or mobile IM because they can access computers at the times and places they wish to use electronic communications. Like the iUse study, in which computer usage diminished the demand for advanced wireless service, Blechar et al. (2006) find that computer-based internet creates a referent situation that is superior to similar services on the mobile phone, thereby decreasing the likelihood of mobile use. The data from Study I suggest that the reference price of fixed-line internet biases users against adopting wireless internet for the laptop, which reinforces the findings by Blechar et al. that reference prices influence the decision to use advanced wireless services.

The principal contribution of my thesis is the ACT model which uses the TCV and behavioral economics in tandem. Within the information systems literature Kim, Chan, and Gupta (2007) take a similar value-based approach to their study of technology adoption. They use prospect theory as a tool to account for the more sacrifices being more heavily weighted in the consumer mind. My work builds upon Kim et al. A fundamental difference between our research, however, involves my central question: *why do consumers use a given wireless technology when they have so many options to choose from?* The contribution of this dissertation is an understanding of why consumers make choices and how they choose among alternative technologies. Kim et al. (2007) take a value perspective that places more weight on perceived losses to explain that the value of ICT impacts the adoption intention. I use a value-based perspective in a comparative setting to provide an understanding of how people determine which technology has greater value and how that influences their decision to use wireless technology. Kim et al. provide a solid foundation by examining a

binary adoption / non-adoption decision; whereas this thesis centers around decisions made in a context of multiple choices.

There are other applications of prospect theory, a behavioral economics theory central to this thesis, within IS research that focus on technology decisions by managers within organizations (Keil et al. 2000; Lauer 1996). Both explore management behavior that leads to suboptimal or risky decisions. Because my research focuses on wireless technology decisions made by consumers in situations of choice, these studies and mine have little in common. I study people who make decisions for themselves, whereas managers make decisions on behalf of others. Furthermore, I study consumer wireless technology whereas these articles study large organizational information systems.

8.2 Implications for Practice

As part of the DREAMS project, my work should not only provide contributions to theory and scholarship, but should also provide usable guidance for practitioners. Therefore, based on the insights gained from my research I propose key “take-aways” for the those developing new consumer wireless technology and for those managing the launch of high tech wireless products or services.

In order for a product under development to be accepted by consumers and in order for the users to derive more than an ephemeral value from the technology, it is essential that developers identify the referent technology against which potential users will compare the new technology. Once the referent is recognized, designers can identify the values that drive its consumption. Therefore, by identifying the referent (or list of most likely potential referents), designers can focus on creating a superior value proposition by making sure the new offering has greater consumption value. Considering that losses loom larger than gains, it is essential to be at least on par with the referent technology for all salient characteristics. Keeping in mind that there are five consumption values, once designers reach parity with the referent, they can build upon their strengths by focusing on the consumption values by which they can best

differentiate as superior their product or service. While differentiating the new technology, designers should keep in mind that there may be consumption values that are not salient drivers for the use of the new technology, and therefore no matter how strongly designers may embed those values into the offering, consumers may ignore the benefits because consumers will only compare the attributes and values that they deem important. Thus, even if a new technology offers several advantages, designers must ensure that new wireless technology is at least as good as the referent in most, if not all, other respects, because disadvantages will impact consumer decisions much more heavily than advantages. At the same time, once parity is achieved, designers can increase the consumption values where they can add the most value.

Those tasked with launching a new wireless technology must identify the referent as well as the referent situations. The first question to ask is whether the new offering is superior to the referent. After identifying the referent, product managers must identify the key value drivers because some values may not be relevant in the comparative decision process. As emphasized in this thesis, any perceived disadvantage may outweigh the advantages of the new technology or service because losses are more pronounced than gains. If the losses are minor, advertising and marketing campaigns can stress the advantages while commodifying the relative weaknesses. For example, if a new wireless offering offers a photography feature that is inferior to the referent, the marketing message can suggest “all wireless devices take pictures, but this device can do X.” By suggesting that the inferior technology (photography) is common to all devices, the marketing campaign may remove photography from the comparative decision because people ignore common traits and only compare the differences.

If the primary advantage of the new wireless technology stems from conditional value, then the reference situation must be considered. How compelling is the conditional value? Revisiting the case of wireless internet for the laptop as an example, mobile broadband offers conditional functional value because it enables people to access the internet when they are away from Wi-Fi hotspots.

However, the reference situations for internet use are at home, school, and work – all locations where the users have hotspot access. Therefore, while wireless internet for the laptop offers very strong conditional value, the referent situations that shape user behavior make the conditional value irrelevant. In such cases, the success of the product requires creating new reference situations in the consumer mindset. While simple in theory, creating a new reference point is tantamount to creating a new market and creating demand that does not yet exist. While far from impossible, it can be both risky and expensive; and competitors can enter the new market once it is created.

Managers charged with launching a wireless technology that is below parity with the referent face a daunting task. Why would people adopt an inferior product? The most likely answer is that they will not use the new technology. Based on the findings of this thesis, managers should launch a marketing campaign that changes the reference technology to one that is significantly inferior when compared to the new technology. For example, the data from Study I suggest that the referent for wireless internet for the laptop is fixed-line (cable or DSL) internet, which is perceived to be superior in almost every salient value. In order to change the referent for mobile internet for the laptop, an advertising campaign could compare web surfing via mobile internet on the laptop to web browsing on a mobile phone. With a bigger screen, more memory, and faster processors; and with the same connection speed, stability, and security as mobile phone internet, the mobile internet for the laptop is no longer at an absolute disadvantage. In fact, it has many notable advantages over mobile phone internet.

While I have divided the implications for practitioners into advice for designers and launch managers, the advice has three common recommendations that are essential for a wireless technology to gain mainstream use:

- 1) Identify the referent against which people will compare the new technology
- 2) Identify the consumption values that drive the use of the referent

- 3) Ensure the new wireless technology is not subpar in any salient aspect and offers superior consumption value in one or more value categories

8.3 Limitations and Hindsight

Now that I reach the end of my journey, I look back upon my research and note the limitations of my research and take a moment to consider what I would have done differently given the benefit of hindsight.

8.3.1 Limitations

While my qualitative study of the adoption and use of wireless technology offers many contributions to theory and to practice, several limitations exist. Both studies detailed in this dissertation have sample sizes of 15 people. While the participants have provided insights that are generalizable to theory, it would be inappropriate to try to generalize to entire populations or to provide probabilistic estimates. For the self-contained focus group study I deliberately selected people within a specific demographic: college-aged persons living or working in Denmark. As such, the data may be biased toward young users of technology and may not reflect the views of the broader society. The small sample of the iUse study, all of whom were students of a graduate course, was chosen for practical reasons. The lack of a random or representative sample may threaten the internal validity of the study. The external validity and generalizability likewise face limitations. Although the sample included a range of technical savvy and wide range of technological experience, as students in an e-business course, the participants may have a greater affinity toward technology than the population at large. Such an affect may have impacted their perceived value of the artifact in this study. The iUse study has an inherent bias because its design created extreme facilitating conditions because it provided free Apple iPhones and six months of free basic subscription service to the participants.

My research studies technology that exists within the business-to-consumer (B2C) domain. Therefore, my data is not appropriate for reaching conclusions

about other decision-making relationships, such as business-to-business (B2B). Additionally, the research I discuss in this thesis investigates decisions made by individuals on their own behalf. As such, this thesis cannot provide usable insight into other adoption and consumption choices, such as group decisions or decisions made on behalf of others.

An additional limitation comes from my choice of research venue. Denmark has a population of 5.5 million, 87% of whom live in urban areas (CIA 2011). It has one of the world's highest standards of living (CIA 2011) and is among the most internet-ready nations on the planet (EIU and IBM 2010). As such, Denmark may have unique qualities that will affect the generalizability of my research to populations in other countries.

This study investigates two specific technologies: smart phones and wireless internet for the laptop. These technologies were chosen because their multi-functional capabilities position them as alternatives to many previously-existing ICT devices. By design, these technologies face many potential alternatives from which consumers can choose. While these technologies were chosen because they represent current developments within the wireless marketplace, the findings of this study, and suitability of the theories discussed herein may not be relevant to wireless technology that do not have substitutes.

Finally, the primary contribution of this thesis is the proposition of the ACT model. While I have argued its validity using criteria suggested by Glaser (1978), further research is necessary to validate it with new data collection and to further delimit its applicability.

8.3.2 Hindsight

Now that I am at the end of my PhD journey, I look back on the past 3 years and reflect upon on two aspects of the journey that I believe were the toughest obstacles to my shift from industry practitioner to social scientist. I revisit my first year as a PhD student and recall the struggles I underwent early in my

information systems research, particularly as my investigation kept leading me to theories to outside the IS discipline.

The first steps of my odyssey at Copenhagen Business School began as I stepped from the field of practice, in which I was charged with finding solutions to unique and context-specific problems. The transition to scientist / academic researcher was a difficult one. I faced great difficulty moving from focusing on immediate problems and providing solutions distinct to that problem setting to considering the situation in a more general, more abstract manner. Only through abstraction could my findings and my contribution be generalizable beyond the specific problem or specific question that I was researching; and without abstraction my work would not be useful to other researchers or future practitioners.

Those who were helping guide this transition such as my PhD supervisor, the faculty at the DaRSIS summer school, and the others who were generous enough to me by offering their counsel can attest to the difficulty I had moving beyond the problem at hand to abstraction. The clarity finally came to me when I began to understand that my role as a scientist is not just to answer a question, but to provide a theory or framework by which others can approach similar questions and find answers. Once I understood this, my work became easier and my research progressed rapidly. Even with the benefit of hindsight, I don't know how I could have made this transition faster or with less deliberation and learning; but I must admit I wish it came sooner and more easily.

I look back and think about how much more productive my work could have been had I reached that understanding sooner. At the same time, part of my growth and part of my experience of earning a PhD and doing the research that has culminated in this thesis involved the difficult steps, the difficult challenges and the rite of passage that I could experience only through the laborious and often frustrating process necessary to overcoming such challenges.

I similarly faced challenges in positioning myself within the information systems discipline. As my research progressed and my command of the theories

that are commonly applied within the information systems field grew, the stronger was my conclusion that different perspectives were necessary to understand the new, multi-purpose and open-ended nature of consumer wireless technology. I felt compelled to look to other reference disciplines in order to explain the adoption and use of consumer wireless technology. In the end, as evinced by the theoretical perspectives used in this thesis, I saw the potential for the application of theories from market research and behavioral economics as a way to understand this phenomenon. However, they come from outside disciplines. It was necessary that I position my work within the information systems domain. Thus, like learning to shift from solving a tactical problem to exploring a more universal approach that can be used by others, I went through a very challenging process of how to stay within one discipline, with its strong body of literature and accepted paradigms, while at the same time importing and incorporating perspectives from other fields. The final outcome was one in which I am now able to position my work within IS, regardless of whether the perspective has its origins in information systems (e.g. TAM, UTAUT, etc.) or whether it is borrowed from a different tradition. But this too was a very difficult rite of passage for me. I am glad I underwent the hardship and, in the end greatly benefitted from it, and I have grown as a researcher and a scientist by struggling through and eventually overcoming the difficulties, I still secretly wish it had come a little more easily to me.

8.4 Further Research

The body of work represented by this thesis provides many areas for further research. The ACT model can be tested with new data and applied to different types of consumer information and communication technology. Other research using TCV and behavioral economics can explore different technologies in different settings. Future research can also design studies that investigate risk-seeking behavior in situations of loss, an important principle of prospect theory observed in organizational IT decisions (Keil et al. 2000; Lauer 1996) but not observed in thesis Studies I or II.

I made the deliberate choice to write my thesis using qualitative methods because I was studying innovative wireless technology. My study of wireless internet for the laptop coincided with a big push into the consumer market by telecoms; and the launch of the iPhone represented the mainstream launch of consumer smartphones in Europe. I was looking for new insights due to the newness of the technologies as because I was using theories that did not have a very strong presence within the information systems tradition. Therefore, because of the nature of the theories and the technology, I wanted an approach that allowed for exploration.

Additional qualitative research can add new insights. At the same time, future research can adapt the information and insights presented in this thesis for quantitative study. Quantitative methods can be used to test the tendencies uncovered from the small samples in Studies I and II against a wider sample, perhaps one that includes different markets and cultures. Quantitative research can also determine more precisely the relative weights of the different consumption values and the behavioral economic concepts that influence decision making.

Additionally, the use of quantitative exploration of consumer wireless technology using the theories discussed in this thesis may open these insights to a new audience. During the review process of my papers, I learned that there are researchers within the IS community who do not hold as valuable qualitative research. While I vehemently disagree with their position and instead see the great contributions that come from qualitative investigation, taking a quantitative approach may be able to disseminate this information to those who refuse to read qualitative studies.

As for me, I intend to continue to study how people make technology decisions. My immediate future plans are to expand the conference papers in this thesis into journal articles. Moving beyond my participation in the DREAMS project, I intend to continue my work as a researcher and hope to keep investigating the exploration of cutting-edge technology. At the same time, the exact objects of study may be dictated the future projects. Nevertheless, I look forward to the

exploration of ICT and the way people make technology decisions in whichever project I participate.

8.5 Epilogue

The completion of this thesis marks the end of my time as a PhD student and the end of what has been an amazing adventure that spanned continents and different understandings of science, technology, and the world. During these final days a friend asked me: was it worth it? To which I can only answer with a content grin and light shining from my eyes: Yes. This trek through a world of ideas, knowledge, and learning has been a grand adventure that I will treasure for the rest of my life.

I've expanded my horizons and broadened my mind. I see the world differently and now walk with my eyes opened more widely as I look to understand the world around me. I faced many challenges, several small and a few that initially seemed insurmountable. But these challenges forced me to mature, not only into a better scholar, but a better person as well.

The time has come for me to stop looking back upon my experience as a PhD and turn forward, looking to the future. My journey as a PhD student may be complete, but it represents just the first step in a much larger adventure. As I write this last sentence of my dissertation, I begin the next step in what I hope proves to be a life-long expedition into learning, growth, and scholarship.

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**“Value-driven Adoption and Consumption of Technology:
Understanding Technology Decision Making”**

Part II

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PAPER I

Decision Models and the Adoption of Wireless Technology

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This paper uses behavioral economics to explore technology adoption in an environment in which different technologies fill a similar need by focusing on wireless internet access. In many markets, consumers can choose among competing technologies to connect to the internet. This paper uses a series of focus group interviews to analyze the use of cognitive referencing in the form of reference prices, situational (status quo) framing, and mental accounting as potential determinants of technology adoption. The findings in this paper suggest that adoption decisions are reference-dependent and that researchers should consider users' referents when studying adoption in the wireless broadband market.

DECISION MODELS AND THE USE OF WIRELESS TECHNOLOGY

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Abstract

Many nations boast high broadband internet penetration. In many of markets, consumers can choose among competing technologies to connect to the internet. Much research in the IT diffusion domain has been useful for examining the adoption of individual technologies. This paper explores technology adoption in an environment in which different technologies fill a similar need by focusing on wireless internet access. This paper uses a series of focus group interviews to analyze the use of cognitive referencing in the form of reference prices, situational (status quo) framing, and mental accounting as potential determinants of technology adoption. The findings of this study suggest that adoption decisions are reference-dependent and that researchers should consider users' referents when studying adoption in the wireless broadband market.

Keywords: Pricing, technology choice, diffusion theory, adoption, standards, wireless, broadband, qualitative research

DECISION MODELS AND THE USE OF WIRELESS TECHNOLOGY

1.0 Introduction

In Europe, the USA, and parts of Asia, internet penetration is high, with substantial consumer use of broadband technology. A plethora of companies offers internet access through a wide variety of different technologies. Wireless data technologies for laptop computers, such as 3G and WiMAX, are new market entrants that offer a fundamentally different delivery method than the more widely adopted fixed-line access points. This paper examines influences on the consumer decision process that affect the adoption of information and communication technology (ICT) through the study of wireless internet for the computer.

Researchers often employ traditional theories of technological adoption when investigating the adoption of ICT. While these methods have proven useful when studying individual technologies, exploring different models can also enhance the understanding of new technology usage. The current broadband market offers existing technologies that compete with new technologies, all of which access the same internet. The users in this study did not evaluate choices in isolation, but weighed alternatives against their current internet technology.

This paper explores the adoption of technology in a situation in which different technologies fill a similar consumer need. More specifically, it explores the determining factors for the adoption of one internet service technology over another; the choice of fixed-line versus wireless technology in particular. Denmark, the world leader in broadband penetration according to an Economist Intelligence Unit study (2007), serves as a market exemplar for Western nations, and was consequently chosen as the location for this study.

In a market offering a plethora of technological choice, why does such a large portion of the population use such a small number of technologies? What goes on in people's minds during the process to decide which type of information technology to buy? Wireless broadband is a relatively new offering. This paper investigates diffusion models in an environment of competing options by asking

the question: what is the best model for predicting and understanding consumer adoption of high-speed wireless internet?

This paper uses focus group research to fill apparent gaps, as pointed out by the calls for alternative perspectives on technology adoption (Benbasat & Barki 2007; McMaster & Wastell 2005; Venkatesh & Davis & Morris 2007) and by the call for the exploration of the consumer decision-making process beyond construct-based research (Blechar & Constantiou & Damsgaard 2006). Following the example of Eynon (2005), this paper utilizes focus group methodology to explore user attitudes about the adoption of internet ICT. The analysis builds upon bounded rationality, prospect theory, and mental accounting. It also expands on the more recent work of Blechar et al. (2006) who applied reference pricing to wireless ICT.

The contributions of this study are two-fold. First, it adds to user behavior research in wireless services by elaborating on the process by which end users make communication technology purchase decisions. Second, it illustrates the insights gained by applying cognitive decision making models to a situation of technological choice.

This article is structured as follows: the next section provides an overview of major broadband access technology. The following section offers an overview to reference pricing and the cognitive psychology theories on which referential decision making is built, as well as the role pricing plays in ICT diffusion. The proceeding segment details the research methodology used to conduct the focus groups and analyze the data. The subsequent section presents the findings. After the presentation of data, the results segment compares research outcomes to theoretical arguments, addresses the implications for service providers, and discusses the propositions and research instrument.

2.0 BROADBAND OVERVIEW

Many technologies enable connection to the internet at high speeds. While they all provide internet access, the various technologies deliver the service in distinctly different ways and offer different performance traits. Fixed line

technology requires a user to access the internet from a specific location. Portable broadband frees users to move their computers within a limited geographic area. Mobile internet enables free movement between access points without interruption.

TECHNOLOGY	CAPACITY	TRANSMISSION	PORTABILITY	MAXIMUM RANGE
xDSL	1.5 Mbps (12 Mbps)	copper telephone lines	fixed location	5.4 km (0.3 km)
Cable	40 Mbps	coaxial cable TV lines	fixed location	1-3 km
Fiber	1 Gbps	fiber optic cable	fixed location	20 km
Powerline	200 Mbps	existing A/C power lines	fixed location	1-3 km
Satellite	155 Mbps	extraterrestrial satellite	fixed location / wireless	1000-36,000 km
Wi-Fi	11.3 Mbps	unlicensed radio band	portable / wireless	100 m
WiMax	2.8 Mbps (practical speed)	3.5 GHz radio frequency	portable / wireless	50 km
3G	2.0 Mbps	mobile telephone tower	mobile / wireless	Large: based on cellular network

Table 2.1 Summary of common technologies and their distinguishing features (Corning 2005)

This research makes the explicit distinction between using a Wi-Fi router to relay a fixed line connection for a few meters and using a subscription Wi-Fi hotspot service. This study considers a home Wi-Fi router as fixed-line technology because users must decide which access technology to connect to the router when making an ICT adoption decision. See Figure 2.1 for an illustration of the distinction made for Wi-Fi in this study.

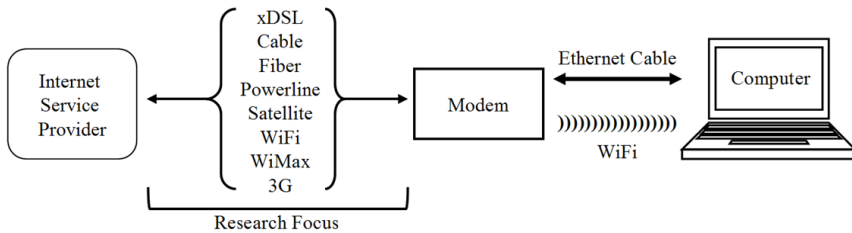


Figure 2.1 Distinction regarding focus of broadband technology choice

3.0 THEORETICAL INSIGHTS AND PROPOSITIONS

This section begins with the call for different theoretical approaches to the study of technology adoption within Information Systems research. It provides an overview to the theoretical basis for the argument that reference prices influence the decision of whether or not to use a technology. Second, it provides an introduction to the behavioral economics literature that paves the path for the proposition that a status quo bias impacts the willingness of a person to accept a new technology. Third, it lays the theoretical grounding for user preference of simple, flat-rate payment plans that can affect the selection of one internet service over another.

Much of the recent IS adoption literature uses theories such as the Technology Acceptance Model (Davis 1989), Theory of Planned Behavior (Ajzen 1991), Unified Theory of Acceptance and Use of Technology (Venkatesh & Morris & Davis & Davis 2003) and other theories that focus on individual-level adoption. For example, researchers recently applied the Theory of Planned Behavior by expanding it to new types of IT systems (Dinev & Qing 2007) and to the acceptance of broadband among different groups (Hsieh & Rai & Keil 2008).

Other studies use UTAUT to study computer applications in non-Western countries (Al-Gahtani & Hubona & Wang 2007) or to investigate the adoption of e-commerce in developing nations (Uzoka 2008).

Research continues to advance the Technology Acceptance Model, the most often employed and influential IS theory (Benbasat et al. 2007; Lee & Kozar & Larsen 2003; McMaster et al. 2005). Recent applications include wireless data networks (Yoon & Kim 2007) and mobile communications (Zhang & Mao 2008). Despite greatly advancing IS research by focusing a formerly scattered field of study (Lee et al. 2003), some argue “TAM has fulfilled its original purpose and that it is time researchers moved outside its confines” (Benbasat et al. 2007). While TAM is appropriate in an organizational context, it lacks other vital considerations necessary to explain user behavior (Lopez-Nicolas & Molina-Castillo & Bouwman 2008). Perceived usefulness and ease of use may not be sufficient criteria to study emerging services such as wireless because the impact on everyday routine may be more influential than the technology itself (Bouwman & Carlsson & Molina-Castillo & Walden 2007). TAM is binary, considering only the choice whether to adopt or not adopt one technology in isolation. It ignores context and contingency. Therefore, it does not adequately consider the complexity of the actors’ decision (Bouwman et al. 2007; McMaster et al. 2005).

This paper breaks from the study of technology in an isolated environment to address the gaps pointed out by Benbasat and Barki (2007), McMaster and Watsell (2005), and Venkatesh et al. (2007) in their calls for alternative theoretical perspectives that expand the study of technology diffusion to include contingent models. It also answers Blechar et al.’s (2006) call to explore adoption decisions beyond construct-based research.

Because people cannot gather or analyze every bit of information, they simplify and seek satisfactory, not necessarily ideal, solutions. Building on this concept of Bounded Rationality (Simon 1955), Prospect Theory, a behavioral economics approach to decision-making in the presence of choices and risks, argues that outcomes are contingent upon comparisons to a referent. People judge value by

gains or losses relative to a reference point, not in terms of absolute monetary value (Kahneman & Tversky 1979). For example, people perceive a \$5 price change on a \$25 item as greater than a \$5 change on a \$500 item, even though the differences have the same financial value (Thaler 1980). Constructive preference, in which people determine their preferences when presented with a choice rather than drawing upon *a priori* preferences, suggests that the context and the framing of the choice affect the decision. A goal of the decision-making process is to maximize the ease of justifying a decision (Bettman & Luce & Payne 1998).

Constantiou, Damsgaard, and Knutsen (2007) argue that price is the most important attribute for basic and advanced users of advanced mobile features. Similarly, a study of Wireless Application Protocol details how users compared it against PC-based internet services (Hung 2003). Blechar et al. (2006) introduce reference pricing to the use of advanced mobile services by arguing that mobile phone users compare phone-based data services to computer-based internet services. The reference situation of the internet, perceived as nearly free of charge for similar services, made nearly any price for m-services too expensive in the consumer mind. Therefore, the redundancies between mobile services and PC-based internet could constrain mobile services adoption if users perceive the personal computer as higher in quality relative to mobile devices (Blechar et al. 2006). The importance of reference pricing in a situation of constructive preferences leads to the following proposition:

Proposition 1: the reference price of fixed-line internet creates a situation that biases the consumer against adopting wireless internet service for the laptop.

Because preference construction is contingent on the framing of the problem, the method of elicitation, and the context of the choice; contrast effects play a strong role in decision making by influencing the reference point that is used to gauge value (Tversky & Simonson 1993). The perception of quality differences between a new option and the referent affect the likelihood of switching (Constantiou et al. 2006). Since losses loom larger than corresponding gains, loss aversion suggests that disadvantages are more salient than advantages

(Tversky et al. 1993). In an identical situation, a different decision can be reached depending on whether the choice is framed to indicate a gain or a loss (Kahneman et al. 2003). Perception is reference-dependent and people notice and evaluate changes as percentages rather than the whole value, creating a phenomenon in which people assign a higher value to something that they view as theirs to be lost; while they assign a lower value to something they see as a gain. Take for example the person who is unwilling to pay more than \$35 for a bottle of wine yet is unwilling to sell a bottle he already owns for \$100. The loss aversion associated with this “endowment effect” contributes to status quo bias (Kahneman & Knetsch 1991). Loss aversion during the discernment process leads to the second proposition of this paper:

Proposition 2: status-quo bias adds a perceived switching cost that increases the difference between the referent and the alternative, diminishing the perceived the gain from the adoption of a new broadband technology.

Consumers use “mental accounting” to frame purchasing decisions by assigning them to an expense category. They use these mental distinctions as a frame of reference to measure changes to reference prices. Decisions about which category, and whether to combine categories, impacts the perceived value of the choice. Loss aversion strongly influences how people organize financial transactions in their mind. Accordingly, “consumers don’t like the experience of ‘having the meter running.’ This contributes to what has been called the ‘flat rate bias’ in telecommunications. Most telephone customers elect a flat rate service even though paying by the call would cost them less” (Thaler 1999).

Research into the implications of the bundling wars that have begun with the telecom business explores the effect complementarity has on perceived value and how customers assess a bundle’s transaction value. Mental accounting plays a key role in assessing the transaction value and how context and perceived price affect the choice of mental “category” consumers use to budget a bundled offering (Sheng & Parker & Nakamoto 2007). The influence of mental accounting in purchase and usage decisions leads to the third proposition set in this paper:

Proposition 3: consumers prefer flat-rate plans over pay-per-use billing as a way to simplify mental accounting.

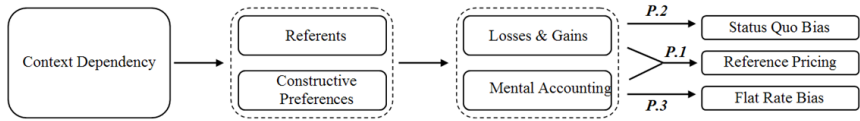


Figure 3.1 Theoretical model of decisions in the presence of choice and derivative research propositions

4.0 METHODOLOGY

This section describes the research methodology used in this study. It begins by detailing the selection of the research instrument and details the study design, recruitment of participants, data collection methods, and data analysis technique.

4.1 Instrument Selection

This study explores how consumers make the decision whether or not to adopt wireless broadband for their laptops. It asks the research question: “what do people think about when deciding to buy broadband internet?” The attitudinal-based nature of the research question and propositions makes the focus group interview the logical choice of research formats (Kitzinger 1995; Krueger & Casey 2000; Morgan 1997).

The processes of attitude formation and decision-making are inherently unobservable. When researching such topics, focus groups provide access to data than cannot be easily obtained by direct participant observation or open-ended interviews (Morgan 1997). Krueger and Casey emphasize the suitability of focus groups to “uncover factors that influence opinions, behavior, or motivation” (Krueger et al. 2000).

The group interview research technique can be a self-contained methodology that can generate principal data that can be the basis for a complete study (Morgan 1997). The data gained from a particular study provide theoretical insights which possess a sufficient degree of generality or universality to allow their projection to other contexts or situations which are comparable to that of the original study (Sim 1998).

4.2 Study Design

This study consists of multiple focus groups in order to be able to analyze data across groups to find patterns and themes (Krueger et al. 2000) and to reduce the effect of individual group dynamics on the overall dataset (Morgan 1997). The formation of three separate groups serves to achieve the data saturation recommended by Morgan (1997) and by Krueger and Casey (2000).

The number of participants represents a strategic balancing act between manageability and achieving significant idea diversity among group members (Morgan 1997). This study opted for small groups, with 6, 5, and 4 participants respectively. In order to compare and contrast data across groups, the interview questions were created prior to the focus groups (Krueger et al. 2000). The questions progressively narrow the topic of discussion specifically to gather data relevant to validating the propositions.

4.3 Participant Recruitment

Recruitment strategy and the study design encouraged openness of sharing and to facilitate interaction among participants. As recommended by Barbour, the goal was to achieve a balance between diversity and homogeneity (Barbour 2005). In order to ensure sufficient heterogeneity of ideas within each group, the selection criterion was “college-aged persons living or working in Denmark.” This basis is general enough to include a large population, yet create a sense of similarity among the group interviewees, as recommended by the literature (Kitzinger 1995; Krueger et al. 2000; Morgan 1997). Within the mixed gender participant set, some were students, others were students with jobs, and some had completed their education and were in the Danish workforce. Thus the screening criteria also had the advantage of diversity, which according to Kitzinger (1995) maximizes the exploration of different perspectives within a group setting.

The study selected young adult participants for several reasons. The study aimed to reduce extraneous variables and prior studies show that age affects individual technology adoption (McFarland 2001; Morris & Venkatesh 2000; Yang & Jolly 2008). The selected group has lived their entire lives since the introduction of mainstream personal computing and related technologies (Prensky 2001). They make heavy use of ICT; particularly internet use, and they have therefore incorporated it into their daily lives. They consider

technology to be part of the landscape (Oblinger 2003) and they consider computers as commonplace, not as technology (Frاند 2000; McMahon & Pospisil 2005). Networked for most their lives (Prensky 2001), they are generally unaware of the pre-internet era (Rickard & Oblinger 2003). Equally important, they are consumers whose entrance as decision makers into the marketplace closely coincides with the wide-scale launch of wireless internet services.

4.4 Data Collection

The focus groups were convened during late April and early May 2008. After the meetings, field notes were typed recording salient points and researcher impressions of the discussions. The conversations were recorded in order to maintain accuracy during the analysis phase of the project. In keeping with the effort to make participants feel comfortable about sharing their opinions, the research plan followed the privacy guidelines recommended by Krueger and Casey (2000).

4.5 Analytical tools

The analysis used both the field notes and transcripts. The data were analyzed at the group level and on a comprehensive (study-wide) level. ATLAS.ti was used to code the data. At times many statements contained similar information; and other statements were short statements that required the context of the surrounding conversation to convey a point. The quotations included in the next section of this paper serve as demonstrative exemplars.

5.0 FINDINGS

This section details the information provided by the focus group participants. It begins with an overview and then elaborates by providing specific statements and quotations.

Based on past and present experiences, the focus group participants weigh many factors when evaluating broadband internet service. Service characteristics such as speed, security, stability, provider reputation, data transmission consistency, and convenience all play a role in the decision-making process. For all participants, price plays a pivotal role in deciding which broadband service to adopt. Rather than purely considering the monetary amount charged, they view

price as the financial value derived from the amount paid for the service relative to the performance received. The overall pricing function includes the evaluation of different service characteristics such as performance metrics and provider reputation. Thus, they compare the price of one option to another, both in terms of the monetary amount and the price to performance ratio. While some consumers seek the ultimate price-performance ratio, there is a propensity for the monetary amount to supersede other attributes once the consumers' minimum needs have been satisfied. Therefore, generally speaking, the performance portion of the function begins to weigh less heavily once a minimum threshold is satisfied.

All of the participants subscribe to fixed-line internet technology, and all use Wi-Fi access at least part of the time. The use of Wi-Fi to deliver the internet from a fixed line access point creates the reference perspective that internet access is portable. While such internet access cannot be accessed continuously over a large geographic area, it does enable access in a wide variety of locations. Some participants expressed an interest in mobile internet that they could use on moving trains, etc. Others saw little difference between mobile service and the portable service they currently experienced with a Wi-Fi link to a fixed line connection. Some subscribe to Wi-Fi hotspot services as either a paid subscriber or as part of an internet collective, but all participants primarily use Wi-Fi as router connected to the same fixed line access that the users can plug into if they choose. Therefore fixed line access serves as the reference point against which wireless alternatives are compared.

Although all participants used fixed-line for primary access, the cost basis varied widely. Some purchased internet as part of a service bundle along with VoIP or television service. Others had home internet service paid by an employer so that they experienced no out-of-pocket expense for the service. Others received internet from the building in which they lived. Often the internet was included as part of the rent, essentially creating a reference price of zero. A participant explains how this frames the decision process:

“And that might be a competition to wireless because people will have internet with their rent, as it is right now. So they don’t need that wireless or that extra internet. It’s not like they say ‘either we’re going to have wired that we pay for or we’ve going to have wireless.’ It’s ‘we have a wired are we going to pay for wireless as well?’”

Others lived in buildings in which their choice of fixed-line provider was determined by the building, and therefore had only wireless technologies as alternatives. In a similar instance, a participant must choose between two fixed-line options available at his building. A participant whose rent payment includes internet service also belonged to the Webbies collective. Webbies members receive a wireless router that permits any member to connect to any other member. The participant states: “And this way, I also have almost internet everywhere with my cable. ...It’s free and a lot of people have it.”

When asked about willingness to switch providers in order to adopt a new technology, some participants express a willingness to switch providers. Others express a status quo bias in which they are hesitant to change providers when such change was necessary to adopt a better internet technology. If participants associate inconvenience with switching, they would stay with their provider. Participants explain that this hesitation stems from a broad aversion to changing relationships with companies.

Others explain their hesitation to switch companies because of the time it takes to complete the switching process. One participant shares that uncertainty plays a part in creating his status-quo bias:

“It’s changing the paperwork and the bank details and whatever it is. But it’s also the fact that you know what you have. You know that it works or that it doesn’t work or that whatever else you *don’t know* about the other company.”

All of the participants’ primary internet access services employ flat-rate billing plans. The participants expressed a general preference for flat rate pricing plans and an aversion to per-use billing structures. Those who have internet-enabled

phones use the data service infrequently because of the high cost of sending and receiving data. One participant uses three services with his laptop: fixed-line, Wi-Fi hotspot, and 3G. The fixed line and hotspot subscriptions are flat rate and used frequently; however, the expense of 3G causes him to use it “only as little as possible, for *essential* things.” Participants explained that choosing fixed rate plans simplifies their personal budgeting process and also makes it easier to decide whether or not to use the internet:

“...if there is a new opportunity to get like TV access or somebody tells you to go watch this or do this, I don’t have to worry about whether it is worth it to do that transaction; whether I want to spend the extra money on the download. I like the that flexibility of being able to do whatever I want”

Prior to broadband, internet service price varied upon use. When asked about the advantages of dial-up versus high speed fixed-line internet service, in addition to performance differences, focus group participants brought up the differences in billing strategies between the two technologies with statements like:

“When you used the modem, you know in the back of your head, that it costs for every minute. Now it doesn’t matter, really.”

6.0 RESULTS

This section is divided into two parts. The analysis compares the findings to the expected outcomes based on theoretical arguments and suggests a diffusion approach for wireless internet service providers based on the study findings and existing literature. A discussion of the propositions and evaluation of the focus group methodology concludes the segment.

6.1 Analysis

The participating consumers view internet service options as access technologies. They have already integrated the internet with their daily lives. They are accustomed to fixed line and wireless ICT. Therefore, people view the

choice among alternative types of technology as a relatively routine purchasing process and thus employ standard cognitive choice models.

When buying broadband service, people exhibit isolation effects. In the case of the focus group data, all broadband technologies take the user to the internet, enable VoIP, data transfer, etc. As a result, the focus group participants pay attention to the factors that differentiate the choices, the most concrete of which is price. Therefore, their ISP choices are generally a function of price. The disregard for components shared by the alternatives conforms to the findings of Kahneman and Tversky (1979).

The interviewees base value on price, not just absolute prices of one offering versus another, but as an assessment of the price relative to various key features. Therefore, if one service costs twice as much, but offers performance perceived to be twice as “good” then the offers would be equal in the consumer mind. At that point, the consumer would evaluate the offering that came closest to his or her subjective performance requirements, in a rough but somewhat rational manner. As a result, the participants evaluate the offerings using their past and current experience to frame their decision, as postulated by Kahneman and Tversky (1979). They make their decisions by evaluating differences from their fixed line reference point, supporting Kahneman’s (2003) findings that people use analogical reasoning to make choices.

Focus group participants using home broadband access reimbursed by an employer or included in the rent or tenant fees perceive the reference price of broadband services as free. These consumers experience no marginal cost for adopting their current internet service, but would experience an incremental cost if they decided to use a different internet service. Therefore, any alternative choice, including wireless broadband, would be *infinitely* more expensive; which provides support for the argument by Blechar et al. (2006) that mobile service users make reference to existing service delivery platforms when making their usage decisions.

Participants use price analysis to view possible outcomes as a gain or loss to a reference point so they can employ a partially rational decision process. This approach to balancing accuracy and effort conforms to the findings of Bettman et al. (1998) who write that people reach a subconscious compromise between the desire to make the right decision and the desire to minimize the cognitive effort required to make the decision.

A notable situation exists when comparing current fixed line and wireless broadband service. Except for mobility and installation convenience, every metric considered by focus group participants is inferior to the fixed line frame of reference. As predicted (Kahneman 2003; Kahneman et al. 2003), the loss of functionality is weighed more strongly than the gain of another function. This also supports Constantiou et al.'s (2006) argument that quality perception may cause a status quo bias against mobile services.

The presence of an affinity for flat-rate billing and supports Thaler's (1999) argument that "mental accounting matters." Participants feared that pay-per-use plans could become very expensive, as postulated by Thaler's assertion that loss aversion contributes to a flat rate bias in telecommunications decisions (Thaler 1999). Furthermore, the adoption of a flat-rate plan frees the internet user from evaluating whether or not each internet activity is worth incurring a separate expense, in accordance with Bettman et al.'s argument that one goal of the decision making process is to maximize the ease of justifying the decision (Bettman et al. 1998). In the case of broadband internet, an unlimited use plan eliminates the possibility of "buyer's remorse" after spending money to visit a website, download a file, or view a video.

6.2 Discussion

This discussion provides an overview of the findings and a summary of the contribution to theoretical literature. Second, it addresses the relevance to the business community. Finally, it reviews the methodology chosen for the study.

The data support the propositions derived from existing literature. In general, as put forth Proposition 1, participants use reference pricing as a primary decision-

making tool. Although opinions vary, a general status quo bias influences purchase decisions, supporting Proposition 2. Mental accounting contributes to a flat rate payment bias in telecommunication services, as predicted by Proposition 3.

The findings contribute to the body of literature that studies technology adoption beyond individual-level technology studied in isolation. The study adds to the body of knowledge about consumer decision-making processes outside construct-based research. It adds to user behavior research in wireless services by elaborating on the process by which end users make ICT purchase decisions. It illustrates that insights can be gained when cognitive decision models are applied to technology choice.

In addition to theoretical contributions, the findings resulting from this focus group study have several business implications for companies with heavy investment in wireless internet technology. With heavy sunk-cost investments in licensing and infrastructure roll-out, much is to be lost if wireless broadband does not gain mass adoption. There are many challenges to the adoption and diffusion of wireless broadband: inferior perceived performance, high price, and reference situations that weaken the wireless value proposition. These reference situations concern the demand for mobility framed by Wi-Fi and by current usage habits.

Study data suggest wireless providers should use flat rate pricing and create an offering that disassociates mobile broadband from fixed-line internet so that users (i) assign the cost to a different mental account and (ii) view it as different enough to weaken a performance comparison between the technologies. Once customers begin using wireless internet, they may experience the “endowment effect” (Kahneman et al. 1991) which will cause the users to perceive giving up wireless internet as a loss. In such case, status quo bias will make them less likely to discontinue service. As Kahneman (2003) indicates, people opt out of the framed situation much less frequently than they opt in to an alternative.

The study creates an opportunity to review the selected methodology. In this case, the focus group format provides a method to learn the thought process of the test subjects. The interplay of the different participants during discussions provides rich data for analysis. The open-ended nature of the format allows participants to introduce new ideas into the group and therefore provides insight not attainable through surveys. During the first focus group, for example, participants introduced a topic that received significant attention and generated much discussion. This topic appears as a question within the interview guide used with subsequent groups. Additionally, a theme recurred within the first focus group that seemed a worthy topic of research. Therefore, a new question explicitly asked subsequent focus groups about their perceptions regarding the theme, enabling more elaborate data collection.

The small sample size of this study precludes developing a probabilistic model from the data; however, the focus group findings are useful for theoretical generalizability (Barbour 2005) and conceptual transferability (Krueger et al. 2000). The selection of participants with common characteristics rather than random sampling provides insights, but it limits the transferability of the findings to the general population at large.

7.0 CONCLUSION

This study uses focus group data to explore the differences as perceived by high-speed internet users that would influence the adoption of wireless broadband. By exploring what consumers consider when making technology purchase decisions, the data support the importance referencing pricing plays in technology adoption. It lends additional support to the existence of status quo biases in purchase decisions; and it strengthens the argument that consumers prefer flat-price service plans in telecommunications because of bounded rationality and the derivative concepts of prospect theory and mental accounting.

A significant implication of this paper is furthering the proposition that much consumer adoption of new technology can be explained with general decision

models by providing strong evidence that these models play a primary role in adoption decisions. The implications are important both to further research as well as to industry. Focusing exclusively on technology diffusion models when conducting research or developing business plans or marketing strategy may ignore real and present influences that affect the acceptance and uptake of innovation.

While this study provides support for and insight into applying cognitive decision models to technological adoption, the study has limitations that warrant further research. For example, additional qualitative studies could enrich the findings of this study by exploring the underlying reasons why some consumers exhibit stronger status quo bias than others. Additionally, quantitative research with larger samples could validate the findings of this study. One potential study would focus on the young demographic featured herein because their technology literacy differs from the population at large. Continuing to study this demographic is relevant to adoption theory and business practitioners because the participants may view different technologies as their referents; and thus their status quo may be different from that of older individuals. At the same time, a sample of the population at large would serve to test the overall validity of the findings. Similar results between the groups would validate this study. If differences between younger and older demographics prove significant, then it might support a call for different approaches to the study of technology adoption based on generational considerations.

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PAPER II

The Values of Using Smart Phones

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The purpose of this paper is to complement previous research on the adoption and use of smart phones by introducing theories from consumer research and media use. The focus is on both the intrinsic and extrinsic values user experiences when possessing, interacting and using smart phones as well as media use behavior. As such, it shows how the theories of consumption values and its five value categories: functional, social, emotional, epistemic, and conditional are useful supplements to traditional conceptualizations and explanations of smart phone adoption. Using concepts from consumption values theory to explain the user’s activities and experience of the iPhone, we show how the smart phone can be usefully articulated as in terms of consumption. It also implies that the use as such is an end by itself and not only a mean to reach some other objectives, e.g. calling or surfing. In addition, we portray the smart phone use as a question of fit. These can be beneficial perspectives 1) when designing smart phones and wireless devices in the future and 2) when describing, explaining, and predicting the diffusion and adoption of smart phones and other technologies in general.

The values of using smart phones

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Abstract. The purpose of this paper is to complement previous research on the adoption and use of smart phones by introducing theories from consumer research and media studies. The focus is on the both intrinsic and extrinsic values that users experience when possessing, interacting with, and using smart phones as well as the media usage associated with the smart phone. As such, it shows how the Theory of Consumption Values and its five value categories: functional, social, emotional, epistemic, and conditional are useful supplements to traditional conceptualizations and explanations of smart phone adoption. Using concepts from consumption values theory to explain the user's activities and experience of the iPhone, we show how smart phone use can be usefully articulated as in terms of consumption. It also implies that the use as such is an end by itself and not only a mean to reach some other objectives, e.g. calling or surfing. In addition, we portray the smart phone use as a question of fit. These can be beneficial perspectives 1) when designing smart phones and wireless devices in the future and 2) when describing, explaining, and predicting the diffusion and adoption of smart phones and other technologies.

Introduction

Researchers often employ theories of technological adoption such as the Technology Acceptance Model when investigating the adoption of ICT. While these theories have proven useful when studying individual technologies, exploring different theories can also enhance the understanding of new technology usage. This paper introduces consumption values theories as an alternative perspective in describing, explaining and predicting technology usage.

By doing so, this paper breaks from the study of technology in an isolated environment to address the gap pointed out by Venkatesh et al. (2007) in their call for alternative theoretical perspectives that expand the study of technology diffusion to include contingent models. It also answers Benbasat and Barki's (2007) call to consider as a necessary variable the IT artifact and its design.

The contributions of this paper are two-fold. First, it adds to user behavior research in wireless services by elaborating on user preferences and adoption of new or different technologies. Second, it explores a contextualization of consumption values theory by using a distinction between time-in and time-out media use that draws upon phenomenological media research.

This paper is structured as follows: the first section offers a discussion of relevant theories and literature. The following segment details the research methodology used to collect and analyze the data. The subsequent section presents the findings. After the findings is a discussion addressing the theoretical implications and proposing a new model for understanding technology adoption and use. Finally, concluding remarks bring the paper to a close.

Literature review

This section begins with the call for different theoretical approaches to the study of technology adoption within Information Systems research. It then provides an overview to the Theory of Consumption Values (TCV), which can help understand and predict decision whether or not to use a given technology. It then reviews relevant literature that argue how time-in versus time-out media usage shapes the way in which people employ technology in everyday life.

Call for different approaches

In the study of adoption and use of information technology, researchers have adopted and applied different behavioral models from cognitive psychology (Benbasat and Barki, 2007). To explain the adoption and use of information

technology in different contexts, a significant body of literature has built upon the Theory of Reasoned Action (Fishbein and Ajzen, 1975), Theory of Planned Behavior (Ajzen, 1985, 1991), Technology Acceptance Model (Davis, 1989; Davis, Bagozzi, and Warshaw, 1989) and Unified Theory of Acceptance and Use of Technology (Venkatesh, Morris, Davis, and Davis, 2003).

Recently, TRA has been used to gauge attitudes about mobile advertising (Wong and Tang, 2008) and to shed light on blog participation (Hsu and Lin, 2008). The Theory of Planned Behavior continues to advance ICT research by expanding to include new types of IT systems (Dinev and Qing, 2007) and to the acceptance of broadband among different groups (Hsieh, Rai, and Keil, 2008). Other studies use UTAUT to study computer applications in non-Western countries (Al-Gahtani, Hubona, and Wang, 2007) or to investigate the adoption of e-commerce in developing nations (Uzoka, 2008).

The most established is the Technology Acceptance Model, which has been and still is used widely in information systems research (Venkatesh et al., 2007), including the recent study of topics such as wireless data networks (Yoon and Kim, 2007) and mobile communications (Zhang and Mao, 2008).

Even though TAM is among the most influential behavioral models, recent literature has questioned whether it directs researchers' attention away from the antecedents of belief and does not take into account the IT artifact or its design; thus neglecting important outcomes of information technology (Benbasat and Barki, 2007). Other authors have argued that TAM is reaching maturity (Venkatesh et al., 2007). This, coupled with the need for alternative perspectives (Venkatesh et al., 2007), establish the need to explore alternative theories that may explain the adoption and use of advanced wireless devices.

Consumption values

Consumption values are at the core of consumer research. They address the explicit and implicit reasons and motives when people are making decisions in consumer situations. The academic discipline of consumer research emerged in

the mid sixties (Holbrook, 2006). Since the start a number of models, frameworks, and theories have emerged that explain, predict, and describe consumer choices, including Theory of Consumption Values (Sheth, Newman, and Gross, 1991a; 1991b), experiential value (Mathwick, Malhotra, and Rigdon, 2001), and Holbrook value typology (Holbrook, 2006). In the early days the consumer was viewed as a rational economic decision maker who processes information in order to maximize value (Sheth, 1979). Furthermore, consumer value was primarily conceptualized as a tradeoff between price and quality. In the early 1980s researchers began to criticize and question the logic of the economic rational man and the assumption that consumers resemble a calculator (Holbrook, 2006). Subsequently, Holbrook and Hirschman (1982) proposed what is known as the experiential approach. They introduced new concepts and constructs, such as fantasies (dreams, imaginations, unconscious desires), feelings (love hate, anger, fear, joy, sorrow), and fun (Holbrook, 2006). Consumer research has evolved from a simplistic view of the consumer decision process to embrace many more reasons and motives including both intrinsic and extrinsic values (Holbrook, 2005; 2006).

One effort to integrate the different types of consumption values is Sheth et al. (1991a; 1991b) who proposed the the Theory of Consumption Values (TCV). The TCV is based on the synthesis of a large literature review survey and includes five different types of values that underlie consumer choice, thereby providing an encompassing understanding of the consumer experience. A particular choice may be determined by one value or influenced by several values. The five values are described below:

1. Functional value follows the logic of the rational economic man and assumes economic utility theory. Decisions (consumer choices to buy or use a product or service) are based on characteristics or attributes of the consumable item. For example, the purchase or use of a mobile phone might be based on functionality or price.
2. Social value is important in consumer decisions that involve highly visible products or services to be shared with others (such as gifts). For

example, a sports car, mobile phone, or laptop may be chosen more for the perceived social image evoked than for functional performance. The idea that some products or services possess symbolic importance in excess of their functional worth is the foundation of social value.

3. Emotional value is the third type of value influencing consumer choice. To illustrate emotional values, consider the thrill of riding a rollercoaster or buying a new mobile phone. The thrill, joy, or excitement is emotional value. Aesthetic considerations, such as beauty, can add emotional value to a product.
4. Epistemic value applies when consuming or experiencing new products or services, such as buying a new computer or mobile phone. In cases when you are either bored with your current product, curious about something, or just want to learn something new, epistemic value applies.
5. Conditional value applies to products or services that only have a value depending the context (time or place). For example, the telephone number 112 is only valuable when you are in certain countries and need to call for emergency services. Products that have a seasonal value also provide strong examples of conditional value.

The application of TCV has been demonstrated in technology decisions. An early technological application that is relevant to this study comes from Alpert (1994) who studied the decline in functional, epistemic, emotional, and social value of technology over time.

Time-in, time-out uses of media

Jensen (1995) and Larsen (1998) have proposed a distinction between *time-in* and *time-out* uses of media. The distinction draws upon a sports metaphor in which time-out activities always occur within the time-in of a game. The distinction describes how uses of media within the life-world (i.e. the ordinary, the un-reflected) can be punctuated by time-out media use when a consumer

takes out time to consciously use a medium. Similar distinctions can be found in Giddens' structuration theory (Giddens, 1984), where ordinary life is interspersed with reflective moments, as well as in Carey's treatment of media as transmission and ritual (Carey, 1989) and Roger Silverstone's distinction between the *ordinary* and the *ritual* (Silverstone, 1994; Larsen, 1998). To some extent all draw upon a phenomenological tradition that highlights the "lived" uses of media, particularly how certain classes of media (e.g. television or radio) play a role in people's lives. For the purpose of this paper Jensen's and Larsen's distinction provides a suitable framework because it suggests a movement between the two kinds of media use without sacrificing a relational perspective on them. Time-out is integral to "make the game go on," in the sense that new strategies, new knowledge, and new reflections on the state of the *time-in* can be acquired in *time-out* consumption mode. In other words, the dimensions on the consumption of media in either time-in and time-out mode are intimately related. However, as we will show later, observing consumption over time ties specific time-in/out usage patterns to changes in the user's valorization of the technology.

Time-In	Time-Out
Integrated practice	Autonomous practice
Social Practice	Aesthetic practice
The ordinary	The extraordinary
Resource	Exposition
Action	Representation

Table 1: Time-in/out dimensions (adapted from Jensen 1995)

As Larsen (1998) argues, neither Jensen (1995) nor Silverstone (1994) give empirical examples of time-outs as suspensions of everyday activities. This paper employs the distinction in order to expand the Theory of Consumption Values by adding the dimension of time-in/out usage to the standard conditional value that is used to predict and explain consumer choices.

A significant contribution of this paper uses the time-in/out distinction to begin the development of a Mundane Consumption Model (MCM) that shows how use of an “extraordinary device” changes over time. By repurposing the time-in/out distinction from the original inspiration from the likes of Habermas (1979), Giddens (1984), and Carey (1989) by way of the theory of consumption values, this paper marks a pragmatic move that allows the time-in/out distinction to be applied in empirical studies of technology artifacts and services.

3 Methodology

The data analyzed in this paper comes from a six-month-long qualitative field study in which 16 participants were given iPhones shortly after Apple’s release of the 3G iPhone in Denmark. The participants worked full time or part time and their age varied from 22 to 51. The common denominator is that they were recruited from a university course in e-business strategy. In exchange for participation in the study that included access to usage data from the operator and the commitment to fulfill data collection requirements, participants received six months use of an iPhone including a voice, SMS, and data plan.

Using surveys, focus groups, and one-on-one interviews, data were collected regarding pre-adoption and post-adoption attitudes and expectations. Prior to receiving the iPhone, participants completed a comprehensive survey that included detailed information regarding computer, mobile phone, and other information and communication technology usage. They were also asked what they would like to do with their phone that they were unable to do with their previous phone, and how their usage of ICT would likely change after receiving the iPhone. Flexibility and openness in the direction of the interaction with the participants was kept during the study, allowing new perspectives, theories, and propositions to occur throughout the study.

After adopting the iPhone, participants were divided into three focus groups to discuss the various consumption values that determined their interest in the device and its various uses. The groups reconvened to discuss their interaction

with the handset interface. Surveys were repeated at the midpoint and end of the study to track behavior and usage. Responses from the initial survey were used to customize questions for the subsequent open-ended interviews. One interview discussed the features most important to them when selecting a wireless device. Another set of interviews was conducted at the conclusion of the study to discuss the change in behavior and attitudes over the duration of the study. Focus group and interview field notes were analyzed, coded, and a selection of the findings are detailed in the following section.

Empirical Findings

This section presents the findings relating to each of the five consumption values. It reflects longitudinal data collected at different points, beginning shortly before the participants received their iPhones through the end of the study. Therefore, it reflects both pre- and post-adoption values, and it describes the change over time. In order to illustrate the theoretical concepts we present the empirical finding according to the theories.

Functional value

At first glance, the web-enabled smart phone offers great functional value to users. It offers constant access to the internet, email, and information search. It also enables telephone conversation and SMS, two features that have become part of everyday communication. Entertainment features, such as the video player and music player, as well as productivity tools like the calendar add additional functional value to the device. The ability to navigate unfamiliar areas with GPS adds value. The ability to download various programs, be they games or productivity tools, enhances the user experience. A quintessential value of the smart phone offering stems from the integration of many functional elements into a single, transportable, always-available device. Having so many useful tools literally in the palm of one's hand, ready whenever needed, separates the smart phone from other ICT devices.

At the same time, the functions that resonate most strongly with users gain much of their value from the other consumption values: social, emotional, epistemic, and conditional. These values influence the significance the smart phone offering (specifically the iPhone in the case of this study) to the end users.

Users' perception of functional value changes over time. From pre-adoption to the end of the study, significant value changes occur. For example, the functional value increased for some participants, while it decreased for others. For example, Participant #10 explains that the smart phone-based email is decent, but it is significantly less robust than his laptop's personal computer email system. Participant #12 noted a decline in the functional value once she experienced the product, citing difficulty-in-use and problems with wireless connectivity. Participant #11 said: "It's only when you use it that you find out about the negative things." At the same time, others found that the functional value increased post-adoption. Participant #1 indicated that some things do not work well, while other functions exceed expectations. Likewise, participant #7 said that when she first adopted the iPhone, she was unaware of what it could do or how easy it would be to use. After using it, she sees the benefit to having certain features available on her mobile device. Participant #9 describes the growth in functional value over time. She experiences a progression from not using it to not wanting to be without it. She declares that certain uses have become habit, perhaps even addictions.

Social value

The iPhone itself creates social value. It can be a conversation piece about which many people ask questions and strike up conversations. It provides an icebreaker for iPhone users to begin talking to other users, thereby facilitating social interaction and establishing new relationships. As described by Participant #8: "It brings people together and creates an inner circle." The iPhone serves a social value similar to many fashion items. Participant #10 explains as follows: "It must be high tech, cutting edge and fashionably

designed. This is important because it tells my surroundings about me, my interests, and my preferences.” Participant #8 describes it as personal branding that sends a message to affect friendships and relationships, similar to the personal identity associated with wardrobe choices. Participant #11 describes the iPhone as being “like golden chains or expensive cars. It’s a fashion icon. ‘Look I can afford this iPhone. I have money.’”

The reaction can be different based on different social settings and groups. Participant #16 gives a good example by juxtaposing his work environment: “all my colleagues have one, so it’s not interesting to them” with the positive reception in his domestic setting: “I got 30 seconds of attention from the kids.” While the iPhone may garner admiration for its owner, it can also be deemed unfashionable or inappropriate in certain settings. Participant #6 indicates that “in some groups I like to flash it; in other groups I feel like a follower because my friends have it.” He also says, “I don’t like to show my phone some places. People ask me how I can afford it – I don’t like to talk about money and finance.” Participant #2 echoes this sentiment, saying: “When people ask me why I got it, I always say I got it for free [as part of the study]... I’m not paying for it myself. That is important to me. I don’t like to flash it this way in public, late at night [because it might make me a robbery target].”

Social value changes over time, which can result from intrinsic reasons or from social responses. For example, the social value declined for Participant #10. His attitude changed as he realized social confirmation was not as important to him as he thought. He explains: “Before I got the iPhone, I saw it as a social phenomenon. Over time, I realized that I didn’t get gratification socially by talking about the iPhone.” Participant #12 experienced a paradoxical change over time. During the study she received much more positive attention because she owned an iPhone, which raised the social value. At the same time, she found much of the attention bothersome and annoying, which lowered the social value. Participant #7 continues to derive strong social value from her iPhone over the course of the study: “The iPhone gives an impression to people. It makes a statement, even though it is more common

than six months ago. People know the brand, the phone, and what it is; but not many people have it.” Participant #9 offers a different opinion: “When it came out it was cool. Now it is common.” Likewise, Participants #6, 8, and 13 explain that the phone no longer offered the caché that it afforded at the beginning of the study. Similarly, at the commencement of the study, Participants #15 and 16 envied people with iPhones and expected their social groups to share the opinion. Once they received their phones, however, they learned that their peers did not care.

Participants #1, 2, and 11 expressed a drop in social value over time that was causally linked to a decline in functional value. As more people gained first-hand or vicarious experience with the iPhone, many began to notice the functional shortcomings. Therefore, as the functional value of the phone declined, so did the social value. At the extreme, Participant #11 explained that the decline in functional value affected the social value by creating a situation in which adopters were viewed negatively – as unwise for spending too much money on a product with limited functionality. He explained that some users found themselves in the position of defending their decision to purchase an iPhone to the members of their social groups.

Emotional value

The Maslowian need of belonging (Maslow, 1946), which is an emotional need fundamental to many of the participants, is filled by the ability to be constantly connected. Participant #13 explains: “Connections to other people. It is obvious that whenever we switch off our phones we are not important anymore.” For example, the ability to access social networks and various twitter sites enables people to maintain their social relationships in a way that other types of communication do not offer. Participant #9 uses such sites to “see what everyone else is doing.” As Participant #2 describes: “It’s easy to stay updated on what’s going on in my friends’ lives without really committing to a dialogue.” Communication features such as telephone and SMS provide a connection to family and friends. Participant #4 describes how the many

different communication media make it easy to keep in touch with friends and “it helps me keep in touch with some people that I normally wouldn’t talk to so often.”

The technology integrated within the smart phone provides tools for altering one’s emotional state. Many participants use the music player because the choice of music can bring about a desired mood. Others have downloaded specific applications, such as Participant #8 who downloaded a program named Tranquility that plays relaxing sounds. In addition to the emotion-enabling features, the phone itself can trigger emotions, as described by Participant #15: “it’s also beautiful [and] the aesthetic feeling.” She also uses it to listen to spiritual e-books.

According to Participant #7, “I like to always have my pictures with me -- reminds me that a situation was fun, and I get in a better mood.” By carrying her photo albums with her, Participant #8 describes how her iPhone provides the familiar feeling wherever she may be: “You can take a little bit of home with you. It makes you feel secure.”

Emotional value changes over time. Some people, such as participant #7, remain excited about having their phones. Others compare their emotional relationship with the iPhone to a love affair. Participant #16 says: “It’s like a girlfriend. In the beginning, it’s fun and sexy, but after half a year, the excitement is gone.” Participant #9 paints a similar picture: “It’s like being in love. You have to touch it all the time, but then it’s just part of your everyday life.” Other participants expressed a shift from enthusiasm to disappointment during the course of the study. Participant #11 describes it as follows: “When I get new things, I’m leaning toward optimism and not focusing on negative things. It’s only when you use it that you find out about the negative things.”

Epistemic Value

The iPhone derives epistemic value in three ways. First, the artifact itself inspires curiosity. People like trying new technology and learning how to use a

new device and experiencing a new graphic user interface. The device itself therefore provides novelty value and appeals to those seeking to satisfy their curiosity. Several described this quality as the “cool factor.”

The second way the iPhone derives epistemic value is through the availability of downloadable applications and various media. There are thousands of programs that can be downloaded, many for free. Access to video websites such as youtube further provides a constant stream of novelty. The applications themselves can be used to explore and see what each application is like. Participant #12 explains: “The iPhone is a new product. It’s interesting to see what people make. What applications are there? You really have everything in the apps.” Participant #6 indulges his intellectual curiosity by finding out about the latest programs: “I read a lot on the web, new ways to use it [the iPhone]. How to make your everyday easier with new applications...” Participant #11 explains: “I’ve been looking at the development tools – how to make things for the iPhone.”

Third, the integration of a standard web browser enables users to find whatever information they seek. This helps satisfy curiosity, and it can end confusion. Participants #2, #4 and #13 suggest that users visit Wikipedia when they disagree on something. Participant #10 declares: “It can awaken creativity. I’m a musician as well. I can come up with new ideas. Music puts me in a different mindset– thinking in a different way when you work.”

Of the five consumption values, in this study epistemic value experiences the greatest decline over time. As indicated by the literature, curiosity and novelty are key drivers of epistemic value. As familiarity with a device grows, the epistemic value declines. In the beginning, participants explored the iPhone features, and downloaded applications simply to experiment with something new. As the study progressed, the amount of tinkering declined. Participant #11 sums up this phenomenon by explaining that at the beginning of the study, the iPhone was a toy. It increased his technical knowledge, but by the end of the study a future increase in technology knowledge was unlikely. The epistemic value declines rapidly.

Conditional value

A significant impact of the iPhone stems from its omnipresence. The participants almost always have their iPhone with them, and through the 3G and EDGE connections are always connected to the internet. The integrated tools, such as music player, camera, and other applications add significant value to the iPhone. However, many of the features are viewed as inferior substitutes to equipment that is focused on a single purpose. The preferences varied by individual participants, but all believed the iPhone was a satisfactory, not optimal, device for many of its uses. Participant #10 articulated that smart phones do many things, but they do not do any of them well.

In general, the conditional preference for the iPhone was based on convenience-related measures. Much of the conditional value stemmed from the availability of a laptop computer and internet connection. In general, if a computer were close and connected to the internet, the computer would be the device of choice. If time were limited, the long-boot up time of a computer added conditional value to the iPhone, which was ready for use. When a Wi-Fi or land line internet connection was unavailable, the conditional value of the smart phone rose dramatically because it was the only alternative. For example, none saw much value in typing email on the iPhone unless a computer was unavailable, the message must be sent immediately, and the message could be conveyed in a few words. At the same time, some preferred reading email on their iPhone, even when the computer was ready-at-hand. Such preference was often discussed as a habit, rather than a conscious choice. Participant #2 frames her thought process: “I use the [mobile] internet on the go. I don’t sit at home and say ‘I want to sit on a bench and surf.’”

Towards a consumption theory of mobile use

This section discusses the empirical findings by focusing on the consumption values, followed by a discussion of the implications of time-out and time-in media use reflected in the data. It then discusses the correlation of the two theories and proposes a new framework that synthesizes of the two theories.

Consumption values

The data from this study evinces the significance Consumption Values have in understanding the usage of technology by end users. All five values impacted the user experience. The study examines theoretical generalizability, not aiming to develop a probabilistic model. Participant data indicate an interrelation between different values such that a change in one value may cause a change in others. Additionally, the study presented extreme facilitating conditions by providing an iPhone and six month subscription at no cost to the user. This creates a pro-adoption bias that results in an inability to determine real-world intention to adopt the iPhone. While most participants expressed the intention to use a different type of mobile device after the study, the recall of the phones at the conclusion of the study also created an artificial stimulus, which impedes measuring accurately whether participants would have continued to use the phone if they were permitted to keep the phones.

At the same time, the study highlights how the iPhone does not derive its primary value from stand-alone capabilities. Through this empirical study we have seen how value is not a discrete activity on the phone, but a mixture of consumption values enabled and embedded within a portable media device such as the smart phone. Through this longitudinal study, we have seen how the iPhone changed (for most participants) from being an object for “conspicuous consumption” (Veblen, 1912; Veblen and Howells, 1965) and intense epistemic curiosity to becoming a mundane, ordinary artifact.

At the beginning of the study, the “coolness” factor (social and emotional values) and epistemic value were the primary drivers. The potential functional benefits also drove interest, but to a lesser extent. Over time, the perceived functional benefit declined for most of the participants; however, the conditional value increased. While the iPhone never served as a viable replacement for a personal computer, the use of the iPhone when a computer was unavailable became a standard part of many users’ daily lives. Several participants described, for instance, checking their email or using the iPhone to “kill time” as a habitual activity that blended in with a range of other activities.

Going time-out to time-in

These findings present an interesting scenario that can be examined using Jensen's (1995) and Steeg Larsen's (1998) distinction between time-in and time-out media consumption. The social value reaped by "showing off" the iPhone is clearly a time-out task. It involves deliberately dedicating time and effort to the social, conspicuous practice of promoting the phone, discussing the phone, or otherwise flaunting it as a gadget. The emotional value gained by the aesthetic beauty of the product design is also a time-out event. Users take time away from other activities to look at it, caress the shape, and feel the glassy texture of the device. At this stage, the iPhone has a representative meaning greater than its functional value. It is extraordinary and its owners treat it as such. Jensen's (1995) distinction highlights the way in which media can be both integral to the flow of daily activities and can also facilitate a reflective distance from the mundane. In the case of the iPhone, the time-in/out distinction shows how new portable media and communication devices give rise to time-in integration activities that previously occupied time-out situations.

The novelty, and therefore the associated time-out activities, of the iPhone declines rapidly after its adoption. The aspects that originally filled epistemic needs quickly serve primarily utilitarian functions. As the iPhone becomes more ordinary, its usage becomes primarily time-in use. Checking email, making phone calls, and other uses that are "invisible," or seamlessly integrated with life. Music is used during jogging, commuting, or other activities; e-mail was regularly checked during other activities (attending class, commuting, eating breakfast, etc.). By the midpoint of the study, participants were not specifically playing with the iTunes function or setting aside time to listen to music. The conventional mobile phone features were used in a similar manner to pre-iPhone behavior, with the exception of SMS, which for most participants declined because typing on the iPhone requires concentration, making it more of a time-out activity than their old phones, on which typing was almost an unconscious activity. This shift in usage supports Jensen and Jankowski's (1991) argument that media usage is generally changing from a time-out mode of consumption to

a time-in mode in which multiple activities coincide with or are supported by media usage.

Table 2 presents examples of time-in and time-out activities are represented by the research data.

Time In	Time Out
Integrated practice	Autonomous practice
Example: using the MP3 player while jogging, checking e-mail in class	Example: Watching downloaded movies
Social Practice	Aesthetic practice
Example: keeping in touch with friends, using the phone as a general communication device in daily life	Example: product design, enjoying the form-factor of the device, comparing iPhone form to “regular” phones
The ordinary	The extraordinary
Example: calling a friend to talk, e-mail client and browser on the iPhone resembling large screen equivalents	Example: demonstrating the device for a friend, comparing iPhone functionality to “regular” phones
Resource	Exposition
Example: using GPS for wayfinding	Example: conspicuous public display of phone
Action	Representation
Example: Using device to get address from internet, using device as a decision tool (getting information off the web, using GPS)	Example: Using device to be "cool", life-style considerations, watching others who carry iPhones

Table 2: Examples of time-in vs. time-out (adapted from Jensen, 1995)

Synthesis

The Theory of Consumption Values is intended to predict and explain the intention to purchase a consumer good (Sheth et al., 1991a; 1991b). Information and communication technology experiences rapid decrease in monetary value. The data from this longitudinal study indicate that four of the five consumption values that lead to initial adoption decline rapidly over time, affecting the way people use the ICT device and affecting the perceived desirability of the device compared to other offerings in the market. By itself, the Theory of Consumption Values does a good job describing this change. At the same time, applying Jensen (1995) adds additional explanatory power to TCV. As the consumption values decline for a given product, the usage follows a parallel pattern that shifts from time-out use of media to time-in use of the product. Realistically, this change does not apply to the whole range of consumption values, and the figure below merely illustrates a shift that is arguably more pronounced in terms a change towards an emphasis on functional value and a corresponding change towards time-in usage.

Figure 1 illustrates the shift in consumer value placed on a device and the change from time-out to time-in use.

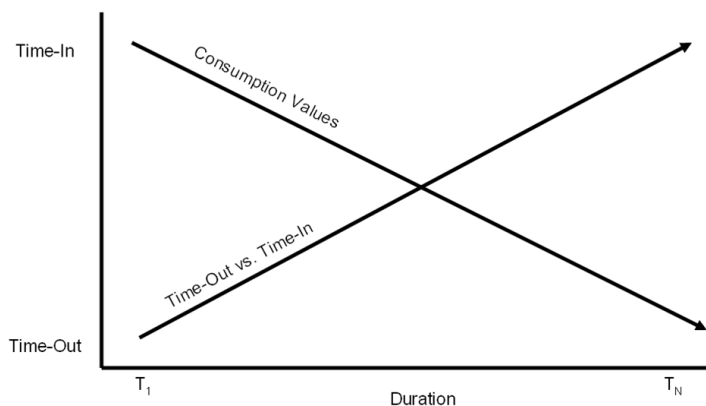


Figure 1. Tentative model of changes in consumption values and time-in/out usage

We argue that these changes are correlated, and that a change in one can be used to predict a change in the other. However, we emphasize that the figure is tentative, and that further analysis should be made to understand the differences in the rate and nature of the change over time for consumption values. By combining the two frameworks, we can gain a better understanding of the product lifecycle of technology-based consumer products. Therefore, we propose further research be conducted to further formulate and validate a Mundane Consumption Model (MCM). Such a model has both methodological as well as theoretical consequences. From a methodological perspective, it highlights the phenomenological perspective on consumption values, i.e. that consumption values are embedded in everyday life and everyday activities. This emphasizes the importance for continued advancement in the research on consumption values, and it demonstrates the importance that rich data contributes with to the study of consumption values as a way to understand technology adoption.

On a theoretical level, applying the distinction between time-in and time-out use has the advantage of highlighting the contextual nature of consumption values by drawing attention to the importance of an artifact's conditional value. This study shows how consumption values are articulated differently across a continuum of time-in and time-out usage. As noted in the simplified model above (fig. 1), the ways in which users articulate value for their products shifts over time. However, in a short lifecycle model, the contextual manner by which values are expressed is also worthy of notice. Thus some values are articulated in the realm of time-in use, some in the realm of time-out. While this study has not explicitly researched this new model, we believe that it provides a fruitful vista for further research. As mentioned, particular care should be taken to better model the differences in how various consumer values change, and how the dimensions of the time-in/out model of media consumption are related to that change.

Conclusion

This paper uses the Theory of Consumption Values to understand the value of the iPhone over time as perceived by its users. TCV provides a rich framework for researchers, marketers, and product developers alike. A detailed analysis of the qualitative data finds a relationship between the changing consumer value of the device and whether it is integrated into the user's daily activities or is used in a time-out situation that entails taking time from everyday, mundane activities. From the point of view of the time-in/out proposition, Jensen and Jankowski (1991) argue that new media technologies increasingly creates a space of time-in media usage, where the ritual meanings of usage (e.g. representational use, aesthetic forms of use, ritualized, time-critical forms of reception such as regular tv-news and so on) are gradually disappearing. This change can be demonstrated on the level of the individual consumer whose behavior and value attributions on single-product and service level changes over time, as well on a cultural macro scale where the form factor of technological media devices is shrinking, while wireless access, and accesability of media content is rapidly increasing.

While we identify the relationship between Sheth et al. (1991a; 1991b) and Jensen (1995), this paper modestly seeks to introduce the relationship into the lexicon of scientific discussion. Further research is necessary to determine how strongly the two theories correlate with each other and to examine how a change in one causes a change in the other. Additionally, while this study provides a theoretical investigation rich with qualitative data collected from each participant, our goal is to provide theoretical generalizability, not to create a probabistic model statistically generalizable to general population. Future studies should add both qualitative research to gain new insights, and quantitative data collection to provide theoretical validation. Whereas this study introduced faciliating conditions that led to the adoption of specific smart phones, other studies should study first-time adopters without significant incentive in order to avoid the bias inherent in this study.

Acknowledgments

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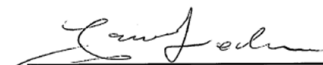
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Do you verify that the authors have contributed to this joint paper as described above?


Yes: ☒ **No:** ☐

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PAPER III

Technology Use as Consumption: A Longitudinal Study of Smart Phones

Bødker, Mads, Gimpel, Greg, Hedman, Jonas, “Technology Use as Consumption: A Longitudinal Study of Smart Phones,” International Conference on Information Systems 2009, Paper 88, Phoenix, USA, 16 December 2009 – 18 December 2009. (Research-in-progress paper)

This paper investigates technology use as consumption behavior instead of using innovation/ diffusion/ acceptance frameworks. Building on consumer research we introduce the Theory of Consumption Values (TCV) to understand the underlying values and motives of technology usage. Data were collected through interviews, focus groups, and surveys from smart phone users during a six month period. We have adopted a narrative approach to analyze our empirical data and present the data as a dialogue between two smart phones. The story presented in the dialogue shows how different consumption values, including functional, epistemic, emotional, social, and conditional values, drive technology use how they evolve over time. In the beginning, epistemic, emotional, social values drove the use. Later, functional value – particularly conditional functional value – became the key driver of use.

TECHNOLOGY USE AS CONSUMPTION: A LONGITUDINAL STUDY OF SMART PHONES

Research-in-Progress

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Abstract

This paper investigates technology adoption and continued use as consumption behavior instead of through the traditional innovation/diffusion/acceptance frameworks. Building on consumer research we introduce the Theory of Consumption Values (TCV) to IS research in order to understand the underlying values and motives of technology usage. Data was collected through interviews, focus groups, and surveys from smart phone users during a six month period. We have adopted a narrative approach to analyze our empirical data and present the data as a dialogue between two smart phones. The story presented in the dialogue shows how different consumption values, including functional, epistemic, emotional, social, and conditional values, drive technology use and how they evolve over time. In the beginning, epistemic, emotional, social values drove the use. Later, functional value became the key driver..

Keywords: Technology adoption, technology use, smart phones, consumption values

Introduction

When new technologies are developed and put on the market, some are adopted by a large group of users and have a profound impact on our daily life. At the present time, the mobile industry offers the promise of a technological revolution. The increased use of smart phone technology, which originally made gains in the business community, has recently exploded within the consumer market, driven primarily by the iPhone and the subsequent new offerings by major mobile phone manufacturers. Now millions of users have a single device with the potential to integrate many of the functions that previously required multiple technology artifacts.

Given the technological evolution and the increasing rate adoption of smart phones in the world, it become necessary to ask how and why do people use smart phone technologies for their everyday life and how does their usage change over time. Is it a question of fit among the best technologies for a certain task? Or is it a choice of the most convenient and available technology? To answer these questions we need in-depth insight into how people use technology and the underlying motives for using technologies over time.

The adoption and diffusion literature has identified a number of factors associated with adoption and diffusion of technologies including spreadsheets (Mathieson 1991), mobile phones (Kwon and Chidambaram 2000), and broadband internet (Hsieh et al. 2008) among others. Focus is given to understanding of the adoption or use at a specific point in time, yet technologies such as the smart phones challenge the understanding of adoption and diffusion as a discrete decision that takes place once (Sheth et al. 1991a, 1991b; Kleine III, 1992). Benbasat and Barki (2007) call for researchers to pay closer attention to IT artifact design and evaluation by end users, which reinforces Karahanna et al.'s (1999) and Holbrook's (2006) calls for researchers to explore the factors differentiating the drivers of initial adoption from those influencing continued use over time. This gap is further emphasized by Blechar et al. (2006), who

stress the need to seek the underlying motives or values that drives users to adopt, use and consume technology in general and mobile phones in particular.

This study seeks to fill these gaps in adoption literature by exploring technology use from a consumption perspective through the introduction of the Theory of Consumption Values (TCV) (Sheth et al. 1991a, 1991b) to information systems research. We apply an Actor-network approach (Latour 1996) to include the artifact in the exploration of real-life scenarios that include multiple, readily-available technologies to choose among in a longitudinal field study, where 16 people have been given a smart phone free of charge.

The primary contribution to this paper is to introduce a different way to view technology acceptance and use: technology use as consumption decisions driven by underlying consumption values: functional, social, emotional, epistemic, and conditional.

The reminder of the paper is structured as follows: the first section introduces TCV. The following section details the research methodology used to collect, present, and analyze the data. The subsequent section presents the empirical findings through an illustrative dialogue between two smart phones. The dialogue is then analyzed through the theoretical lenses of TCV. Finally, we discuss results and present concluding remarks and avenues for further research.

Theory of Consumption Values

In this paper we view the use of technology as a consumption decision based on underlying motives (consumption values) that may change and evolve over time. Consumption values are fundamental to consumer research. They addresses the implicit and explicit reasons and motives during decision-making. Academic consumer research began in the mid sixties (Holbrook 2006), since when many models, frameworks, and theories have emerged that explain, predict, and describe consumer choices. Examples include the TCV (Sheth et al. 1991a, 1991b), experiential value (Mathwick et al. 2001), and Holbrook value typology (Holbrook, 2006). In the early days the consumer was viewed as a

rational economic decision maker who processes information in order to maximize value (Sheth 1979). Consumer value was primarily conceptualized as a tradeoff between price and quality. In the early 1980s, however, researchers began to question the logic of the economic rational man and the assumption that consumers resemble a calculator (Holbrook 2006). To address this gap in understanding, Holbrook and Hirschman (1982) proposed what is known as the experiential approach. They introduced concepts such as fantasies, feelings, and fun (Holbrook 2006). Since then consumer research has evolved from a simplistic view of the consumer decision process to embrace many more reasons and motives including both intrinsic and extrinsic values (Holbrook 2006).

The TCV (Sheth et al. 1991a, 1991b), which was applied to technology by Alpert's (1994) marketing study of the decline in functional, epistemic, emotional, and social value of technology over time, outlines five different values that underlie consumer choice. The framework thereby provides an encompassing understanding of the consumer experience. A particular choice may be determined by one value or influenced by several values. The five values are described below:

- Functional value follows the logic of the rational economic man and assumes economic utility theory. Use and purchase decisions are based on characteristics or attributes of the consumable item. For example, the purchase or use of a mobile phone might be based on functionality, quality or price.
- Social value is important in consumer decisions which involve highly visible products or services to be shared with others (such as gifts). Social value embraces the idea that some products or services possess symbolic importance in excess of their functional worth.
- Emotional value is the third type of value influencing consumer choice. The thrill, joy, or excitement of a product is the emotional value. Aesthetic considerations, such as beauty, can add emotional value to a product.

- Epistemic value applies when one is bored with a current product, curious about something, or just wants to learn something new. It derives its value from the curiosity to learn or explore something new or different.
- Conditional value applies to products or services that only have a value dependent the context (time or place). For example, an umbrella only has value when it rains.

Methodology

This study is part of a larger research project on future mobile services. The aim of this study is to increase the understanding of how and why people use technology over time. We followed 16 iPhone users who were given iPhones and operator subscriptions to use at their discretion for a 6-month period that commenced shortly after the European product launch. The participants were enrolled in a master program in e-Business. The mixed gender group ranged in age from 22 to 51 and all were working full- or part-time. We sought a balance of commonality and diversity by choosing participants who would interact on a regular basis and disseminate knowledge, yet be diverse enough in job, personal life situation, and age to offer different attitudes and habits. During the project period, 60 one-on-one interviews, three focus groups as well as three surveys were administered in order to collect data.

For the analysis of our empirical data we have adopted a narrative approach. Taking our cue from the sociological critique of the correspondence theory of truth that assumes that textual representations have validity as representations of the world (Czarniawska 2004), we have analyzed the qualitative data from the interviews, focus groups, and surveys as “stories” that, in order to be analyzed and understood, require some form of emplotment. According to Laure-Ryan (1993), this implies identifying central characters, attributing functions to events, and finding an interpretative scheme. This allows us not only to understand the chronology of events or actions because emplotment states the causality of events and actions in social science research. Thus, it refrains from the descriptive mode of reporting from empirical encounters to better give

account of overall thematic, experiential, and causal relations between events in social data.

We have chosen the dialogue form to figuratively give the reader an impression of the material that we have collected. The dialogue is based on participant comments, re-contextualized in a dialogical form to emphasize how the iPhone is also a central protagonist in the story. Rather than just letting “the facts speak for themselves” we have chosen the narrative as a presentational strategy (Czarniawska 2004) that allows the reader to better understand the motivation, the experience, and the value-based opinions expressed by the participants in the study. In the story the iPhone will be the protagonist, the central character around which activities and experiences revolve. It might be somewhat peculiar to cast a piece of technology as the leading character in our narrative. However, understanding the relationship between humans and technologies as (at least analytically) symmetrical, the technology takes on the role of an actor and conveys a certain agency vis-à-vis the human actor (Latour 1996). This allows us to sidestep the strong humanist tradition of casting the human as the prime mover in technological relationships. In our story, intentionality also subsists in the technology itself. The strength of this approach is that we are allowed to see how technology is “dialogical” in the way in which it actively allows, disallows, motivates, and extends capacity for action in the human user, and how the user in turn attributes emotions and values to the technology. Thus, following Latour, our approach to analysis and interpretation provides an opportunity to open the “black box” of technology that would otherwise function as an invisible tool or provide an invisible, un-reflected delegation (Latour 1996). Thus, the delegation of agency to the artifact that we methodologically employ gives a more nuanced picture of the role that artifacts play beyond mere “usage” (Orlikowski 2001). The interpretative scheme for the data thus rests on the assumption that the technology in question entails the ability to change and “script” certain kinds of behavior and experiences in the user; and that behavior develops in an ongoing co-evolution between the artifact, the human, and the network. This behavior might be preferred but also, as we shall see, might have unanticipated consequences.

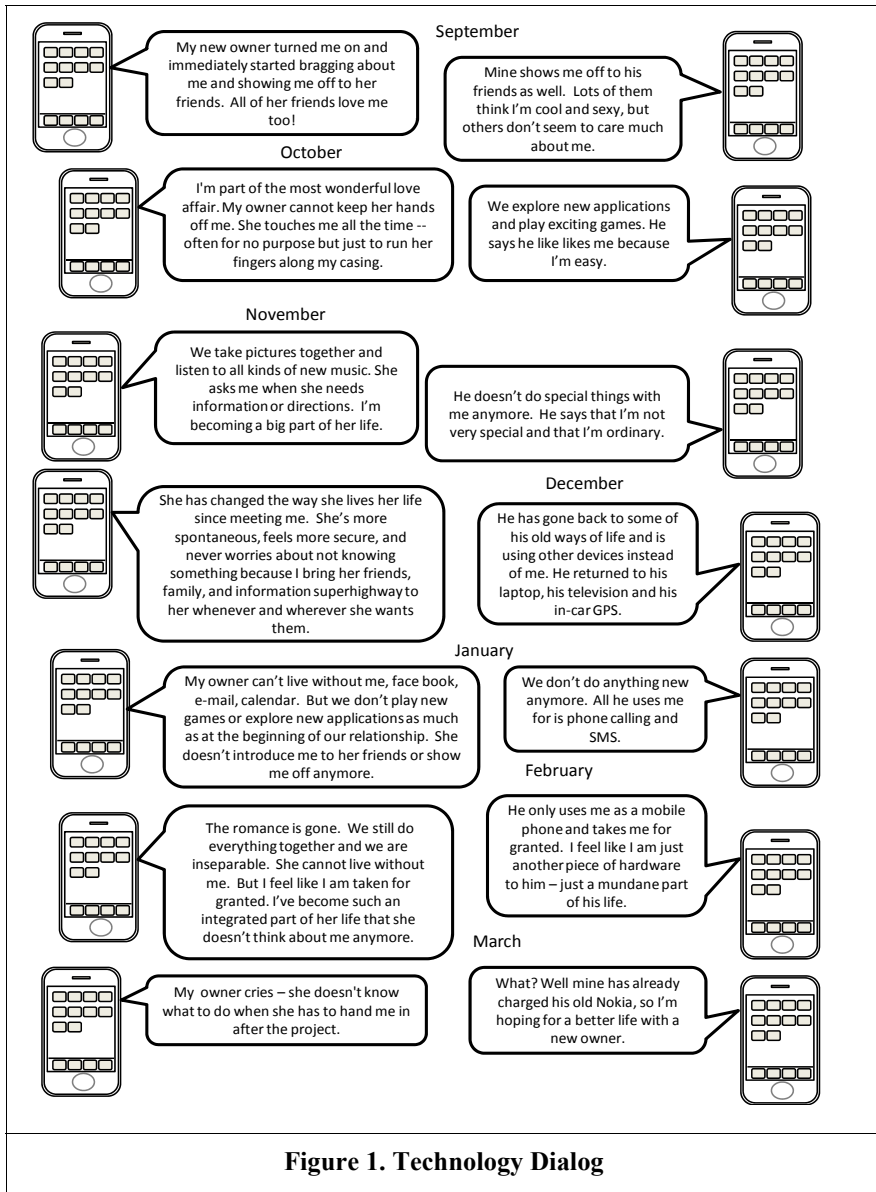


Figure 1. Technology Dialog

Analysis

The framework for this paper hinges on the TCV. We see the narrative strategy combined with the symmetrical approach to human/machine agency that theoretically underlies our method as a way to become more attentive to the role of the artifact in this kind of research.

Functional value: The smart phone offers functional value to users. It provides constant access to email and the WWW. Additionally, it enables telephone conversation and SMS, two features that have become part of everyday communication. Offering so many useful tools in one artifact, accessible as needed, makes the smart phone functional and distinct from other ICT devices. The functional value offered by the phone changes (increases, matures, declines). Functional value was not a defining driver of early use, but becomes extremely important for continued use. Some began using features such as the Facebook app and the search capabilities more extensively over time. In some cases the constant connectivity to Facebook made them addicted to the phone. The seamless integration with iTunes and App Store was found very easy to use. Others stopped using advanced features, returning to other devices for non-phone specific tasks. However, the perceived functional value varied between the users depending personal preferences and technological maturity.

Social value: The iPhone itself creates social value. It can be a conversation piece about which many people ask questions. It can serve as an icebreaker for iPhone users to begin talking to other users, thereby facilitating social interaction and establishing new relationships. The reaction from others – and hence the social value – differs based on different social settings and groups. In some settings the iPhone may garner admiration for its owner; however, it can also be deemed unfashionable or inappropriate in certain settings. Social value decreases over time, which can result from intrinsic reasons or from social responses.

Emotional value: The emotional need for belonging is fundamental to many of the participants, and it is filled by the ability to be constantly connected. For

example, the ability to access social networks (Facebook) and various twitter sites enables people to maintain their social relationships in a way that other types of communication do not offer. The technology integrated within the smart phone provides tools for altering one's emotional state. Emotional value changes over time. Some people remain excited about having their phones. Others compare their emotional relationship with the iPhone to a love affair, which is fun and exciting in the beginning, "but then it's just part of your everyday life."

Epistemic value: In this study, epistemic value experiences the steepest decline over time. As indicated by the literature, curiosity and novelty are key drivers of epistemic value. As familiarity with a device grows, the epistemic value declines. In the beginning, participants explored the iPhone features and downloaded applications simply to explore and experiment with something new. As the study progressed, the amount of tinkering declined substantially. This could be explained through the initial exploration where the phones embedded limitations are discovered (e.g. tilting the keyboard and recording video, which is impossible if the phone is not 'jailbroken').

Conditional value: The conditional value for the iPhone was based on convenience-related measures. Much of the conditional value hinged on whether a laptop with an internet connection was available. In general, if a nearby computer were connected to the internet, participants would choose the computer. If time were limited, the long-boot up time of a computer added conditional value to the iPhone, which was ready for use. When a Wi-Fi or land line internet connection was unavailable, the conditional value of the smart phone rose dramatically because it was the only alternative. No participant placed much value on using the iPhone to type email unless a computer was unavailable, the message needed to be sent immediately, and the message could be conveyed in a few short words. At the same time, some preferred reading email on their iPhone, even when the computer was ready-at-hand. Such preference was often described as a habit, rather than a conscious choice.

Summing up the analysis, we find it significant that the use of the smart phone changed dramatically over time. Indeed the artifact changed from a coveted, exotic artifact to become an integral part of everyday life. This process entailed a parallel change in the values assigned to the product. Such change underlines the challenge to information systems research to understand the dynamic nature of the artifact and the human-technological relations that artifacts and contexts make possible. Clearly there are important lessons to be learned for practitioners and researchers alike in understanding how technologies change and how users' validation of artifacts is not a pre-hoc process, but an ongoing, dynamic process that is hinges on a variety of factors in the technology itself.

To a large degree, the dialogue that gradually emerged from the research centered on the transformation of both the users and the technology over time. It is not a great surprise that even new, fancy technologies gradually become mundane and "taken for granted" in the lives of the users. The story also stresses the point that the same technology may be used very differently depending on the users' likes and preferences.

When discussing the findings, it is necessary to consider that the choice of the iPhone as the research artifact may lead to some limitations. The extremely high level of hype surrounding the product introduction is different from most technology launches. Additionally, the selection of the iPhone rather than a basket of assorted smart phones may result in findings that have a device-specific bias.

Given the limitations, it still seems obvious that technology must constantly re-contextualize itself in order to be used. Love at first sight (emotional value) most aptly describes the initial situation for most of our participants in the study. For our iPhone protagonists, they too loved their users and rewarded them with a lot of attention, convincing them to change the way they performed daily activities such checking Facebook, reading e-mail and writing SMS. The waning love from their human users was a result of becoming mundane – becoming an integrated part of daily practice, a piece of hardware rather than something extraordinary that demanded attention or interest. Curiosity and

exploration (epistemic value) shared the path of emotional value, but declined even more rapidly. Devices that evoke the desire for learning and exploration are likely to be used, so artifacts that can stay novel can continue to be the object of attention. The social value also declined over time; but it is much more dependent on those interacting with the owner. In some setting the artifact signals newness, richness, coolness; but in others it was seen as following the crowd.

In cases such as this one in which social, emotional and epistemic values decline, the functional and/or conditional value must rise or usage will drop. The path of functional and conditional value varies depending upon on users' personal preferences. It may drop for some, whereas other users may attach an increased functional value over time with expanded use of the device. The conditional value may also compensate for a decrease in other values. Debating a Trivial Pursuit question late in the evening is an example of conditional value that encourages continued use. The story told is one that emphasizes the ongoing emotional and value-based commitment (or lack of commitment) that makes a multifunctional technology such as the iPhone work. It also demonstrates how functional and conditional value may compensate for decline in the other three values.

In previous studies, such as information adoption research based on Innovation and Diffusion Theory or Technology Acceptance Models and in consumer research, focus is given to understanding of up-front acquisition decisions (Holbrook 2006), yet technologies such as the iPhone challenge the understanding of consumption as a discrete decision that takes place once (Sheth et al. 1991a; 1991b; Kleine III, 1992). The story that we saw in our empirical data related consumption as a continuous process through which becoming mundane or transparent of technology was one of the outcomes. Use is both a discrete event and a process. The data from this longitudinal study indicate that three of the five consumption values that lead to initial adoption decline rapidly over time, affecting the way people use the smart phone and

affecting the perceived desirability of the device compared to other offerings in the market.

Conclusion

This paper employs as longitudinal study to examine the adoption and continued use of technology in general (smart phones in particular) through the framework of consumption values. The Theory of Consumption Values, borrowed from consumer research, explains initial adoption and continued use as a decision based on underlying motives. The 5 values (function, social, emotional, epistemic, and conditional) explain how use changes over time. In this data set, for example, the values that act as primary drivers for adoption are not the values that drive the decision to continue use of the technology. Accordingly, initial adoption is determined by social, emotional, and epistemic (curiosity) values. These values, however, rapidly decline after initial use. For continued use, functional value becomes the primary determinant of use. As such, those participants who found great utility used their smart phone in increasing ways. Conversely, those who found declining utility used their device more selectively as the study progressed.

This study investigated technology use as consumption in a voluntary, consumer situation. While TCV provides a suitable framework for such research, further research is required to determine the explanatory power of TCV in mandatory technology use settings, such as organizational and group environments.

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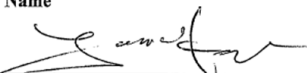
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PAPER IV

The Adoption of Hyped Technologies: a Qualitative Study

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The introduction of new consumer technology is often greeted with declarations that the way people conduct their lives will be changed instantly. In some cases, this might create hype surrounding a specific technology. This article investigates the adoption of hyped technology, a special case that is absent in the adoption literature. The study employs a consumer research perspective, specifically the theory of consumption values (TCV), to understand the underlying motives for adopting the technology. In its original form, TCV entails five values that influence consumer behavior: functional, social, epistemic, emotional and conditional. The values catch the intrinsic and extrinsic motives influencing behavior. Using a qualitative approach that includes three focus groups and sixty interviews, the results of the study show that emotional, epistemic and social values influence the adoption of hyped technologies. Contrary to expectations, functional value, which is similar to the widely used information system constructs of perceived usefulness and relative advantage, has little impact on the adoption of technologies that are surrounded with significant hype.

The Adoption of Hyped Technologies: A Qualitative Study

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Abstract

The introduction of new consumer technology is often greeted with declarations that the way people conduct their lives will be changed instantly. In some cases, this might create hype surrounding a specific technology. This paper investigates the adoption of hyped technology, a special case that is absent in the adoption literature. The study employs a consumer research perspective, specifically the theory of consumption values (TCV) to understand the underlying motives for adopting the technology. In its original form, TCV entails five values that influence consumer behavior: functional, social, epistemic, emotional and conditional. The values catch the intrinsic and extrinsic motives influencing behavior. Using a qualitative approach that includes three focus groups and sixty one-on-one interviews, the results of the study show that emotional, epistemic and social values influence the adoption of hyped technologies. Contrary to expectations, functional value, which is similar to the widely used information system constructs of perceived usefulness and relative advantage, has little impact on the adoption of technologies that are surrounded with significant hype. Using the findings of the study, this paper proposes a model for investigating and understanding the adoption of hyped technologies. This article contributes to the literature by 1) focusing on the phenomenon of hyped technology, 2) introducing TCV, a consumer research-based theoretical framework, to enhance the understanding of technology adoption, and 3) proposing a parsimonious model explaining the adoption of hyped technology.

KEYWORDS: Hype, technology adoption, qualitative field study, iPhone, theory of consumption values, intrinsic motivation

1 Introduction

This paper addresses the adoption of hyped technology. Hyped technology artifacts are distinct from other innovations and product launches because they are surrounded by extravagant publicity, and much of the discourse surrounding the debut is based on speculation and incomplete information, which can blur the distinction between what the technology can actually do and what potential users imagine. Despite the internet speculation and media attention given to these technologies, little research has been conducted to understand the drivers of the wide-spread interest in such IT products. The iPhone is an example from the proverbial list of innovations such as airplanes, personal computers and the World Wide Web that ignited people's imagination. Exciting, but not unique in its effect, the launch of the iPhone offers researchers the chance to understand what drives people to adopt such hyped technological artifacts.

The starting point of this research begins with Steve Jobs' announcement in 2007: "We're going to make some history together today." He continues: "Every once in a while a revolutionary product comes along that changes everything..." This message was repeated later by countless blogs, magazines, TV shows and newspapers, all of which contributed to technological hype. A year passes before Europeans can get their hands on the new technology in July 2008. During this baited wait, the iPhone becomes a mythic subject of IT lore. The imminent release of the 3G version swirls in a vortex of unbridled promotion, speculation and anticipation (Block 2007).

Given the hype surrounding technology such as the iPhone, what drives people to adopt hyped technologies? Is it the perceived usefulness or the relative advantage over another technology? Is it a choice based on perceived enjoyment and playfulness? Why do people commit to a technology before they have an opportunity to try it? The literature on technology adoption gives us many different answers. The prevailing explanation is that people adopt technology based on extrinsic motives, such as whether users perceive it to be useful (Davis 1989) or provide a relative advantage over other options (Rogers 1995). The majority of this literature focuses on technologies that are used for productivity

improvements in organizational context (Agarwal 2000). Hyped technologies, on the other hand, can be used both for business and personal use. This paper focuses on a consumer choice situation that may be driven by either intrinsic or extrinsic motives. The extant adoption literature provides limited understanding concerning acceptance by consumers and the motives that drive their adoption decisions. This paper researches the question: What are the underlying motives that drive consumer adoption of hyped technology?

Answering this question requires insight into how and why consumers adopt hyped technologies. Leading IT adoption scholars, including Ventaktesh et al. (Venkatesh et al. 2007), Benbasat and Barki (Benbasat et al. 2007), and Bagozzi (Bagozzi 2007) have calls for new approaches that include why people find technology worth using. To answer the research question and the calls for new approaches, we borrow concepts from consumer research, specifically the *theory of consumption values* (TCV) (Sheth et al. 1991a; Sheth et al. 1991b). The TCV provides an integrated perspective that takes into consideration the theory of reasoned action (TRA) and diffusion of innovations (DOI), the two dominant IS adoption traditions. At the same time, TCV incorporates hedonic factors and other decision drivers that tie in strongly with hyped technology. The TCV explains, describes and predicts discrete consumer decisions and entails five consumption values: functional, epistemic, emotional, social and conditional value. Each value may influence consumer decisions independently or in concert (Sheth et al. 1991a; Sheth et al. 1991b). The present qualitative study finds that epistemic, social and emotional values explain the adoption of the hyped technology featured in this study. Contrary to expectations, functional value has limited influence and conditional value is immaterial. In contrast to traditional studies, the findings suggest that different drivers motivate the adoption of hyped consumer technology. Drawing on the study findings, this paper proposes a model for explaining the adoption of hyped technology. This research contributes to the literature in three ways: firstly, it specifically looks at newly-launched technology that is surrounded by hype, and it explores the values that drive users' desire to adopt the technology. Secondly, the paper applies TCV to technology adoption studies in order to view IT adoption as

consumption, driven by many factors rather than the traditional IT-as-tool paradigm. Thirdly, this paper draws upon the empirical findings to propose a parsimonious model for explaining the adoption of hyped technology, based on three underlying values: emotional, epistemic and social. As such, this paper answers to several calls beyond this special issue, such as the general calls for alternative perspectives of technology adoption (Benbasat et al. 2007; McMaster et al. 2005; Venkatesh et al. 2007) and the specific call by Blechar et al. (Blechar et al. 2006) to seek the underlying motives or values that drive users to adopt and use technology.

This article proceeds as follows: the next section provides a review of previous research and the motivation for the study. The third section introduces the TCV. The fourth section details the research approach. The fifth section presents the findings and the analysis. The sixth section discusses hyped technology as a research focus, the applicability of TCV for adoption research, suggests a modified framework for understanding the adoption of hyped technologies, and discusses implications for practice and the limitations of the study. Concluding remarks and avenues for further research appear in the final section.

2 Literature on adoption and hyped technology

This paper focuses specifically on the adoption of technology surrounded by hype. The literature about technology hype within information systems research is discussed in subsection 2.1, establishing the gap in understanding the phenomenon. Section 2.2 provides an overview to technology adoption research, including the limitations of the dominant research paradigms and the calls for new theoretical approaches to adoption research.

2.1 Technology hype

The introduction of new technological innovation occurs at an exceptional rate. Some of these technologies and products become hyped, including video game systems (ATARI 2600 and Wii), computers (Apple II and IBM PC) and mobile phones. As the hype declines, the products become part of the normal everyday

landscape. The literature about technology hype covers a range of topics and technologies such as business process re-engineering (Davenport et al. 1994; Edwards et al. 1994), e-commerce (Bergeron et al. 1995; Strader et al. 1997) and knowledge management (Blair 2002; Cloete et al. 2003; King 1999). The literature focuses on topics such as overcoming the hype by clarifying the differences between the “buzz” and the actual results delivered by the technology, or by discussing how the hype obscures other issues that need to be addressed. Few articles address the acceptance or adoption of hyped technologies. Gill (Gill 1995) did a retrospective analysis of expert systems, which did not gain the acceptance that analysts originally forecast. The article specifically looks at the ways in which the systems were used, rather than focusing on the drivers of adoption. Another example is Spaulding’s (Spaulding 2010) study of the role that trust and social contracts play in the willingness of consumers to accept certain business activity within virtual communities, but the role that hype plays in these decisions is not explored. The introduction of XML language motivates Warwick and Pritchard (Warwick et al. 2000) to emphasize the importance of hype. They state: “The more hype that is generated, the more people will hear of XML, the more XML will be implemented.” However, they do not provide theoretical insight into the adoption of such innovations. This paper seeks to fill this gap.

2.2 Technology adoption

Much of the literature regarding technology acceptance follows the diffusion of innovations (DOI) and theory of reasoned action (TRA) traditions. DOI (Rogers 1962; Rogers 1995) considers the innovativeness of the potential user and the attributes of the innovation, such as its relative advantage, compatibility, complexity, trialability and observability. Relative advantage is the perception that an innovation is better than the currently used technology. Complexity is the perceived difficulty in using an innovation. Compatibility refers to how consistent a new technology is with the needs, values and experiences of the potential user. Low compatibility will bias the user against adoption. Trialability is the ability to experiment with an innovation before fully committing to it.

Observability reflects the degree to which a potential adopter can see others using the technology and thus the ability to vicariously evaluate it (Rogers 1995). Moore and Benbasat (Moore et al. 1991) build upon DOI with the innovation diffusion theory (IDT). IDT respecifies compatibility as ease-of-use, referring to how easy or difficult it is for a user to learn a new technology. It also adds two additional constructs: perceived voluntariness and (social) image. Perceived voluntariness measures the degree to which a person perceives usage to be optional. Image is the perceived gain in social status one experiences by using an innovation. Even though DOI and IDT are widely accepted and have been proven useful in explaining the diffusion of innovations, they face limitations (Kauffman et al. 2009; Lyytinen et al. 2001; McMaster et al. 2005).

TRA (Fishbein et al. 1975) uses two primary constructs to predict behavior: a person's attitude towards the behavior and the subjective norm, which is the person's perception whether the behavior will meet with the approval of others. Ajzen furthered the TRA by developing the theory of planned behavior (Ajzen 1985; Ajzen 1991), which adds perceived behavior control to the TRA's two constructs. The perceived behavioral control construct incorporates the level of perceived ease (or difficulty) that a person faces when deciding what action to take, and also includes the pressure the person feels that may inhibit a given behavior. The technology acceptance model (TAM) (Davis 1989) argues that TRA's reliance on indirect influence of attitudes should be replaced by two more specific constructs: perceived usefulness and perceived ease-of-use. Davis defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" and refers to perceived ease of use as "the degree to which a person believes that using a particular system would enhance his or her job performance." The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003) borrows from the TPB, TRA, TAM, IDT and four other frameworks to propose an approach that integrates the most relevant constructs from each. The UTAUT uses four criteria to predict technology adoption: performance expectancy, or the degree to which a potential adopter believes a technology will improve job performance; effort expectancy, which is the perceived ease-of-use; social

influence, which is the perception that “important others” want the decision-maker to use the technology; and facilitating conditions, which represent a person’s belief that the organization will support his or her use of the new technology.

Researchers continue to employ the IDT, TRA, TPB, TAM or UTAUT in their research. For example, researchers recently used the innovation diffusion theory to analyze the diffusion of a bio-terror surveillance system (Fedorowicz et al. 2010). The theory of reasoned action has been employed to examine the acceptance of blog usage (Hsu et al. 2008), to explore the adoption of mobile internet services (Jiang 2009), and to explain the intention to use internet-based stock trading (Ramayah et al. 2009). The theory of planned behavior has been expanded to new types of IT systems (Dinev et al. 2007), the acceptance of broadband among different groups (Hsieh et al. 2008), and mobile commerce adoption (Khalifa et al. 2008). Other studies use UTAUT for studying computer applications in non-Western countries (Al-Gahtani et al. 2007), adopting e-commerce in developing nations (Uzoka 2008), and investigating the role of social influence in workplace adoption decisions (Eckhardt et al. 2009).

TAM, which has become the most often employed and most influential IS theory (Benbasat et al. 2007; Fang et al. 2003; Lee et al. 2003; McMaster et al. 2005; Wakefield et al. 2006), continues to make contributions to the literature. Recent applications include wireless data networks (Yoon et al. 2007), mobile communications (Zhang et al. 2008) and SMS service (Lu et al. 2008). Despite greatly advancing IS research by focusing a formerly scattered field of study (Lee et al. 2003); however, some argue “TAM has fulfilled its original purpose and that it is time researchers moved outside its confines” (Benbasat et al. 2007). Others argue that the constructs of TAM provide do not provide much actionable guidance to practitioners (Benbasat et al. 1999).

While TAM is appropriate in an organizational context, some argue that it lacks other vital considerations necessary to explain user behavior outside the workplace (Lopez-Nicolas et al. 2008). Perceived usefulness and ease of use may not be sufficient criteria to study new, emerging services, because the

impact on everyday routine may be more influential than the technology itself (Bouwman et al. 2007). TAM is binary, considering only the choice whether to adopt or not adopt one technology in isolation. It ignores context and contingency. Therefore, it does not adequately consider the complexity of the actors' decision (Bouwman et al. 2007; McMaster et al. 2005). Additionally, some argue that TAM is too generic to provide a realistic understanding regarding the adoption of modern wireless technology (Bouwman et al. 2009). Similarly, UTUAT has proven useful, but is subject to its own limitations. Bagozzi (2007) has criticized UTUAT for its lack of parsimony. Benbasat and Barki (2007) argue that through the constructs selected to make it comprehensive, UTAUT comes full circle back to its origins by capturing the same information as the TRA.

Given the history of mainstream adoption research, there are strong calls for the introduction of a new approach within adoption research. Venkatash et al. (2007) call for an end to the "replication and minor extensions" of the dominant theories used in IS research. Bagozzi (2007) and Benbasat and Barki (2007) argue for a deepening of adoption research by providing variables that can explain what makes technology useful to end-users. They argue that research should include "why" people find technology worth using.

IS adoption research includes alternatives to the TRA and DOI traditions, although they represent much smaller paradigms within the literature. Task-technology fit (TTF) (Goodhue 1995), for example, accounts for the presence of different choices in the IT landscape by taking into account the specific attributes of the IT artifact and argues that the "fit" between the task to be completed and a given technology determines whether the technology will be used. TTF has been used to extend TAM (Dishaw et al. 1999; Mathieson et al. 1998) and to explore task fitness as an antecedent to IT usage (Lee et al. 2007; Lin et al. 1998).

Other research argues that because not all technology is used as a means to accomplish a goal, both instrumental and hedonic reasons should also be considered in adoption research (Magni et al. 2010; Van der Heijden 2004;

Venkatesh et al. 2001). The argumentation draws upon the work of Hirschman and Holbrook (Hirschman et al. 1982), who identify the emotive aspects of product usage as being distinct from utilitarian motivation. Accordingly, “hedonic consumption refers to consumers’ multisensory images, fantasies and emotional arousal” (Hirschman et al. 1982). A product needs not be a means to something; but it can also be a fulfilling end in and of itself. Thus, the research approach focuses on what the product symbolizes to the user and the emotional responses it elicits. Examples of topics researched using hedonic (intrinsic) motivation include the adoption of home computers (Venkatesh et al. 2001), mobile technology (Dickinger et al. 2008; Hong et al. 2008; Wakefield et al. 2006), social network sites (Sledgianowski et al. 2009), and broadband (Choudrie et al. 2006).

This research uses the theory of consumption values (TCV) (Sheth et al. 1991a; Sheth et al. 1991b) to investigate the adoption of hyped technologies. The TCV is a parsimonious model, containing five constructs, which are detailed in the next section. The theory establishes value constructs that can be used to understand and predict consumer behavior, including the adoption of technology. The introduction of the theory answers the calls for alternative research perspectives. At the same time, the construction of TCV specifically drew upon the TRA and DOI (Sheth et al. 1991a), and thus incorporates the foundational concepts of the dominant IS adoption traditions. It also explicitly incorporates the work of Hirschman and Holbrook (Hirschman et al. 1982) that inspired the calls for IS research to consider hedonic motivations. It also includes context, answering the criticism that IS adoption ignores context and contingency (Bouwman et al. 2007; McMaster et al. 2005) by providing a conditional value based on contextual “fit.” Finally, TCV has been used for many kinds of purchase decisions as well as abstract decision processes, such as voting and church attendance (Sheth et al. 1991a). The theory was designed specifically for the use of practitioners to understand specific factors that drive decisions and so that they can develop actionable strategies. Therefore, using a practice-focused theory such as TCV for IS adoption research answers the calls for using theories of relevance to practice.

3 Theory of consumption values

Rather than viewing a technology adoption as a tool to achieve a performance goal, this study views technology adoption as an individual decision to begin consuming a technology. Consumption values address extrinsic and intrinsic reasons and motives that drive decisions such as to buy or not to buy; and they help form the cornerstone of consumer research. After motivation research reached its height in the 1950s (Sheth et al. 1991a), the more rigorous academic discipline of consumer research emerged in the 1960s (Holbrook 2006). A number of models, frameworks and theories have emerged that explain and describe consumer choices, including TCV (Sheth et al. 1991a; Sheth et al. 1991b), experiential value (Mathwick et al. 2001) and Holbrook value typology (Holbrook 2006). In the past, consumers were considered rational economic decision-makers who process information in order to maximize value (Sheth 1979), and consumer value was primarily conceptualized as a trade-off between price and quality (Holbrook 2006). In the early 1980s, however, researchers began to question the assumption of the economically rational person and the belief that consumers evaluate purchase and usage decisions with a calculator-like approach (Holbrook 2006). Holbrook and Hirschman (Holbrook et al. 1982) proposed the experiential approach and introduced new concepts such as feelings, fantasies and fun (Holbrook 2006). Since its introduction, consumer research has evolved from simplistic assumptions about the consumer decision process to embrace more complex motivation that includes both intrinsic and extrinsic values (Holbrook 2005; Holbrook 2006).

Sheth et al. (Sheth et al. 1991a; Sheth et al. 1991b) proposed TCV to integrate different consumption models and frameworks. The TCV is based on the synthesis of literature from many research traditions. It includes five different types of values that underlie consumer choice, providing an encompassing understanding of the consumer experience. A particular choice may be determined by one value or influenced by several values. The values are as follows: 1) *Functional value* stems from an alternative's perceived utility for

accomplishing a specified task or achieving a practical goal. It follows economic utility theory and assumes economic rationalism (the trade-off between cost and performance). Consumer decisions to buy or use a product or service are based on the attributes of the focal object and how well they fulfill the consumers' utilitarian needs. 2) *Social value* involves highly visible products and services or objects to be shared with others (such as gifts). According to the theory, such an item may be chosen more for the perceived social image it conveys than for functional performance. Essentially, social value is derived from the symbolic importance of an artifact. 3) *Epistemic value* applies when consuming or experiencing new products or services, such as buying a new computer or mobile phone. Epistemic value stems from curiosity, the desire to learn, or the urge to experiment with something new. 4) *Emotional value* influences decisions because of a product's potential to arouse emotions that are believed to accompany the use of a product. Aesthetics, such as beauty and artistry, can add emotional value to a product. 5) *Conditional value* applies to products or services of which the value is strongly tied to use in a specific context. A temporary functional or social value arises when the circumstances create a need. For example, a winter coat may have significant value during a winter snowstorm, but no value during a hot summer day. According to TCV, the five values make differential contributions to the decision process. The weight of each value can be different, and not all values will drive every decision

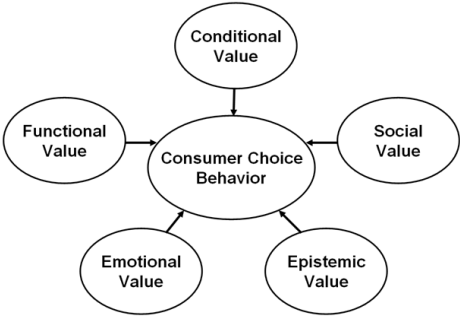


Figure 1. Five values that influence consumer choice, based on Sheth et al. (1991a; 1991b)

The application of TCV has been demonstrated in technology decisions. An early technological application from Alpert (Alpert 1994) appeared in marketing literature and analyzed the decline in value of software over time. At present, TCV's appearance within information systems literature is limited, appearing as non-focal arguments (Kim et al. 2008; Kim et al. 2007), or else selected values have been used to research internet banking (Ho et al. 2008) and ringtones as hedonic IT artifacts (Turel et al. 2009). There is a gap because no information systems research has addressed all five values of the TCV. This paper fills this gap by introducing the entire TCV framework as an analytic tool for information systems research.

4 Methodology

This study is part of a larger research project on future mobile technologies and services that includes universities, government agencies and private firms. In order to address the research question, we applied a qualitative field study approach inspired by explorative and interpretative information systems research tradition (Klein et al. 1999; Orlikowski et al. 1991; Walsham 2006). Following this tradition, the view taken on the technology is broad and includes the physical artifact and its embedded features, as well as the different services and applications that can be downloaded or accessed via the technology.

4.1 Subject selection

The six-month field study, called iUSE (iPhone Use) commenced in September 2008, shortly after the European product launch, and initially involved 16 participants (one dropped out due to hardware failure). The participants were each equipped with a new 3G iPhone and the basic voice, SMS and data plan for a six-month period (September 2008 to March 2009). Participants were recruited from a graduate-level e-business course. The group, consisting of mixed gender (seven males and eight females) and nationality (five different nationalities) ranged in age from 22 to 51 and all were working full- or part-time. They had diverse undergraduate degrees and practiced a variety of professions. We sought a balance of commonality (enrolled at the same master

program) and diversity (age, gender, nationality, professional background and technology expertise) when selecting the participants, in order to ensure richness in data collection (Barbour 2005; Kitzinger 1995; Krueger et al. 2000; Morgan 1997). The participants committed to data-reporting obligations, such as answering surveys, participating in focus groups and granting interviews. At the end of the study, the participants had to return their phones as required by government regulations.

Unlike the participants, the iPhone was not chosen based on its balance of commonality and diversity. On the contrary, the object of study was chosen because of the storm of global hype surrounding it. The iPhone also targeted the consumer segment, whose motivation and discretion in the adoption decision may be different from business users, who were the target of many competing smart phones, such as the Blackberry, Nokia N95, Sony Ericsson X1 and Palm Treo.

4.2 *Data collection*

To ensure a rich dataset, data were collected through 60 interviews, three focus groups and three self-reported usage surveys (in the beginning, middle and end of the study). The surveys, which collected basic usage information, were used to provide a gauge for understanding trends in individual usage and were used to help formulate individual interview questions. The surveys were not intended for statistical analysis.

Early in the study, participants were divided into focus groups in which they discussed their adoption and use of the devices. The research followed established protocols for group interviews and was facilitated by one researcher, while another video recorded each focus group and took field notes (Barbour 2005; Kitzinger 1995; Krueger et al. 2000; Morgan 1997). In order to be able to analyze data across groups to find patterns and themes, this study conducted three focus groups. An objective of the multiple groups was to reduce the effect of individual group dynamics on the overall dataset (Krueger et al. 2000; Morgan 1997). The sessions concentrated on the role that the five consumption

values played in the participants' initial interest and subsequent behavior (see Appendix 1 for focus group script). The first question was a general topic for conversation and was structured so that everyone had to answer, as a way to deter "groupthink," which is the phenomenon in which people of different opinions stay quiet in order to maintain an ideological consensus (Morgan 1997). During the opening instructions people were encouraged to speak to each other, sharing their reactions to others' comments and to discuss items of interest that were raised by other participants (Kitzinger 1995). Each focus group session lasted no more than two hours. The focus groups were recorded following privacy guidelines that were explained prior to the group discussions (Krueger et al. 2000). Participants were informed that recordings would be used for transcription and research but not released to the public and that they would not be identified by name in the presentation of the data.

Following the focus groups, a total of 60 structured and semi-structured interviews were carried out with each participant interviewing in four settings (A-D). (The focus and key questions of the interviews are summarized in Table 1.) Interviews A lasted for 30 minutes and were conducted by one researcher focusing on the most important values for adopting technologies. Interviews B also lasted for 30 minutes and were carried out by two researchers, one taking notes and one asking questions exploring the usefulness and limitations of the artifact. Interviews C took approximately 60 minutes and were done over Skype with one researcher addressing changes in use over time. Interviews D took 60 minutes with two researchers focusing on the use of the iPhone and its relationship to other technologies, such as how the use of the iPhone affects the use of other technologies. Interviews A and C used data from the survey to develop individual questions for each participant.

Table 1. Interview focus and main questions

Main focus of interview		Key questions posed
Interview setting		
A	Exploration of usage behavior	<p>What are the five most important things when picking out/buying a new phone?</p> <p>In the survey at the beginning of the study, we asked “What would you like to do with a mobile phone that your current phone cannot?”</p> <p>You indicated... (different answers from each participant). Since the iPhone can do all of those, please let me know how much you use those features and how that compares to what you expected?</p> <p>In what ways has the iPhone significantly changed the way you do things in your daily life?</p>
B	Probing of the device’s usefulness	<p>What makes it useful?</p> <p>How come?</p> <p>Why is that aspect of the phone perceived as being useful?</p>
C	Changes in adoption and usage behavior	<p>Participants were asked different questions based on changing patterns in self-reported use. They were also asked to reflect upon the attitudes and reasons that resulted in their behavioral changes.</p>
D	Usage in relation to other technologies	<p>How has the iPhone changed your use of other technologies?</p> <p>Why do you prefer to use it instead of other technologies?</p>

The iterative structure of the surveys, focus groups and interviews is illustrated in Figure 2. The results of the first usage survey and the focus groups were explored in interview setting A. The data from all three surveys and the focus groups were further discussed in interview C. Similarly, the data from the focus groups were used to inform interviews B and D.

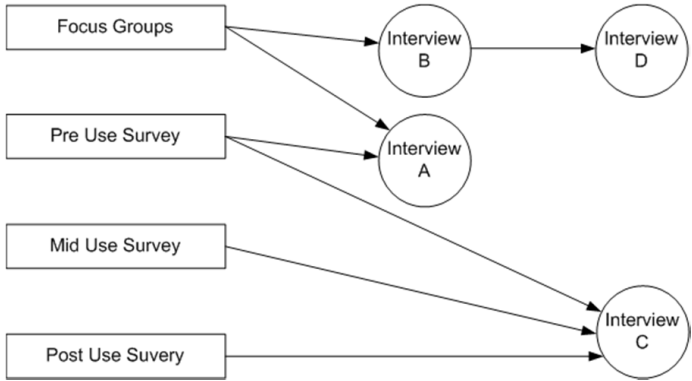


Figure 2. Structure of data collection

4.3 Data analysis

Data were coded and analyzed in conjunction with the iterative data collection process (focus groups and interviews A-D). Data coding was done jointly by the researchers to create a shared understanding of the empirical phenomena as suggest by Saldaña (Saldaña 2009) and Guest and MacQueen (Guest et al. 2008). Leveraging the opportunities available in the field study, answers during one round of data collection were analyzed, compared with previous answers, and inconsistencies were identified and explicitly addressed during the next interview round. The first iteration of coding the qualitative data assigned one of the five consumption values to each pertinent datum. Because data were collected throughout the study and since subsequent interviews were used to clarify extant data, the coding used the time period referenced by the participant rather than the point at which the data were collected. Participant statements were coded by participant, consumption value and point of time within the

study. Data were segmented into component parts. Actions were defined. Tacit assumptions of the participants were analyzed. The actions and intentions stated by participants were explicated. The significant point of statements and comments was clarified when possible. The data were compared with other participant data. Gaps and ambiguities in the data were identified and questions for subsequent interviews were created to close the gaps (Charmaz 2006).

The final analysis focused on the relationships among data. The researchers identified ambiguous participant comments in which the interviewees specified values, but the context of their statements implied that different values were driving a given action. Such issues were clarified during subsequent interviews. This occurred most frequently with statements relating to the iPhone's functional value at the beginning of the study. For example, when participants indicated that downloading applications from the App Store was a driver of their interest in adopting the iPhone, subsequent discussions dug deeper into the meaning. For some participants, the App Store was not a functional value; rather, the participants were driven by their curiosity to learn more about the App Store; therefore they were driven by epistemic value, not functional value.

5 Adoption of a hyped technology

The iPhone 3G was launched world-wide on July 11, 2008. The launch in Europe was not just a quiet introduction to the market, but was heralded by a plethora of pre-release rumors and hearsay on pricing, calling and data plans, etc. Much of this took place on internet blogs that discussed Apple products or the iPhone specifically, as well as general smart phone blogs. It is within this context that this section presents the findings based on the participants' view on their initial adoption of the iPhone. The presentation is organized by the value constructs of the TCV framework.

5.1 Functional value

During the focus groups and interviews, participants discussed the values that drove their interest in the iPhone. Much of the discussion about functional value

focused on what the participants perceived to be drawbacks that they would encounter when they replaced their current phones with the iPhone. Heavy SMS users were familiar with the T9 phone keypad, which they could use without focusing their attention. These users believed that the virtual QWERTY keyboard would require much more effort and be disruptive because they would have to look at the keyboard while typing. One participant succinctly framed the foreseen drawback: “You cannot walk and SMS at the same time.” While the web browser option elicited the interest of the participants, many expected poor performance because they knew 3G coverage was unavailable in many parts of the city. Unlike the mobile phones of some of the participants and many competing smart phones on the market, the 3G iPhone could not be used as a video camera. The still camera had lower resolution than other mobile phones, including older basic models. Regarding the photographic attributes, the participants expressed their wonder that the iPhone offered specifications lower than many other phones on the market.

While the participants expressed reservations about some of the features of the iPhone, they did express functional attributes that they expected to be both positive and important. The attribute that universally drove the utility value was the phone feature. While important in modern life, this did not differentiate the iPhone from other phones. Many predicted value from the MP3 player; however, all participants already had portable MP3 players, and many already used their phones to listen to MP3 files. Not everyone saw the MP3 player as a primary driver of the phone. Participants #6, 10 and 11 did not view it as an important smart phone feature. Participant #6 also expressed his concern that the iPhone would be delicate to use as an MP3 player when he was jogging or when it was raining. Participant #12 preferred to keep her music player separate. She was afraid that if she carried it with her at all times, she was more likely to lose it; and thus lose her music library. Participant #4 remarked that 8GB of storage was not enough and therefore was not attracted by the iPhone’s MP3 feature. During the study, the participants who indicated that they found the MP3 player valuable, elaborated that the music features of the phone were attractive not for their usefulness, but for the emotions that music elicits. During

this initial adoption decision stage, the iPhone derived negligible value from its perceived functional usefulness.

5.2 Epistemic value

The individual's desire to learn and explore new things, or epistemic value (Sheth et al. 1991a; Sheth et al. 1991b), is an important driver of using the hyped technology. The manufacturer's announcement of the product and the subsequent newspaper reports, articles, blog comments, etc. created much curiosity. Apple Inc. created a perception among its potential customers that adopting the new device would make them part of an historical shift in ICT. This perception stimulated an interest to learn about the new technological innovation. The curiosity among participants indicates that technologies are important, not only for what outcomes can be achieved by using the technology, but also for the act of learning about new technology. Technology is important by itself. The adoption of hyped technologies involves a strong desire to explore and discover the artifact. This is not driven by the functionality of the different applications, but based more on the individual's desire to understand the advantages and limitations of the device.

The novelty value of the phone was a key driver of adoption. The artifact itself inspired curiosity and generated strong epistemic value. People wanted to explore the new technology, learn how to use the new device, and experience a cutting-edge GUI. As such, the device itself provided a "cool factor" and appealed to those who sought to satisfy their curiosity.

For instance, the iPhone derived epistemic value through the availability of downloadable applications and various media. Thousands of programs were available for download, many of which were available at no charge. Access to websites like YouTube also provided a constant stream of novelty. Participant #12 explained his fascination with researching what the applications programmers were releasing for the new iPhone. Likewise, Participant #6 indulged his intellectual curiosity by finding out about the latest programs: *"I read a lot on the web, new ways to use it. How to make your everyday easier*

with new applications...” Participant #11 added a creative component to the epistemic attraction. He studied development tools so that he could learn to program his own iPhone apps. Participant #10 elaborates: *“It can awaken creativity. I’m a musician as well. I can come up with new ideas. Music puts me in different mindset– thinking in a different way when you work.”* Others wanted to explore the World Wide Web from the palm of their hands. They sought to satisfy their curiosity and cure confusion through 24/7 access to Wikipedia and search engines. Curiosity, especially given the speculation surrounding the details of the phone’s features, created an intrinsic desire to get the iPhone.

For many, the satisfaction of learning first-hand about the device was a direct objective. Prior to getting their phones, several participants followed the hype by reading blogs and news articles. They focused on the experience of learning about this object. The iPhone was an experiential good, and the process of learning how to use it and discovering its nuances drove their interest. Upon receiving their phones, many specifically avoided instructions, preferring to figure it out on their own, learning and satisfying their curiosity about the novel device in the process. They were focused not on what the artifact could do or how it worked, but on the potential for exploration and discovery.

5.3 Social value

Hyped technologies can be an ice breaker. Because the user possesses and has explored the artifact, the individual can talk about something that is perceived as “cool” and gain conversational currency few others may possess. The heavy promotion and media attention raised the social value by associating a symbolic importance with the device. As a result, significant social value was conveyed through the iPhone itself. The artifact generated conversations as people asked questions and they struck up conversations about it. It served as an icebreaker for users to begin talking to other users, thereby facilitating social interaction and forming new relationships. The early hype turned the iPhone into a discussion point at social events (dinner, pubs or on the street). The hyped artifact bestowed upon the possessor social prestige because others wanted to know about, touch and experience the technology.

The iPhone also provided social value by helping the owner convey an image to others in a way similar to many fashion items. Participant #10 explained how the iPhone would project his personality: *"It must be high tech, cutting edge and fashionably designed. This is important because it tells my surroundings about me, my interests and my preferences."* It served to announce that its owners have style: that they are leaders at the forefront of the latest trends. Participant #8 compared the device to wardrobe choices because it is a type of personal branding that sends a message to affect friendships and relationships. In addition to style, the high price of ownership lent the device a special caché. Participant #11 describes the iPhone's social value as being *"like golden chains or expensive cars. It's a fashion icon. Look, I can afford this iPhone. I have money."*

5.4 Emotional value

Emotional value, a product's potential to arouse emotions (Sheth et al. 1991a; Sheth et al. 1991b), heavily influences the adoption and use of hyped technologies. This particular artifact clearly possessed some unique aesthetic properties, such as the large touch screen and the smooth, elegant tactile feel. However, emotional value exists prior to adoption. The hype surrounding the iPhone in the press and on the net created a desire to possess, own and explore the device. This created positive feeling towards the iPhone that was illustrated by numerous positive expressions towards it, such as *"I love it," "It feels good to hold,"* and *"It is beautiful."*

The iPhone was an exciting device that elicited strong passion and emotions among the participants. Part of the emotional draw stemmed from an emotional need to be connected to others. Participant #13 explains how strong this feeling was to some of the participants: *"Connections to other people. It is obvious that whenever we switch off our phones we are not important anymore."* As such, the prospect of constant connectivity filled many participants with strong feelings and created an emotional attachment to the phone – even before they held one in their hands.

Some integrated tools also hit an emotional chord. Several were drawn to the MP3 capabilities because music can elicit desired emotional states. At the same time, some wanted the emotional rewards that come with carrying a portable photo album. According to Participant #7: *"I like to always have my pictures with me - reminds me that a situation was fun, and I get in a better mood."* Participant #8, who stores her photo albums on her phone, describes the familiar feeling enabled by her iPhone: *"You can take a little bit of home with you. It makes you feel secure."* In addition to the emotion-enabling features, some participants enjoyed the aesthetics of the design – the appearance and feel of the phone. Participant #15 explains: *"it's also beautiful, the aesthetic feeling."* Going beyond aesthetic appreciation into a strong emotional attraction, Participant #9 says: *"It's like being in love."* Participant #16 paints a similar picture: *"It's like a girlfriend. In the beginning, it's fun and sexy..."*

Before and at the time of adoption, the communication features often carried emotional value, not a relative advantage over other devices. Likewise, the music capabilities drew their influence from emotional implications rather than from facilitating the attainment of a goal.

5.5 Conditional value

Sheth et al. (Sheth et al. 1991a; Sheth et al. 1991b) define conditional value as a temporary functional or social value that is strongly tied to use in a specific context. According to TCV, conditional value is an antecedent to the decision to purchase or consume. In the case of the iPhone, however, the participants did not have experience with the iPhone, which made it difficult to understand its conditional value. Similarly, precious few details about the artifact's specifications were available from confirmed sources prior to the release, again limiting the participants' ability to predict contexts in which the iPhone would offer value specific to a given circumstance. According to the TCV, not all values must drive the consumption decision. In this study, conditional value was not a driver of the users' desire to adopt the artifact.

Under normal circumstances in which a new technology is previewed and many details about the product are available from official sources, conditional value may play a bigger part in the adoption decision. In this case, and perhaps for the category of hyped technology in general, lack of product knowledge may prevent users from predicting specific situations when temporary value might arise. After all, in order to experience conditional value a user needs to understand what the device is capable of, relative to other technologies and specific contexts.

6 Discussion

This paper adds the adoption of technology surrounded by hype to the literature. In doing so, this paper introduces a specific context that influences the adoption decision. The study data suggest that a hyped environment does impact technology adoption decisions. The data suggest that using approaches to studying adoption that focus on the utilitarian aspects may not capture the salient drivers of adoption and that other analytical lenses may be advisable. This discussion section addresses the following: 1) the use of TCV to study technology adoption, 2) the use of the study findings to propose a new model for understanding the adoption of hyped technology, and 3) a discussion on the limitations and implications of the study.

6.1 Theory of consumption values

The empirical data from this study supports the argument that the TCV can make a significant contribution toward understanding the adoption of ICT by consumers. All five values were investigated; however, only three exerted a material influence on the desire to adopt the iPhone.

Emotional value seems to heavily influence the adoption of hyped technologies. This particular artifact clearly possessed some unique aesthetic properties, such as the large touch screen and the smooth, elegant tactile feel of holding it. Emotional value exists prior to adoption. The hype surrounding the iPhone, in the press and on the net, creates a desire to possess, own and explore the device.

This creates a positive feeling towards the iPhone, which was illustrated by numerous positive expressions towards it.

Epistemic value is another important driver of using the hyped technology. People want to learn about new technological innovation. For many people technologies are important, not for what can be achieved with the assistance of the technology, but just to learn about technology. Technology is important by itself. The adoption of hyped technologies also involves a high degree of exploration of the artifact, i.e. using GPS-based maps, internet access for surfing and downloading of applications. This is driven more by the individual's desire to understand the advantages and limitations of the device than by the functionality of the different applications. The exploration process does not occur in a vacuum or black box. It is done by comparison to existing technologies, so there is always a reference point, be it the computer, TV, newspaper or radio.

Social value is the third factor influencing adoption. Social value emerges in two ways. Firstly, participants believed they would gain social prestige because they possessed a rare and expensive artifact. Owning an iPhone would make them "cool." They envisioned the iPhone as an object of conversational currency at social events (or at a bar or on the street). They believed the technology has the capacity to become the centerpiece of conversation. They believed the hyped iPhone would serve as an ice-breaker, enabling them to start or join conversations. The participants also believed they would be viewed positively by their peers because they had insider knowledge about a phenomenon the others wanted to know more about. Participants believed this expertise would raise their profile and project a positive image.

The importance that hedonic values (emotional, epistemic and social) play in creating the desire to adopt the iPhone supports the arguments that individual behavior is driven by intrinsic motivation (Hirschman et al. 1982; Magni et al. 2010). As such, it provides a richer understanding of the decision-making process than theoretical perspectives that focus on instrumental motivation. By applying a theory that prominently factors hedonic considerations into the

decision-making process, adding TCV to the technology adoption literature answers calls for research approaches that include hedonic factors (Magni et al. 2010; Van der Heijden 2004; Venkatesh et al. 2001).

Contrary to expectations, conditional and functional values were not significant drivers of adoption. Conditional value, which considers how specific contexts create value, was an immaterial adoption driver among the participants in this study. While much publicity surrounded the launch of the iPhone, few specifications and concrete details were available prior to the launch. Therefore, participants in the study were unable to envision circumstances when the “fit” of the iPhone would add value to it. As a result, conditional value played little part in motivating the adoption of the hyped artifact in this study.

Prior to and at the time of adoption, the participants seemed to perceive many of the instrumental features of the phone as less useful than their current devices or other products on the market. Ironically, the participants in the study wanted iPhones despite the functional drawbacks. While this qualitative study cannot make a specific comparison regarding the relative effectiveness of TAM to TCV, the analogous relationship between TAM’s perceived usefulness construct and TCV’s functional value suggest that TAM would not be as suitable for studying the adoption of hyped technologies as the TCV. The TCV offers a more robust understanding of technology adoption than TAM and can help overcome the limitation of using TAM outside of the workplace setting, as pointed out by (Bouwman et al. 2009; Lopez-Nicolas et al. 2008). Similarly, the TCV offers an alternative to the DOI and IDT, which offer a broader understanding than TAM, but still place heavy emphasis on the instrumental traits of a technology. In this study, relative advantage should have had a chilling effect on the intention to adopt; however, the desire for the artifact was high.

The TCV provides a deep understanding of what motivates the adoption of a hyped technology. Originally designed to predict consumer behavior and to uncover the reasons that underlie purchase and use decisions, TCV offers practitioners a tool to gather an understanding of the determinants of consumer

behavior, including whether people will use a new technology. Equally important, it can be used not just to understand the adoption of a technology, but to inform product design and marketing strategy. As such, the TCV provides a framework that can be used to inform practitioners regarding design, marketing, strategic issues and other concerns relevant to industry. Furthermore, TCV provides a useful tool in answer to the calls for theoretical perspectives that are relevant to practice (Benbasat et al. 1999; Davenport et al. 1999; Lee 1999; Moody 2000; Rosemann et al. 2008).

6.2 Adoption of hyped technology

The findings suggest that utilitarian attributes (functional and conditional values) may not be the primary drivers of consumer interest in hyped technology. Rather, other factors drive the interest, such as curiosity about the novelty of the technology (epistemic value), the passion it ignites (emotional value), and the social image attached to the device (social value). Because only three of the five values provided a material impact on the decision to adopt the iPhone, this paper proposes a specific model explaining the adoption of hyped technology. The model has its roots in the TCV, but is modified according to the findings of the field study to focus specifically on the adoption of hyped technologies.

Social, emotional and epistemic values play a pivotal role in the adoption decision; whereas neither functional nor conditional value played an important role in motivating the intention to adopt a hyped technology. This finding challenges previous findings on technology adoption, for instance studies employing TAM or DOI/IDT, where adoption is predicted by an artifact's usefulness, ease-of-use, relative advantage or the possibility to observe its use and try the artifact. Therefore the proposed adoption of hyped technology (AHT) model incorporates three out of the five consumption values. The first is epistemic value, which explains people's curiosity and desire to learn and experiment with new technologies. The second is the social value attached to an artifact. The technology is perceived to be a topic of discussion and a showpiece in different social contexts. These two values seem to reinforce each other. The

higher the social value, the greater the increase in prestige gained by mastering the device. This gives the possessor higher social status because the person and his or her technology becomes the talk of the evening. The third value of the AHT is the emotional value that some individuals attach to an artifact. The values and their relationships are depicted in Figure 3.

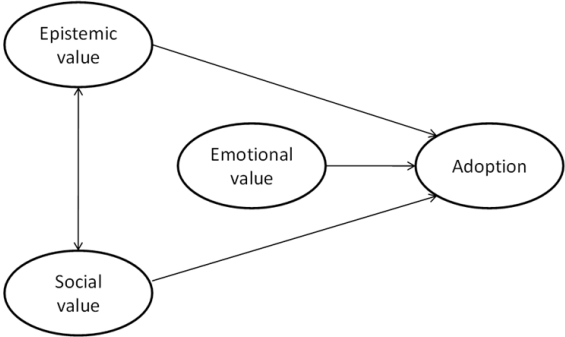


Figure 3. Adoption framework for hyped technologies

The proposed AHT model highlights the difference between decision-making under hyped conditions versus a more rational context. It also strives to increase theoretical parsimony by distilling the model from five encompassing values into three salient ones. The applicability of the AHT model can be assessed by three particular properties: the integration of the model (logical coherence), its practical and theoretical relevance, and its relative explanatory power (Glaser 1978). These assessment principles are derived from Glaser’s (Glaser 1978) work on theoretical sensitivity and have been applied in previous research (Hedman et al. 2003; Volkoff et al. 2005).

Logical coherence refers to the extent to which theoretical constructs are interrelated (Glaser 1978). In the case of AHT model, the constructs show aspects of independence as well as interrelationship. For example, much of the epistemic value is derived from curiosity rather than the facilitation of a task. The curiosity of non-users raises the social value to the user, because the user becomes an expert who can answer questions, explain the new technology, and thus can gain conversational currency. In this case, curiosity and novelty raised

the social value of the artifact so that the device served as an ice breaker and focal point at social events. Unlike the TCV, which assumes independence of its five constructs, the AHT proposes an interrelationship between epistemic and social value. Emotional value remains independent in the AHT, drawing its strength from the aesthetics of the device and the emotions attributed directly to the artifact.

There is both practical and theoretical relevance of the AHT model. Even though the study focuses on one technology, the AHT model may be used to understand other hyped technologies or service that either exist in the market today or someday may emerge. As technology becomes more ubiquitous, the distinctions blur between the concepts of innovation, technology and consumer products. The AHT model provides a useful tool for examining both technological innovation adoption as well as the decision to use new technology-oriented consumer goods. Such technology goods may be viewed as consumer products by potential users, and therefore will require a more encompassing approach to understanding adoption. While affording researchers the ability to research a diverse range of artifacts, the AHT model encompasses potential value drivers with three parsimonious constructs. The AHT model is also useful to practitioners who are developing or marketing new technology goods. Instead of just focusing on technical features, designers need to consider how to create emotional, epistemic and social value for the user. Perhaps to counter-position a hyped technology, competing firms can employ a campaign stressing functional or conditional value.

Finally, the explanatory power of the AHT model provides explanations absent from other models. The AHT is developed to explain the adoption hyped technologies, whereas competing models are more generic. TAM is a general model that explains technology adoption decisions and DOI/IDT are models developed to explain the diffusion of innovations. TAM in its original form does not include any of the three drivers included in the AHT. IDT and UTAUT include social aspects, articulated as image, but do not view people's desire to

learn and explore technology or feelings as factors explaining the adoption of this type of technology.

6.3 Implications and limitations

This study provides important implications for business. Firstly, by introducing the TCV, this paper provides a new tool for use by practitioners as they study the consumer technology market. In doing so, it emphasizes the distinction between technology as a tool and technology as a hedonic end in itself. It also provides information useful for launching high-tech consumer goods. If a technology will be launched with significant hype, designers and marketers should pay attention to the focal attributes of the product. If the hyped artifact offers primarily utilitarian benefits, it may not find its place in the hearts of the potential users who are more likely to buy it out of curiosity, for social prestige or for emotional reasons. Also, the product positioning will affect adoption. An expensive, hard-to-find, or otherwise unique technology may have more social value than one that is more easily attainable. Emotional marketing might provide a bigger impact than stressing the functional benefits. Shrouding details in secrecy may foster more novelty value than pre-announcing all of the technical specifications. At the same time, a company might counter-position its products by competing on the basis of functional value. Such a strategy may appeal to the potential users who are not caught up in the hype surrounding the competing technology. Secondly, a strategic implication involves product development. A company that relies on repeat purchase of each product iteration may want to limit the functionality of an offering and instead focus on promotion that emphasizes social, emotional, and epistemic value. Emphasizing these values can drive interest, while planned obsolescence of the functional attributes will promote future repurchase. The subsequent offering can again target the non-utilitarian consumption values, leading to a cycle of hyped launches and more frequent repeat purchases.

While practitioners and researchers may draw some conclusions from the result presented in this paper, the study does have limitations that warrant discussion. While the artifact studied was the subject of much hype and heavy promotion, it

was packaged with a service network. The focus was on the artifact but the device could not be completely decoupled from the service provider. Furthermore, there is a potential sample bias. A small sample, all of whom are students of a graduate course, was chosen for practical reasons. The lack of a random or representative sample may threaten the internal validity of the study. The external validity and generalizability likewise face limitations. Although the sample included a range of technical savvy and wide range of technological experience, as students in an e-business course, the participants may have a greater affinity toward technology than the population at large. Such an affect may have impacted their perceived value of the artifact in this study. Likewise, while the “halo effect” of Apple Inc.’s brand image contributed to the hype that drove the interest in the iPhone artifact, no measure was taken to establish the participants’ loyalty to the brand, and therefore no systematic analysis was performed to control for the participants’ pro-, neutral or anti-Apple brand bias. The iterative interview process enabled the researchers to gain deeper insights than with single interviews, but it required that all participants’ responses be associated with the corresponding person. Because responses were identified with each participant, there is potential for a social desirability bias within the data.

7 Conclusion

This paper explores the applicability of TCV in a qualitative study for understanding the adoption of hyped technologies and develops the parsimonious AHT model to explain the adoption of hyped artifacts. The results of the study demonstrate that the adoption of hyped technologies is driven by emotional, epistemic and social value. Emotional value was derived both from the hype surrounding the iPhone itself (the aesthetic appearance and tactile characteristics) as well as by software and associated services. The artifact itself provided epistemic value, as did the third-party applications and websites. The novelty value inherent in the iPhone fostered a general desire to learn and explore. Social value was a third influential factor driving adoption. This stemmed from both the artifact which becomes an ice breaker for discussion and

from the prestige the adopters expect to receive because they have intimate knowledge of the new technologies. Surprisingly, functional value, similar to the widely used IS constructs of perceived usefulness and relative advantage, had little impact on people's intention to adopt technology launched amid significant hype.

The findings of this study motivated the proposed framework for the adoption of hyped technologies. This framework is grounded in TCV and offers a more parsimonious approach to conceptualize, understand and measure adoption from a consumer perspective. The framework provides technology adoption researchers with an alternative that complements the utility-centric frameworks such as TAM and IDT. The framework offers researchers the opportunity to identify refinements, extensions and improvements. The proposed framework may enable researchers to understand the adoption of hyped technologies as well as technology in general. For practitioners who are interested in developing new technologies, it provides insight into how users determine the value of new technology. Developers should take into consideration emotional, epistemic and social values, and design products that appeal to these drivers as well as functional values.

This paper's use of the unaltered TCV within IT literature and the introduction of the AHT model provide many avenues for further research. Because investigation into hyped technologies is new to technology adoption studies, further research is needed to explore new emerging hyped technologies from different theoretical approaches. Future research can expand beyond technology artifacts to include technology-based services. Another way to broaden the understanding of hyped technology is to include larger groups of users with different background. Organizational adoption and assimilation of hyped technology provides another setting which would enhance our understanding of this type of technologies. Furthermore, future research should include both causal theories and process theories.

To the authors' knowledge, this is the first time that the entire TCV is brought into technology adoption research. Future research may test TCV's validity in other empirical contexts, including other consumer technologies and work environment technologies. The explanatory limits of the TCV can be tested by expanding the research context beyond voluntary decisions to mandatory use situations. Future research can also explore whether TCV is limited to consumer choices or whether it can be applied to group and organizational contexts.

The AHT model for adoption of hyped technologies was developed through one empirical study with 15 participants. Future research is needed to empirically verify the model with larger respondent samples and a diverse sample of technologies. This can be done through both qualitative and quantitative approaches. Qualitative approaches will help uncover new insights into the decision process and to gain a deeper understanding of the casual relationships proposed in this paper. This type of research could also apply a longitudinal approach in order to discover whether the TCV and AHT models are only applicable for initial adoption or whether it is suitable for studying continuance as well. This will answer calls for a longitudinal understanding of technology adoption (Benbasat et al. 2007; Bhattacharjee 2001; Lee et al. 2003). For quantitative studies it is necessary to develop questionnaire items and thereby operationalize the TCV and AHT constructs. By building a questionnaire that includes all five consumption values, researchers can compare the explanatory power of the AHT relative to the TCV. Future qualitative studies should not only focus on the adoption, but try to following the technology over its hype cycle. This will enable us to develop a stage model of how values change over the hype cycle.

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Appendix 1 Focus group script

- 1) Could everyone take one minute or so and let me know what they think of the study thus far?
- 2) I want to know about what values/motives/reasons are important to you when deciding to use a mobile device or to use a new feature on it? What is important to you? What characteristics give it value?
- 3) There are 5 specific types of values I'd like to explore. The first is functional value. What makes a smart phone useful to you?
- 4) What make a smart phone useful and valuable to you socially?
- 5) What kinds of emotions are satisfied or aroused by having and using a smart phone?
- 6) How is a smart phone useful to you to get knowledge, arouse curiosity, or to aid in some kind of learning?
- 7) Are there certain situations in which a smart phone gains value that it usually doesn't have? What are specific situations that make a smart phone more useful (or less useful) than an alternative...? An alternative could be a regular mobile phone, a laptop computer, or anything else you might want to compare it to.
- 8) Look at the 5 values you've written down. Rank them in order from 1 to 5, with 1 being the most important. Write it down.
- 9) Are there any other important values that we should have discussed but didn't?

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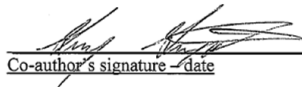
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PAPER V

Choices, Substitutes, and the Smartphone: A Comparative Task-Technology Fit Perspective

Unpublished journal article that expands a conference paper published in the Proceedings of the Eighth International Conference on Mobile Business. Co-authored with Mads Bødker and Jonas Hedman.

Drawing on data from a longitudinal field study, this paper investigates the influence of existing, better and stand-alone technology substitutes on the use of smart phones. By applying prospect theory, task-technology fit, and media richness theory, this paper improves our understanding of the role substitutes, relative fitness, and media richness play in ways consumers use technology. The data suggest that context has a profound influence upon the perception of the usefulness and appropriateness of smartphones. The fit-for-purpose of advanced mobile devices and related services change during the course of a day and over time.

**Choices, Substitutes, and the Smartphone:
A Comparative Task-Technology Fit Perspective**

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Abstract

Drawing on data from a longitudinal field study, this paper investigates the influence of existing, better and stand-alone technology substitutes on the use of smart phones. By applying prospect theory, task-technology fit, and media richness theory, this paper improves our understanding of the role substitutes, relative fitness, and media richness play in ways consumers use technology. The data suggest that context has a profound influence upon the perception of the usefulness and appropriateness of smartphones. The fit-for-purpose of advanced mobile devices and related services change during the course of a day and over time. Implications for further research and practice are discussed.

This paper is a significantly expanded version of research originally presented at the Eighth International Conference on Mobile Business, Dalian, China, 27 June 2009 – 28 June 2009.

1. Introduction

Mobile computing offers the promise of a technological revolution. The adoption of smart phone technology, which made gains in the business community, has recently exploded within the consumer market, driven primarily by the Apple iPhone and the subsequent new offerings by major mobile phone manufacturers. Now, millions of consumers have a single device with the potential to integrate many of the functions that previously required multiple technology artifacts.

This paper explores the adoption and use of smart phones in a situation in which different technology artifacts, such as the laptop, digital camera, or 2G mobile phone, can fill a similar need. In particular, the study follows the adoption of 3G internet-enabled smart phone technology among a group of users. The study was conducted in Denmark, the world leader in internet penetration (EIU 2007). This paper addresses the following questions: How will users react to the Apple iPhone? Will the smart phone replace the computer and other devices that consumers currently rely on for their information, communication, and entertainment needs? This paper investigates ways to improve our understanding of the role task-technology fit plays in the decision to use one technology instead of another to accomplish a given task.

The contributions of this study are fourfold. First, it adds to user behavior research in wireless services by elaborating on user preferences and the usage of new or different technologies. Second, it uses prospect theory to bring context into the process by which people choose technologies in a market environment that includes substitutes. Third, it expands task-technology fit research to include the role that relative fit of alternative technologies plays in choosing which technology to use in a given situation. Fourth, it expands the scope of task-technology fit theory by proposing that media richness theory shapes the use of a new technology, service, or product. By doing so, this paper breaks from the study of technology in an isolated environment to address the gap pointed out by Venkatesh et al. (2007) in their call for alternative theoretical perspectives that expand the study of technology diffusion to include

contingent models. It also answers Blechar et al.'s (2006) call to explore adoption decisions beyond construct-based research.

This paper is structured as follows: the first section offers a discussion of relevant theories and literature. The following segment details the research methodology used to collect and analyze the data. The subsequent section presents the findings. A discussion addressing the theoretical and business implications of the findings follows. Finally, concluding remarks bring the paper to a close.

2. Literature review

In this section, we discuss behavioral theories that explain post-adoption use of technology. We then lay the foundation for the importance task-technology fit plays in technology decisions in a marketplace that includes many competing technologies. We then review task-technology fit literature and propose the inclusion of media richness theory used in human-computer interaction to deepen task-technology fit theory.

2.1 Post-adoption technology use

Much research in the information systems domain focuses on the adoption of technology by individuals and by organizations. Much of the attention on this specific view of technology use stems from the important consideration that if a technology is not used, then it cannot provide benefit to an individual or an organization (Davis 1989; Venkatesh et al. 2003). While adoption research provides insights critical to understanding the benefits of information and communication technology, focusing on the initial acceptance of technology does not provide insights into how the technology is actually used; nor does it provide insight into whether a technology, once adopted, will be abandoned or replaced. Because the success of a technology is more dependent on continued use than initial adoption, post-adoption use warrants dedicated research and study (Bhattacharjee 2001b).

In the past decade, information systems researchers have begun to look at the phenomenon of post-adoption use of technology, with a strong focus on what drives the continued use of a technology. While the volume of literature on the subject is relatively small, it encompasses a rich array of theoretical perspectives. Some studies employ traditional adoption theories such as Roger's (1962) diffusion of innovations (Parthasarathy et al. 1998) and extensions within the technology acceptance model (TAM) tradition (Kim et al. 2005; Venkatesh et al. 2000). Other perspectives range draw upon neuropsychology (Ortiz de Guinea et al. 2009) and memory theory (Kim 2009). Additional post-acceptance ICT usage research make use a social capital perspective (Wang et al. 2009), social influence theory (Malhotra et al. 2005), cognitive absorption (Deng et al. 2010), and contingency theory (Khalifa et al. 2007).

Bhattacharjee's (Bhattacharjee 2001b) Information Technology Continuance model is most influential theory for understanding post-adoption IT use (Warwick et al. 2000). Based on Oliver's expectation-confirmation theory (Oliver 1980), ITC explains the intention to continue using a technology based on the users satisfaction with the system. Satisfaction is determined by whether the user experience exceeds, meets, or falls short of pre-adoption expectations (Bhattacharjee 2001b). ITC has been used to investigate online banking (Bhattacharjee 2001b), customer relationship management (Bhattacharjee 2001a), document management systems (Bhattacharjee et al. 2008), software development systems (Bhattacharjee et al. 2004), and internet-based teaching platforms (Limayem et al. 2008). Others combine ITC and TAM to investigate the likelihood of users to continue using the internet on mobile devices (Hong et al. 2006) and to research enterprise resource planning systems (Hsieh et al. 2007),

While research into information technology continuance provides new insights into technology use, it focuses on a specific phenomenon: whether people will continue to use their technology. In essence, it is an extension of technology adoption research that focuses on the appropriation of technology. Looking at

the way people utilize technology after they have adopted it is not a centerpiece of most post-adoption use studies. To fill this theoretical gap, this paper looks at the way people use new information and communication technology after they have acquired it. Specifically, it looks at the process by which people choose to use or not to use a technology after they have adopted it.

2.2 Consumer behavior in the presence of alternatives and substitutes

When a decision maker has multiple options to choose from, the perceived costs and benefits tied to the decision are not assessed as an isolated transaction but within the context of competing alternatives. Because people cannot gather or analyze every bit of information, they simplify the decision process and seek satisfactory, but not necessarily optimal solutions. Building on this concept of Bounded Rationality (Simon 1955), Kahneman and Tversky (1979) proposed prospect theory, a behavioral economics approach to decision-making in the presence of choices and risks. They argue that decisions are not made in isolation, but that decision outcomes are contingent upon comparisons to a referent. People judge value by gains or losses relative to a reference point, not in terms of absolute value (Kahneman et al. 1979). For example, people perceive a \$5 price change on a \$25 item as greater than a \$5 change on a \$100 item, even though the differences have the same absolute financial value (Thaler 1980). The way in which people process information cannot be separated from its context (Kahneman 2003). A choice becomes acceptable when the value of its advantages is greater than then value of the disadvantages (Kahneman et al. 2000). The differences, however, are not only relative but they are unequally weighted: people weight disadvantages more heavily than advantages. This unequal weighting of outcomes creates loss aversion among decision makers (Kahneman et al. 1986; Kahneman et al. 1979; Kahneman et al. 2000; Tversky et al. 1991)

Decision making usually involves constructive preferences, or determining preferences when presented with a choice rather than drawing upon a priori preferences. Because preferences are determined when confronted with a choice, the context and the framing of the choice affect the decision (Bettman et

al. 1998; Tversky et al. 1993). Decisions are often made without exhaustive thought (Kahneman 2003), and part of the decision-making process is to maximize the ease of justifying a decision (Bettman et al. 1998). The assessment of whether something is better or worse is carried out quickly (Kahneman 2003). When comparing choices against a reference point, people disregard shared traits and focus on the salient differences value (Kahneman et al. 1991). They edit the choice set by creating simplified representations of the competing choices then make an evaluation based on the simplified prospects. Decision makers then choose the option with the highest value relative to the other choices (Kahneman et al. 1979).

As such, options become acceptable if the perceived advantages outweigh the perceived disadvantages relative to the referent (Kahneman 2003; Kahneman et al. 1979). Contrast effects play a vital role in determining relative value. Contrast effects cause something to appear attractive when compared to a less attractive product or to appear unattractive against a background of a more attractive alternative (Tversky et al. 1993).

The perception of quality differences between a new option and the referent affect the likelihood of switching (Constantiou et al. 2006). While attributes of quality can be measured, the concept of quality is inherently subjective by nature. Therefore, the measurement of perceived quality can give strong insight into the decision-making process. The evaluation of quality is usually relative, made via comparison. The judgment whether something is high or low quality depends upon its superiority or inferiority to a referent (Zeithaml 1988).

Choices are made through comparisons and gain/loss evaluations (Kahneman et al. 1979) and a choice is made based on evaluating one choice relative to another (Kahneman et al. 2000). Because preference construction is contingent on the framing of the problem, the method of elicitation, and the context of the choice; contrast effects play a strong role in decision making by influencing the reference point that is used to gauge value (Tversky et al. 1993). The perception of quality differences between a new option and the referent influence the likelihood of switching (Constantiou et al. 2006). Because people compare the

ease of use and performance of different alternatives, the fit between a device or medium and the task at hand becomes an important factor influencing technology choice (Daft et al. 1984).

2.2 Task-technology fit for advanced mobile devices

When people are presented with a task, they often have multiple options available that can be employed to complete the action. Goodhue and Thompson (Goodhue 1995) define these tasks as actions that involve turning inputs into outputs. This conversion process forwards the notion of performance, the facilitation of which will increase the desired output. According to Goodhue and Thompson (Goodhue et al. 1995) “technology provides features that fit the requirement of a task” because technologies are tools which individuals employ to perform tasks. The suitability of a technology to complete a given task is known as task-technology fit (TTF). Many researchers offer definitions of TTF. Goodhue and Thompson (1995) explain TTF as “the degree to which a technology assists an individual in performing his/her portfolio of tasks.” Mathieson and Keil (1998) add an external component by arguing “fit in general refers to the relationship between a person and his/her environment.” Goodhue (1995) states that “TTF focuses on the degree to which systems characteristics match user task needs.” Within an information systems context, fit refers to the agreement between a task and the technology chosen to perform it.

Many researchers have studied the interplay of task-technology fit with the widely used IS constructs of ease of use and usefulness (Dishaw et al. 1999; Klopping et al. 2004; Mathieson et al. 1998). A thorough review of TTF literature indicates positive influence of fit on performance (Belanger et al. 2001; Kositanurit et al. 2006; Staples et al. 2004; Zigurs et al. 1998). Task-technology fit has been found to positively influence performance and precursors to utilization/beliefs, affect, etc. beyond the confines of TAM-based studies. Nance and Straub (Nance et al. 1996) examine the role of task-technology fit in the utilization decision.

Goodhue (1995) finds that the value of a technology is dependent upon the task of the user and that users are capable of evaluating the fit of their technology choices. Contemporary TTF research looks at whether a focal technology is a suitable fit for a given task. It does not, however, use fitness as a comparative decision tool. Therefore, we propose that the application of TTF to technology usage decisions be expanded as a theoretical lens by which we can understand the choice among different technological devices. As such, we broaden the TTF theoretical lens beyond the question of whether there is a congruent fit between a technology and a task to ask: *which technology is a better fit for a given task in a given context?* In doing so, we bring the reference-based, comparative decision making of prospect theory into the application of TTF research. This marks a pragmatic move to introduce the theory to real-world decision situations in which decision makers are confronted with the choice of many different technologies that can meet their needs. Technology use is not just a question of task fitness, but rather, it is the question of which technology is a better fit for the task at hand.

2.2.1 Task-technology fit and mobile technology

Research has shown a positive relationship between task fitness and the acceptance of mobile technology (Gebauer et al. 2004; Gebauer et al. 2008; Lee et al. 2007). Klopping and McKinney (2004) have empirically tested the positive relationship between TTF and behavioral intentions. The original constructs of TTF proposed by Goodhue are generalities about whether someone perceives the technology to be a good fit. While keeping with this concept, we attempt to extend the concept more distinctly into the study of mobile devices. To more closely link task-technology fit to the unique properties on mobile devices, we incorporate human-computer interaction concepts into the broader definition of fitness. Media richness theories have proposed that in order to understand how and why certain technologies are used for certain purposes, we should explore their task-medium fit (Daft et al. 1984; Daft et al. 1986). The task-medium fit implies an intimate relationship between the task that a user wants to carry out and the medium used to do so. Daft and

Lengel (Daft et al. 1986) originally proposed a continuum between rich and lean media according to which we can distinguish between a communication medium's ability to transmit and convey a broad or a limited range of cues. Ideally, the theory proposes that a high task-medium fit in communication media is attained once a communication medium is used that provides the ideal range of cues for the partners to make good decisions. If the medium is too rich, the users may become distracted from the task at hand. If the medium is too lean, the communication lacks in the contextualization that would make it relevant for solving a task (Tan et al. 1999).

With the arrival of advanced mobile phones that are, in effect, sophisticated media devices, a contextual look at the proposed intimacy between technologies and task should be reconsidered since devices that we carry around with us are not fixed objects. Their meaning, efficiency, and value are highly dependent on the users' context. In other words, their role and meaning as a medium change both in a temporal (time) and a locative (place) context.

Using tenets from media richness theory to inform research on advanced mobile services also faces another challenge. Classic applications of the theory tend to focus on relatively well-defined communication tasks and relatively simple technologies (Daft et al. 1987). In order to appreciate the condition of new technologies and new forms of use, we need to be appreciative of actual—often unanticipated—usage and user experiences with the technology in question. First, it is becoming apparent that advanced mobile devices are no longer characterized exclusively as communication devices. Even if the devices have applications for phone calls, messaging, chat, and other forms of online communication, they are also personal devices that fulfill tasks beyond those concerned with communication. Furthermore, the evolution of smart phones and other substituting technologies have a mutually interdependent influence (causally and longitudinally) on competing technologies, user preferences and choices, and the business models of technology and service providers.

3. Research Method

In order to address the research question, we applied a qualitative field study approach inspired by explorative and interpretative information systems research tradition (Klein et al. 1999; Orlikowski et al. 1991; Walsham 2006). Following this tradition, the view taken on the technology is broad and includes the physical artifact and its embedded features, as well as the different services and applications that can be downloaded or accessed via the technology.

3.1 Subject selection

The six-month field study, called iUSE (iPhone Use) commenced in September 2008, shortly after the European product launch, and initially involved 16 participants (one dropped out due to hardware failure). The participants were each equipped with a new 3G iPhone and the basic voice, SMS and data plan for a six-month period (September 2008 to March 2009). Participants were recruited from a graduate-level e-business course. The group, consisting of mixed gender (eight women and seven men) and nationality (five different nationalities) ranged in age from 22 to 51 and all were working full- or part-time. They had diverse undergraduate degrees and practiced a variety of professions. We sought a balance of commonality (enrolled at the same master program) and diversity (age, gender, nationality, professional background and technology expertise) when selecting the participants, in order to ensure richness in data collection (Barbour 2005; Kitzinger 1995; Krueger et al. 2000; Morgan 1997). The participants committed to data-reporting obligations, such as answering surveys, participating in focus groups and granting interviews. At the end of the study, the participants had to return their phones as required by government regulations.

3.2 Data collection

To ensure a rich dataset, data were collected through 60 interviews, three focus groups and three self-reported usage surveys (in the beginning, middle and end of the study). The surveys, which collected basic usage information, were used

to provide a gauge for understanding trends in individual usage and were used to help formulate individual interview questions and were not intended for statistical analysis.

Early in the study, participants were divided into focus groups in which they discussed their adoption and use of the devices. The research followed established protocols for group interviews and was facilitated by one researcher, while another video recorded each focus group and took field notes (Barbour 2005; Kitzinger 1995; Krueger et al. 2000; Morgan 1997). In order to be able to analyze data across groups to find patterns and themes, this study conducted three focus groups. An objective of the multiple groups was to reduce the effect of individual group dynamics on the overall dataset (Krueger et al. 2000; Morgan 1997). The first question was a general topic for conversation and was structured so that everyone had to answer, as a way to deter “groupthink,” which is the phenomenon in which people of different opinions stay quiet in order to maintain an ideological consensus (Morgan 1997). During the opening instructions people were encouraged to speak to each other, sharing their reactions to others’ comments and to discuss items of interest that were raised by other participants (Kitzinger 1995). Each focus group session lasted no more than two hours. The focus groups were recorded following privacy guidelines that were explained prior to the group discussions (Krueger et al. 2000). Participants were informed that recordings would be used for transcription and research but not released to the public and that they would not be identified by name in the presentation of the data.

Following the focus groups, a total of 60 structured and semi-structured interviews were carried out with each participant interviewing in four settings (A-D). Interviews A lasted for 30 minutes and were conducted by one researcher focusing on the most important values for adopting technologies. Interviews B also lasted for 30 minutes and were carried out by two researchers, one taking notes and one asking questions exploring the usefulness and limitations of the artifact. Interviews C took approximately 60 minutes and were done over Skype with one researcher addressing changes in use over time.

Interviews D took 60 minutes with two researchers focusing on the use of the iPhone and its relationship to other technologies, such as how the use of the iPhone affects the use of other technologies. Interviews A and C used data from the survey to develop individual questions for each participant.

The iterative structure of the surveys, focus groups and interviews is illustrated in Figure 1. The results of the first usage survey and the focus groups were explored in interview setting A. The data from all three surveys and the focus groups were further discussed in interview C. Similarly, the data from the focus groups were used to inform interviews B and D.

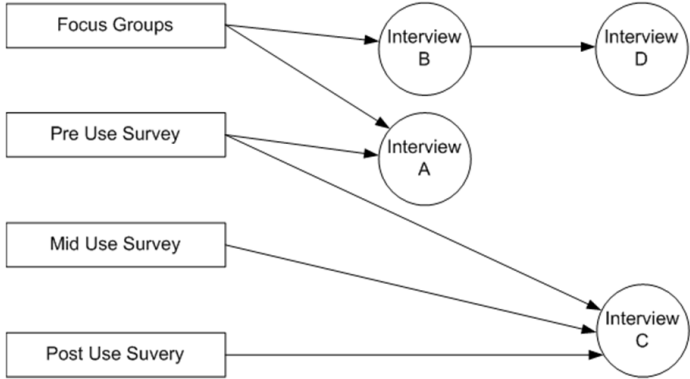


Figure 1. Structure of data collection

3.3 Data analysis

Data were coded and analyzed in conjunction with the iterative data collection process (focus groups and interviews A-D). Data coding was done jointly by the researchers to create a shared understanding of the empirical phenomena as suggest by Saldaña (Saldaña 2009) and Guest and MacQueen (Guest et al. 2008). Leveraging the opportunities available in the field study, answers during one round of data collection were analyzed, compared with previous answers, and inconsistencies were identified and explicitly addressed during the next interview round. The first iteration of coding the qualitative data assigned one of the five consumption values to each pertinent datum. Because data were

collected throughout the study and since subsequent interviews were used to clarify extant data, the coding used the time period referenced by the participant rather than the point at which the data were collected. Participant statements were coded by participant, consumption value and point of time within the study. The actions and intentions stated by participants were explicated. The significant point of statements and comments was clarified when possible. The data were compared with other participant data. Gaps and ambiguities in the data were identified and questions for subsequent interviews were created to close the gaps (Charmaz 2006).

4. Findings

Generally speaking, the participants' actual use of smart phone features differed significantly from their pre-adoption predictions. For example, most participants expected to make heavy use of the email features on their new smart phones. While most participants did use the email, which led to an overall increase in daily email use, participant #16 made no use of the email feature and participant #5 "almost never" checked email via the iPhone. The dedicated email feature was perceived as convenient; however, participant #10 did not use the email feature, opting to access mail through the web browser instead. The participants using email read incoming email, but rarely replied to emails through their iPhone. The small, virtual keyboard presented too much difficulty typing responses. Those that did reply to email would only do so when the response could be limited to a few words. Participant #9 did not expect to be a heavy email user, but began using it extensively when she realized it worked in a similar manner to her computer. At the same time, like the others, she avoided typing on her iPhone.

Participants in the study replaced their previous phones with the iPhone, so they did not have an alternative for using SMS services. However, participants experienced a decline in the frequency of messages and the number of characters they typed. Participants who were heavy SMS users were familiar with the T9 phone keypad and were accustomed to the habit of typing messages using that input device. They were resistant to the virtual QWERTY keyboard.

At the same time, several participants expressed that one reason for decreasing SMS usage was that they could not type SMS messages without looking at the screen: “You cannot walk and SMS at the same time.” They preferred not just the layout of T9, but the tactile feel of physical buttons with a demarked key in the center. They also preferred to view and organize SMS in different ways than the iPhone interface dictates.

Attitudes about internet features were affected in a manner similar to SMS. Participant #9 conveyed a similar sentiment regarding instant messaging. She experimented with IM service, but then abandoned it on the iPhone because of the difficulty typing. Many participants made heavy use of the web browser. Due to the input device, however, many expressed a utilitarian approach to web use. Whereas they would “surf” more on their computers, they would use their iPhone web browser to find specific information and use it seldomly to casually surf the internet. Others limited their web activity to sites that required little or no typing.

A significant impact of the iPhone stems from its omnipresence. The participants almost always have their iPhone with them, and through the 3G & EDGE connections are always connected to the internet. The integrated tools, such as music player, camera, and other applications add significant value to the iPhone. However, many of the features are viewed as inferior substitutes to equipment that is focused on a single purpose. Participant #10 articulated that smart phones do many things, but they do not do any of them well.

The built-in camera is convenient, but the quality is much lower than most single-purpose digital cameras. It can be convenient for snapping pictures anytime, anywhere; however, participants expressed concerns about picture resolution and the difficulty taking pictures in low-light situations. Some expressed appreciation for the convenience of taking a picture and attaching it to the name of a contact in the integrated contact list. Participant #9 gave an example of the trade-off between having an integrated camera versus equipment dedicated to photography: “I just used the camera in Egypt. It’s always good weather, and my boyfriend has a ‘real’ camera.”

Despite concerns about typing, participants expressed an appreciation for constant web access. Some use the web much more than they did prior to the iPhone, particularly when not near their laptops or away from a WiFi connection. Some read the newspaper less, instead getting their news through their iPhone. Others use the phone to receive continuous news updates and sports scores. Participants view the integrated web browser as a substitute to the computer-based browser and use the iPhone when they are away from their computers. Participant #5 does not use phone-based internet very often because of the performance of the 3G connection. Whenever she is near a fast connection such as WiFi, she also has her laptop, which is her preferred internet device. Participant #2 and #15 are exceptions. Number 2 can keep her computer turned off, yet still search the web. Contrary to expectation, she prefers the iPhone because it is *more difficult* to use, and therefore is only used for important things rather than to distract her from other activities. Number 15 uses her iPhone to access the internet even when she has her laptop because the iPhone boots up much more quickly. Therefore, she uses the phone to surf the web much more than she had anticipated.

The built-in GPS is used less than predicted due to what are perceived to be severe limitations in its usability: it is too slow, requires a fast and stable internet connection, does not provide audio instructions, etc. When driving, participants prefer GPS systems designed for automobile use over the iPhone's GPS. Additionally, when they are in a car, they also prefer paper maps to the small screen of the iPhone. At the same time, it is more convenient than carrying a paper map when walking. It also enables special features. For instance, Participants #3 and #6 use an application that uses the GPS to map the route, speed, and distance traveled when they jog or cycle.

The integrated MP3 player is convenient and many participants have increased their music listening since adopting the iPhone. At the same time, many others have not changed music listening habits. They have simply substituted the iPhone for their other music player, which they always carried with them prior to getting the iPhone. Participant #4 still uses a previous music player because

the iPhone lacks sufficient storage space for her music library. Participant #6 still uses his other MP3 player when jogging because he perceives the iPhone to be fragile and is afraid that it will break if exposed to perspiration or rain.

5 Analysis

The qualitative data show that post-adoption use of new technology – smart phones in this case – is not strictly tied to whether someone has adopted the technology. The iPhone offers many technological features that were redundant to other devices already in use by the study participants. After acquiring the new smart phone, however, participants did not indiscriminately replace their existing devices. Rather, they undertook a deliberate process of discernment to construct new preferences given their new utilization choices. They considered which devices were more appropriate for use in given situations. In the process, they considered not only whether the iPhone was a technological fit for a task at hand, but whether it was a *better* fit than another device in their pool of technological resources. They considered not just the task, such as taking pictures, but also the context within the decision was made. For example, the iPhone might offer an advantage over a standalone digital camera for taking casual snapshots, but it might present a material disadvantage for taking important, more meaningful pictures. As such, the participants used a comparative evaluation process in which they determined their preferences based on whether the iPhone was more advantageous for a given use within a specific context.

The preferences constructed by the participants did not always determine the usage. For example, many participants indicated that they preferred their former mobile phones for sending SMS; but they were unable to use their preferred alternative because they had transferred their mobile phone service to the iPhone. In this circumstance, the choice situation may have been limited to a binary use/non-use decision. At the same time, the relative preference for a different device, even though it was unavailable, impacted the utilization of the new smart phone. The participants used the less preferred device by default;

however, they used much less frequently than they had used their previous device.

The pre-adoption preferences that motivated adoption changed once the participants gained experience with their new smart phones. As a result, the study participants reconstructed their preferences post-adoption. As a result, the relative preference for the iPhone versus alternative devices changed with post-adoption experience.

6. Discussion

The study data suggest a different perspective about continued IT use whether pre-adoption expectations were met. The change in usage preferences support the theoretical arguments that preferences are constructed at the time of decision rather than established a priori (Bettman et al. 1998). As such, preferences will be situation dependent, and the preferences that led to initial adoption may not be the same preferences that motivate subsequent usage.

The use of an integrated device such as the iPhone that offers many functions, even when the performance is deemed to be of lower quality supports the theoretical argument that people seek satisfactory solutions rather than the best solutions (Simon 1955). The study participants compare one product to another; and they weigh one technology against the standard set by another. This supports the theoretical foundations of prospect theory that posit that people compare new technology to something they already know or use (Bettman et al. 1998; Kahneman 2003; Kahneman et al. 1979). The use of a reference point to determine quality lends credibility to the role context dependency plays in adoption decisions, as predicted by theory (Tversky et al. 1993). The data confirms a propensity to compare mobile device features to those of the personal computer (Blechar et al. 2006; Hung et al. 2003). And in accordance with the literature, the perceived quality differences between a new option and the referent impact the decision as to whether the new offering will be a part-time substitute or a permanent replacement (Constantiou et al. 2006).

The empirical work clearly shows that the context has a profound influence upon the perception of the usefulness and appropriateness of the technology for a number of tasks. While users are initially impressed with the visual presentation and the interactive features, they gradually discover shortcomings that are contingent upon the contextual fit of the interface functionality. One example that participants mention is the way in which SMS-messages appear on the front screen upon receipt, enabling people near the user to read the message. This function is only problematic in public spaces, not in private settings. Another example is the problem of typing on the phone, which for most of the participants was allocated to time slots when they were not walking, bicycling, or otherwise engaged in bodily movement. These time slots were assigned for other kinds of usage of the device such as music listening. Thus the study data attest to the suitability of task-technology fit (Goodhue et al. 1995), broadened to include medium richness (Daft et al. 1984; Daft et al. 1986), in understanding the use of technology. As this study suggests, TTF is useful not only to understand the suitability of a technology, but to understand that technology users will compare the suitability of different devices and base their usage decisions on which technology is most suitable for a given task. As such, the presence of alternatives and substitutes must be included in the study of task-technology fit.

The presence of substitutable technologies and task-technology fit has implications for practice. Firms designing or marketing smart phones and other technological goods should not limit themselves to considering whether their offering is a good fit for a given task. They should instead ask whether the offering is a better fit than competing technology. In order to determine the relative fitness, firms must investigate the reference technologies in their customer choice set. For multipurpose devices such as smartphones, the reference points are many – laptop computer, digital camera, standalone music players, etc. The study data suggest that the smart phone should not be offered (marketed) as the “only” device, but as a complement to stand-alone technologies. By positioning it as a complement or always-available substitute,

firms can change the reference point against which the smartphone is compared, so that the gain from added availability will outweigh the loss of functionality.

While researchers and practitioners may draw conclusions from this study, they should keep in mind the limitations of the study. There is a potential sample bias. A small sample, all of whom are students of a graduate course, was chosen for practical reasons. The lack of a random or representative sample may threaten the internal validity of the study. The external validity and generalizability likewise face limitations. Although the sample included a range of technical savvy and wide range of technological experience, as students in an e-business course, the participants may have a greater affinity toward technology than the population at large.

7. Conclusions

In this paper we have reported findings from a longitudinal empirical study to address the implications of existing substitute technologies on the use of smart phones. We analyze and discuss the empirical findings using prospect theory and task-technology fit enhanced with media richness theory; and we found that the fit-for-purpose of the advanced mobile device and related services changes based on location and other contextual factors.

This paper advances IS research in four ways. First, it complements user behavior research in wireless services by elaborating on user preferences and adoption of new or different technology. Second, it explores the important role of contextual appropriateness that is embodied in the interface design and examines how it determines the use or non-use of new wireless technology and services. Third, it expands task-technology fit research to include relative fitness. Fourth, it expands the scope of task-technology fit theory by proposing that media richness theory shapes the use of a new technology, service, or product.

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Do you verify that the authors have contributed to this joint paper as described above?

Yes: ☒ **No:** ☐

If no, please explain:


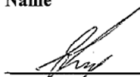
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