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Disruptive Innovation of Mobile Communication Apps

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Abstract

This paper conceptualises mobile communication apps as disruptive innovation that potentially displace incumbent mobile communication services such as voice calls and short messaging services. Using the theoretical lens of disruptive innovation and data from a focus group study and two case studies of mobile service providers, this paper investigates how these apps are signalling radical change in the traditional mobile communication environment through their low cost, simplicity and convenience to create value and growth in order to triumph over powerful traditional incumbents.

Keywords

Mobile Communication Applications, Disruptive Innovation, App Stores, Mobile Service Providers, New-Market Disruptive Innovation

INTRODUCTION

Since the launch of the application (app) store in 2008 by Apple, mobile apps have become one of the most downloaded utilities on communication devices such as smartphones and tablet computers (Liu et al. 2012) making mobile apps a multibillion-dollar business (Cortimiglia et al. 2011). This mass diffusion of apps through the uptake of mobile communication devices is predicted to rake in US$74 billion in revenues for app stores worldwide by 2016 with an estimated 310 billion app downloads (Shen and Blau 2012). In this trailblazing market scenario, we observe that mobile apps (i) allow users to communicate and share information with others (Humphreys 2013) at reduced transaction costs to the users (Gans 2012), and (ii) disrupt the traditional patterns of mobile communication exchanges monopolised by incumbent services such as voice calls and short messaging services (SMS) (Boase 2013). This paper focuses specifically on mobile communication apps because we see a fundamental shift in people communicating through these apps, which we believe is potentially leading to declines in traditional mobile communication services such as voice calls and SMS. For example, a 2013 report by Gartner on three most popular uses of mobile apps find 46% use mobile apps for email and calendaring, 37% for instant messaging and 26% for office and personal productivity, which indicates communication as a high priority area in app use.

Innovation is conceptualised as an important economic phenomenon that drives economic growth and entrepreneurship as a dynamic process (Klochikhin 2012). It involves 'certain technical knowledge about how to do things better than the existing state of the art' (Teece 1986). It is also defined as creating user value by satisfying existing or intending needs of consumers in unique ways (Von Hippel 2009). On the other hand, disruptive innovation is described as a powerful way of expanding as well as developing new markets and functionalities that potentially interrupt and dislocate existing market relations and bonds (Adner 2002; Yu and Hang 2010). Given the easy accessibility, convenience, cost effectiveness and opportunities provided by mobile communication apps, we conceptualise them as disruptive yet innovative communication applications that potentially expand the ways and means through which people connect and communicate with others. These apps potentially disrupt (a) established services such as voice calls and SMS, and (b) business models of established

mobile service providers (MSPs). In addition, the fact that any wireless local area network (Wi-Fi) connection can provide easy access to these apps reduces the dependency on mobile service providers (MSPs) that otherwise monopolise voice and SMS services by routing such services only through their dedicated networks.

The objectives of this paper are to:

- Investigate how mobile communication apps are changing the business models of mobile service providers

- Analyse such changes through the theoretical lens of disruptive innovation.

Our first objective is contextualised to mobile communication apps wherein we offer preliminary insights into the changing mobile communication environment through (i) opinions expressed by self-reported smartphone and app users that participated in a pilot focus group discussion, and (ii) pilot case studies of MSPs. We approach our second objective through the theory of disruptive innovation by discussing how mobile apps are signalling radial change in the traditional mobile communication environment (e.g. mobiles offering voice calls and SMS) through their low cost, simplicity and convenience to create value and growth and gradually triumph over traditional powerful incumbents (i.e. traditional forms of communications such as voice and SMS).

A key contribution of this paper is advancing the theoretical understanding of disruptive innovations. We concur with the causality of new innovations (such as mobile communication apps) triumphing over existing communication services (such as voice calls) as predicted by the theory of disruptive innovation (note: theory is discussed next) if the incumbent services are unable to contest and win over the disruptive innovations based on a variety of factors like convenience, price, unique features etc. (Christensen et al. 2004). However, we observe that during its disruptive trajectory, mobile communication apps potentially follow a '*freemium*' (Anderson 2010) path. In such instances, these apps supplement the existing communication services offered by MSPs. MSPs offer these apps either free of charge or bundle them with existing services until a premium charge is imposed for using them based on their additional functionalities or advanced features (Liu et al. 2012) or as a result of high consumer demands. In such supplementing periods the user employs both, the incumbent services (e.g. traditional communication services) as well as the new innovator services (e.g. apps). Eventually, over a period of time, the high uptake of innovators potentially overtake the existing incumbent services (e.g. voice calls, SMS) making the innovators (e.g. apps) mainstream while incumbent services dip by taking a downward course. Such disruptions can create upheaval in incumbent services by reducing them to a state of non-functionality where although offered free of charge may never be used by consumers. Refer Figure 1.
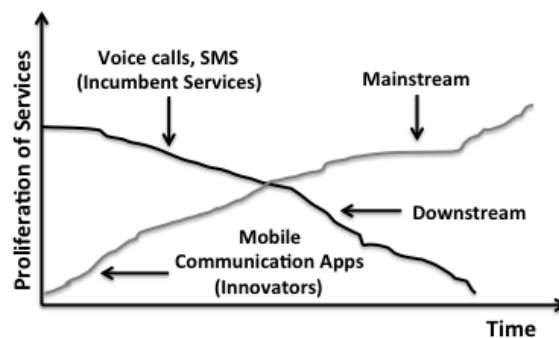

Figure 1: Disruptive Trajectory of Mobile Communication Apps

This paper is structured as follows: The next section is focused on discussing the theory of disruptive innovations followed by a review of the characteristics of mobile communication apps. Evidencing how mobile communication apps are changing the way people communicate through digital devices follows thereafter, which is analysed through the pilot focus group discussions and MSP interviews. We conclude with a discussion on future directions, implications and study limitations.

THEORETICAL BASE – THE THEORY OF DISRUPTIVE INNOVATION

The notion of disruptive technologies pioneered by Christensen (1997) and Christensen et al (2004) describe the displacement of established firms and technologies by new and innovating firms and technologies. Such displacement is based on the superior performance of innovative players and technologies, which incumbent firms or technologies are unable to match. Predicting the possibilities of innovative technologies ousting incumbents has assisted researchers and practitioners in reassessing the ways in which firms should approach both, technological threats and business opportunities (Adner 2002). The concept of disruptive technologies is referred in several past studies specifically relating to punctuated equilibrium (Romanelli and Tushman 1994; Silva and Hirschheim 2007; Tushman and Anderson 1986) where firm equilibrium (i.e. steady pace and state of

firm evolution) is radically impacted by rapid external technological changes resulting in a revolutionary period of upheaval in the firm. Past studies describing technology competition outcomes have researched the supply-side of firm and technology interaction. For example, at the technology level, outcomes have been attributed to failure of the firm in developing a faster technology trajectory to combat innovators (Abernathy and Clark 1985). At the firm level, unwillingness and hesitation by management in speedy adoption and investment in technology has been described as challenges in managing the threat of displacement by new market entrants and innovators (Tushman and Anderson 1986). Adner's (2002) study on the emergence of competition as a result of disruptive technologies identifies the demand conditions that enable disruptive dynamics while Afuah (2000) calls for a closer examination of the environments in which technologies compete for better insights into displacement caused by innovating technologies. According to Christensen et al (2004) technology disruption happens when a new technology displaces the existing mainstream technology from the mainstream market thereby giving rise to three types of innovations.

- Sustaining innovations: these innovations bring improved products into established markets (e.g. cars that offers better fuel efficiencies and mileages, computers with fast processors). In such scenarios incumbents have a higher probability of successfully combating new entrants and innovators.

- Low-end disruptive innovations: these offer existing customers low-priced and relatively 'straightforward products' (Christensen et al. 2004). For example, discount stores or retailers such as Wal-Mart offer cheaper priced products in comparison to similar existing goods that are over-priced relative to the value existing customers can use.

- New-market disruptive innovations: These innovations (e.g. smartphones, laptops, eBay) take place when attributes of existing products and services either limit the number of potential customers or force consumption to occur in inconvenient or unified settings (Christensen et al. 2004). New-market disruptive innovations create new opportunities and growth by making it convenient for people to engage with such innovations that otherwise would have required strong expertise or a large amount of wealth to pursue. These type of innovations also push potential non-consumers or 'non-consuming contexts' (Christensen et al. 2004) into accepting or consuming the new innovations.

We categorise mobile communication apps, which are the focus of this paper, as new-market disruptive innovations because they satisfy the following conditions (in comparison to existing incumbent services): (i) initially, inferior attributes but highly valued by mainstream consumers (ii) value prepositions that attract new customers thereby creating new markets (iii) available free or at extremely low costs, and (iv) penetrates an established niche market in a bid to make it mainstream (Adner 2002; Govindarajan and Kopalle 2006). Mobile communication apps are not expected to completely destroy or totally displace voice calls or SMS services, as such disruptive innovations are comparative in nature to incumbent services (Yu and Hang 2010). Rather, a disruptive innovation unsettles an established and competitive structure of a market either depriving the incumbent of its dominant position or creating a new market altogether (Adner 2002; Christensen et al. 2004).

CHARACTERISTICS OF MOBILE COMMUNICATION APPS

Mobile communication apps can be loosely defined as software, applications, or services that are accessed through mobile devices (e.g. smartphones, tablet computers) to connect and communicate with others for sharing news, information and content (Humphreys 2013). These include apps related to (i) social networking (e.g. Facebook, Google +) (ii) voice over Internet protocol (VoIP) such as Skype and Viber (iii) instant messaging services (e.g. WhatsApp), and (iv) recommendation services like Yelp. Through the characteristics of mobile communication apps (Refer Table 1) we depict their superiority compared to traditional mobile communication services such as voice calls and SMS.

Table 1. Characteristics of Mobile Communication Apps

Characteristics	Description	Literature
Affordances	Media production, distribution and consumption (text, photo, video, audio) is possible through the same app and same device	(Humphreys 2013)
Convenience	Easily available at any time and any place. Can consume and communicate content through any smart digital communication device such as a smartphone or a tablet computer	(Adner 2002)

Connectedness	Omnipresent. Can connect to apps through Wi-Fi as well as through the services provided by MSPs	(Boase 2013)
Versatility	Easy to use. A first time user does not have to comprehend how to navigate, surf content nor grasp how content is uploaded, processed or delivered. Easy to compose messages and content	(Rosemann et al. 2011)
Non-excludability	Available to all and does not require any contractual pre-conditions for general-purpose use. Anyone can access and consume any app.	(Rosemann et al. 2011)
Non-Rivalry	A user engaging with an app does not constrict other users to use the same app	(Rosemann et al. 2011)
Positive network effects	High number of users influence quality and attract more users thereby creating greater demand	(Aral et al. 2013)

The characteristics of mobile communication devices clearly depict their nature to supplement existing mobile communication services. For example, messaging through apps enables (i) simple chatting with friends and family (ii) private communications when voice calls are not desirable (iii) connecting and maintaining ties with members within a social or professional group (iv) accessing multiple comments and ideas, which at times is more valued than the one-to-one interactions through voice calls or SMS.

However, as app usage increases due to positive network effects, we posit that it disrupts the same incumbent services that it previously supplemented. Although the characteristics of these apps play a major role in influencing consumers to make the switch from traditional communication services to communication apps, we also observe that with increased usage, certain generic values of these apps become apparently visible. These perceived values potentially impel and induce prospective consumers. We categorise these values as (i) functional value (ii) social value, and (iii) epistemic value (Sheth et al. 1991).

Functional value: Historically, functional value has been assumed to be the preliminary driver of choice that consumers make. It takes into consideration an alternative's capacity for 'functional, utilitarian, or physical performance' (Sheth et al. 1991). The functional value of apps can be generically measured by its attributes such as cost effectiveness (e.g. price), reliability (e.g. credibility), and durability (e.g. convenience).

Social value: Apps also possess symbolic social consumption values in addition to their functional appeal. This is derived through the association with specific social and ethnic groups that also use the same apps. For example, an individual could switch to an app simply because his or her friends use the same. The social connectedness to an app also evokes a social image of the app. Social value is usually based on the profile of positive or negative stereotyped demographic, cultural, ethnic and socioeconomic groups or networks that use particular apps.

Epistemic value: Sheth et al (1991) define epistemic value as the 'perceived utility acquired from an alternative's capacity to arouse curiosity, provide novelty, and/or satisfy a desire for knowledge.' For example an individual may choose a messaging app such as WhatsApp simply because he or she may be bored or satiated with their existing messaging service such as SMS. Likewise an individual may wish to communicate through an app because it is novel (e.g. Viber) and therefore worth exploring.

EVIDENCING THE DISRUPTIVE INNOVATION OF MOBILE COMMUNICATION APPS

We provide evidence of the disruptive nature of mobile communication apps at the individual level. This denotes: (i) mobile communication apps can supplement the existing mobile communication services, and (ii) mobile communication apps can also disrupt the existing mobile communication services over a period of time. This is demonstrated by gauging an individuals' engagement with mobile communication services on two levels: (a) communicating through mobiles using both, traditional services (e.g. voice calls, SMS) as well as communication apps (e.g. Skype, Viber, WhatsApp), and (b) communicating through mobiles only through communication apps. Demonstrating the above requires more than explaining why an individual is motivated to use apps over traditional mobile communication services. Instead, it requires interpreting an individual's communication patterns over time.

Methodology

We build preliminary understanding of the disruptive innovation of mobile communication apps by analysing individual's opinionated data. As our research is exploratory in nature, we adopt the focus group method, as this

method helps in finding jointly constructed information from individuals that give meaning to phenomena (Munday 2006). This suits the nature and context of our study wherein we attempt to evidence the disruptive innovation of mobile communication apps based on the mobile communication patterns and habits of people. As a test case, we use common sense reasoning to analyse opinions. Common sense is information that individuals normally know but usually do not state in a conversation. This is because such communication is usually based on shared background knowledge of understanding the relationship of objects in the context of their environments, events or situations (Cambria et al. 2010).

Data Collection

We collected data through two sources:

(A) Pilot focus group interviews involving smartphone users in a large tertiary institution in Sri Lanka. The description and composition of the participants is provided in Table 2.

Table 2. Composition and Description of Pilot Focus Group Participants

Composition	Description
Number of participants	Ten
Gender	Four females, six males
Age	Between 20 and 30 years
Nationality	Two Australians, one Russian, seven Sri Lankan
Academics	Five undergraduates, two graduates, three staff

 (B) Pilot case study of two mobile service providers based in Sri Lanka.

Analysis

A. Pilot Focus Group Interview: The interview was conducted on the lines of open forum questions. A list of generic questions is provided in Appendix 1. The discussion was structured and moderated by a researcher for extracting information related to the key variables of frequency, duration and extent of mobile communication app use. Concise edited snapshots of the transcripts are provided below.

View 1: "In Australia the *Smartphone basically does everything* for us. Our bus routines, banking, we order food, for navigation purposes, we connect with friends, Facebook, everything. *Applications like Skype, Viber and WhatsApp come handy when it comes to communication using the Smartphones*. We *hardly use mobile services* any more. All we use is *one App or another. And with data packages we have, everything is like free*."

View 2: "*I almost never use SMS anymore. Everything is WhatsApp now. And everybody is in it*. And as for calls, especially IDD *it's been ages since I last used IDD* provided by Dialog. *It's always Viber now. My bill used to be over 5000 (Srilankan) rupees before I had a Smartphone! But now has come down to half of it or even lesser*."

View 3: "*I always use Skype to take calls. I use the Wi-Fi at my place and connect to friends through Skype mobile app even we are just 2 miles apart. Its way cheaper than taking a voice call, cause the Skype call is like free* of charge you know. If I am outside I will just use Dialogs data package and still *use Skype to contact friends, coz its quite cheaper that direct calling*." "No more texting! That's what WhatsApp is there for right. *It's easy and fast and not to forget no cost*."

View 4: Respondent mentioned that as all his friends use apps made him automatically use apps too. "*Using WhatsApp is easy, cheap and fun than SMS. These apps allow sharing snaps (photos) easily also*." "We, me and my classmates, *have a group in WhatsApp where we discuss subject matters at exam season. When you have a question you only have to post it there. You'll get the answer within seconds." A telephone call cannot do that*. A student will have to call several friends to find the answer.

Analysis:

- The data presents a limited yet rich view of the changes taking place within the mobile communication services space (e.g. View 1: "We hardly use mobile services any more").

- The data confirms our depiction of apps being convenient compared to traditional communication services (e.g. View 1: "Applications like Skype, Viber and WhatsApp come handy when it comes to communication using the Smartphones") and cost effective (e.g. View 3: "use Skype to contact friends, coz its quite cheaper that direct calling").

- Apps also provide other opportunities such as sharing information (e.g. View 4: "These apps allow sharing snaps easily also") and buying products and services (e.g. View 1: "the Smartphone basically does everything for us. Our bus routines, banking, we order food, for navigation purposes, we connect with friends, Facebook, everything").

- The data also candidly showcases the three values: functional (e.g. View 1: "Smartphone basically does everything for us") social (e.g. View 4: "We, me and my classmates, have a group in WhatsApp where we discuss subject matters at exam season") and epistemic (e.g. View 4: Using WhatsApp is easy, cheap and fun than SMS").

- The disruptive tendency of apps to displace incumbent services and become mainstream is also evidenced through the data. (e.g. View 3: "I always use Skype to take calls" ; View 2: "I almost never use SMS anymore. Everything is WhatsApp now").

B. Preliminary data from case study of Mobile Service Providers: One researcher conducted the interviews. The goal was to investigate past and current voice call charges, SMS charges and data packages to identify potential changes related to the rising threat of mobile communication apps.

Analysis:

- SMS charges dropped dramatically (90% reduction) in the past five years. However, there is no significant dip in local voice call charges, which has reduced minimally and remained reasonably stable. This shows that apps are still supplementing the traditional communication services.

- Both, local and national media in the country are increasingly advertising new data packages that include apps. Such promotions depict the changing mobile communication services environment where service providers are wooing customers to buy data packages rather than the traditional communication services. This shows that apps are becoming new-market innovate disruptions wherein mobile service providers are creating a new market as well as new consumer bases for such services.

DISCUSSION

In this paper, we explored the dramatic popularity of mobile communication apps, their effects on consumers and their impact on traditional communication services such as voice calls and SMS. Our preliminary data evidenced that on the one hand apps supplement mobile communication services wherein consumers use both, while on the other disrupt the same services that they formerly supplemented. This study therefore provides a fascinating glimpse of how low cost communication apps penetrate a niche market (i.e. established services, consumers, technology and functions), supplement it by first by providing free services and then disrupt it by attracting mass consumers through its dynamic and novel features, values and functionalities and dare to make it mainstream. We explained the innovative yet disruptive nature of apps through the theory of disruptive innovation and also highlighted that disruptive innovations can potentially enter a phase of supplementing incumbent services before disrupting them, which is understated in the theory. Therefore, this research provides a steeping stone for building a more pragmatic and integrated understanding of the theoretical implications of disruptive innovations. The reflective nature of mobile communication apps supplementing as well as disrupting incumbents raises several questions of its homogeneity over all types of communication apps. These apps are not monolithic concepts but a collective of many different types that potentially represent different technologies and capabilities (e.g. Skype is not the same as WhatsApp). Therefore, it is unclear at this particular stage of our research whether there exists any generic characteristics that instigate all apps to supplement and then disrupt existing services. Another important question hinges on whether the supplementing action will (i) always precede disruption (ii) vary, or (iii) rarely occur before disruption begins.

Based on the above understanding, we propose our future agenda for researching mobile communication apps. This is structured around investigating (i) whether innovative disruption is occurring across all kinds and types of mobile apps and not limited to communication apps. If so, why (explanations)? This paper provided some preliminary evidence of its occurrence (ii) how does the supplementing-disrupting mechanism evolve (prescription)? Our paper provided a snapshot of both occurring almost simultaneously, and (iii) whether time, geographic territories and market conditions (control variables) potentially influence either the supplementing side or/and the disrupting nature of apps.

IMPLICATIONS

In a multibillion-dollar mobile app market, the dichotomous nature of mobile communication apps poses serious dilemmas and challenges to mobile service providers as well as other businesses embedded within the mobile supply-chain network. Therefore, understanding the mechanics of how new technological innovations such as mobile apps behave is vital for firms in addressing their current business models as well as in designing future strategies. Herein, we raise several questions such as (i) whether mobile communication apps will allow traditional services to survive or would it diminish their roles and values (evolving mechanism)?, and (ii) whether it is possible to predict which app is most likely to affect a specific business? Historically, the IS discipline has studied the use, impact and effects of communication media within a closed organizational frame. For examples, studies have researched media cohesion (Yoo and Alavi 2001), media synchronicity (Dennis et al. 2008), and media richness (Dennis and Kinney 1998). Therefore, our study presents an excellent opportunity to the IS discipline in better understanding the unrecognised roles and capabilities of new and dynamic external media communicators such as mobile communication apps.

LIMITATIONS

This study evidenced a snapshot of the disruptive innovation of mobile communication apps. Generalizations based on our findings are limited by our data, approach and investigative methodology. Therefore, expanding this study to cover other apps through various research methods will provide a greater systemic analysis of the nature of mobile communication apps. Opinions and focus groups sentiments can be suggestive. Therefore, more empirical investigations are required to conclusively validate our findings. The national context of the study also limits generalising the findings to other regions where mobile calls and SMS charges may change in relation to their prevailing economic conditions and consumer demands. By no means does this study validate any user intentions or perceptions for selecting apps over voice calls or SMS. Rather, the study is scoped to only highlight and evidence the nature of mobile communication apps, which we conceptualise as disruptive innovation. Our findings are also limited by demographics involved, geographical locations and the economic market situations of the regions in which data was collected.

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APPENDIX 1

Questions	Generic Descriptions (for Pilot Focus Group Interviews)
1	Do you use a smart phone?
2	Do you usually use mobile (communication) apps?
3	How frequently do you use mobile (communication) apps?
4	How often do you use mobile (communication) apps within a day?
5	Why do you think you use mobile (communication) apps?
6	At any situation have you used Skype or any other mobile (communication) apps to take (and make) calls rather than the phone itself?
7	Do you use chat applications in your smartphones to text with friends rather than SMS?
8	What are the other mobile services that you find useful in your mobile device?
9	How often do you use them?
10	What are the advantages of those mobile (communication) apps over traditional calling or texting?
11	Do you have any economical advantage of using these mobile (communication) apps? Is it cheaper or expensive?

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