

# **Downloading Music: A Disruptive Innovation examined by Technology Acceptance Model**

## **1. Abstract**

This study integrates the disruptive innovation theory and technology acceptance model to propose a conceptual model for understanding the consumer behavior in downloading digital music, and subscribing to online music stores. Online surveys with college students and empirical analysis will be performed to test and analyze the proposed conceptual model.

**Keywords:** Disruptive innovation, Technology Acceptance Model, Digital Music, Downloading Music

## **2. Introduction**

The music industry is experiencing one of the most tremendous innovations in its entire history. Everyday more and more customers are turning to download music or subscribe to online music stores. Four years ago InStat predicted that by the year 2012, 40 percent of all the music sold would be downloaded through online stores like Apple iTunes (Buskirk, 2008). However, only

by the end of the year 2011, digital downloads accounted for a record of 50.3% of all music sales in the US, contributing to a rise in total album sales for the first time since 2004 (Halliday, 2012).

This growing trend of music downloading has many implications for the music industry. One obvious effect of this growing phenomenon is that the conventional medium of publishing music, namely the CD, is facing a remarkable decline in popularity. According to a report by Nielsen Sound Scan, by the end of the year 2011, digital music sales has been increased by 8.4 percent from 2010, while in the same time period, CD album sales has dropped by 5 percent. According to the same report, for the first time in the history of the music industry, the digital music sales have outpaced physical album sales (Perpetua, 2012).

In the innovation literature, downloading music has been considered a disruptive technology and has been studied in the disruptive innovation framework (Callaway, 2010; Anthony and Christensen, 2005). The quality of physical media for music, i.e. the CD, has continuously improved over the past decades. However this improvement surpassed the performance that customers can utilize or absorb. This situation made the music market an appealing venue for entrant technologies such as MP3 (MPEG-1 Audio Layer-3), which is a standard technology and format for compressing a sound sequence into a very small digital file. The technology of MP3 offered a unique simplicity and convenience to the low end customers who found the value proposition offered by the technology of CD, excessive and redundant (Callaway, 2010; Anthony and Christensen, 2005).

Disruptive innovation theory focuses on the new technology, explains firm failure and emphasizes the need to redefine product attributes and value propositions (Christensen et al., 2002). However there is a need in the disruptive innovation literature for studies to focus specifically on consumer motivation and the reasons why they may or may not switch to new technologies. Some studies argue that in making a decision to adopt a disruptive innovation, customers perceive a high level of risk and uncertainty (Trott, 2002). These characteristics along with other behavioral patterns attributed to the customers reactions to disruptive innovation, calls for studies which examine this phenomenon using other theoretical frameworks. To be specific, the music downloading technology, which has been considered a disruptive innovation, should also be studied in the context of behavioral theories. For instance Callaway (2010) believes that the behaviors of music downloading customers could be assessed using adoption theories like technology acceptance model (Davis, 1989). Callaway (2010) also believes that the technology acceptance model (Davis, 1989) should be studied in the unique context of disruptive technologies.

This study intends to shed light on the antecedents of customers' decision to switch to music downloading. It also intends to study the behavioral issues assigned to the adoption of the disruptive technology of music downloading. In doing so, we examine the music downloading technology using both disruptive innovation theory (Christensen and Bower, 1996) and the technology acceptance model (Davis, 1989). Drawing on these two robust theories and the extant body of literature in which music downloading has been studied from the technology and market

points of view, this study proposes a conceptual model for a better understanding of this phenomenon.

### **3. Literature Review**

#### **3.1. Disruptive innovation**

Bower and Christensen (1995) coined the term disruptive technology. Christensen (1997) further describes the term in his book, “The Innovator's Dilemma”. In his next book, “The Innovator's Solution”, Christensen (2003) introduced the term disruptive innovation. According to Christensen (2003) a disruptive innovation is an innovation that creates a new (and unexpected) market by applying a different set of values. In other words, disruptive innovations improves a product or service in ways that the market does not expect, typically by lowering price or designing for a different set of consumers (Christensen, 2003).

According to the disruptive innovation theory (Anthony and Christensen, 2005), incumbent companies have a high chance of beating new entrants when the contest is about sustaining innovation. They define sustaining innovation as “radical or incremental improvements that target demanding customers at the high end of the market who are willing to pay premium prices for better products” (p. 38). However established companies have a great tendency to lose to disruptive innovations. They define disruptive innovations as “cheaper, simpler, more convenient products or services that start by meeting the needs of less-demanding customers” (p. 38).

Anthony and Christensen (2005) believe that at the heart of the disruptive innovation theory lies the idea that companies innovate much faster than what customers can absorb. This is the exact time when disruptive innovations come into play. Disruptive innovation could either disrupt a market from the low end, or create an entirely new market by competing against non-consumption (Christensen et al., 2002).

According to Christensen et al. (2002), a disruptive innovation could create a new market as a base for disruption. They argue that companies need to come up with strategies to compete against non-consumption. They define non-consumption as “people’s inability to use available products or services because they are too expensive or too complicated” (p. 24). Christensen et al. (2002) further argue that innovations that cannot compete with non-consumption end up attacking the low end of current market which is dominated by incumbent companies. By low end of the current market they mean the customers for whom the current products, offered by the incumbent companies, are too good and too expensive.

Music downloading is among the technologies that have been mentioned as classic examples of disruptive innovation (Anthony and Christensen, 2005). Improving the quality of physical media for music, i.e. CD, resulted in a value proposition that was higher than the expectations and needs of many customers. Some of these customers were among the low end customers of the CD market, and some of them were among the non-consumers of this market (Callaway, 2010). At this stage of technological development, a new, simple, convenient, and cheap technology for music compression, i.e. MP3, started to grow. Despite the initial lower audio quality, the new

value propositions of this technology, namely price, speed, and convenience, made it quite popular among the non-consumers, and consumers at the low end of the current CD market (Callaway, 2010).

### **3.2. Technology acceptance model**

Technology acceptance model (Davis, 1989) is one of the most widely used and empirically tested theoretical models for explaining the user behavior in different computer systems applications (Davis et al., 1989; Mathieson 1991; Szajna 1996; Hu et al., 1999; Koufaris, 2002).

According to the technology acceptance model (TAM), users' attitudes towards the computer system affect their intention to use the system which in turn leads to the actual use of the computer system (Davis, 1989). TAM proposes that when users are faced with a new technology, two factors influence their attitude and consequently their decision about the usage of the new technology. According to Davis (1989) these two factors are "perceived ease of use" and "perceived usefulness" of the new technology. Davis (1989, p.320) defines perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort" and the perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance".

Customers of online music stores are also computer users. Therefore, their behaviors, decisions, and reactions towards this new disruptive technology could be well explained by a behavioral information system theory like technology acceptance model. In this study we treat music

downloading technology and online music stores as new information systems introduced to users, and the consumers as computer users. By applying TAM to the context of this study, we develop and test a model that explains the intentions of users towards the use of this disruptive technology, i.e. music downloading.

### **3.3. TAM and disruptive innovation compared**

The theoretical foundations of this research are disruptive innovation theory (Christensen, 2003) and technology acceptance model (Davis, 1989). In this section we highlight the similarities among the main ideas of these two theories, and will argue that these two theories are complementary in explaining the user behavior in the music downloading context.

Christensen et al. (2002), propose several criteria for disruptive innovation to be successful. One of those criteria is that the targeted customers should appreciate the new technology which has been offered by the disruptive innovation. This is in accordance with one of the main propositions of the technology acceptance model, i.e. the effect of perceived usefulness on user intention of use. According to Davis (1989), the extent to which the user considers the usage of the new system would enhance his/her task performance, has a positive effect on his/her attitude and intention for using the system.

Another condition proposed by Christensen et al. (2002) for effectiveness of the disruptive innovations is that the new technology offered by the disruptive innovation, should make the task

easier for the new customers. This notion is in complete agreement with the idea of perceived usefulness, which is proposed in the technology acceptance model (Davis, 1989) as an antecedent for user attitude and intention towards system usage. A brief comparison of the main ideas of these two theories has been presented in Table 1.

<b>Disruptive Innovation Theory</b> (Christensen et al., 2002)	<b>Technology Acceptance Theory</b> (Davis, 1989)
A disruptive innovation will be successful, if its customers <b>appreciate</b> the simplicity of the new technology it offers.	<b>Usefulness</b> or “the degree to which a person believes that using a particular system would enhance his or her job performance” has a positive effect on user’s attitude and intention towards system use.
A success factor of a new technology which is offered by the disruptive innovation is its ability to make the task <b>easier</b> for its consumers.	<b>Ease of use</b> or “the degree to which a person believes that using a particular system would be free from effort” is positively associated with his/her attitude and intention towards using the system.

**Table 1. Comparison between disruptive innovation theory and technology acceptance model**

## **4. Theory development**

### **4.1. Conceptual model**

In this section, drawing on the technology acceptance model (Davis, 1989) and disruptive innovation theory (Christensen et al., 2002) we propose a conceptual model for the study of customer behavior and attitudes towards music downloading. In this model we adapt “perceived ease of use” and “perceived usefulness” from the technology acceptance model. We then redefine these constructs in the context of this study. In our conceptual model, these two



constructs are considered as antecedents of “intention for legal download”. This construct has been adopted from the original construct of “behavioral intention of use” in the technology acceptance model.

In this model we are addressing the non-consumption as the main market for the disruptive technology of digital music, e.g. MP3. Although the sales of CD has been dropped dramatically, but one should be careful that the dramatic decline in the sales of CD has not happened until recently (Perpetua, 2012). At the early years of introducing the MP3 as a new medium for listening to music, the sales of CD did not experience a significant decline. In the year 2004, the digital music constituted just two percent of total music revenue (Johnston, 2009). This leads us to believe that the main market for digital music, at least at the early years, was the non-consumption market. This in fact conforms to our theoretical framework that considers digital music a disruptive innovation.

The final dependent variable in our model is the “number of legal downloads” which has been inspired from the “actual system use” in the TAM model. In our model “intention for legal download” has been considered as the antecedent of the “number of legal downloads”. In the technology acceptance model (Davis, 1989) another construct, labeled “attitudes towards using” mediates between the “perceived usefulness” and “perceived ease of use” and “behavioral intention to use”. However, according to some empirical studies, “attitudes towards using” is not a significant mediating variable (Venkatesh and Davis 1996, Venkatesh 1999, Koufaris, 2002).

Therefore we exclude this variable from our proposed conceptual model which has been illustrated in Figure 1.

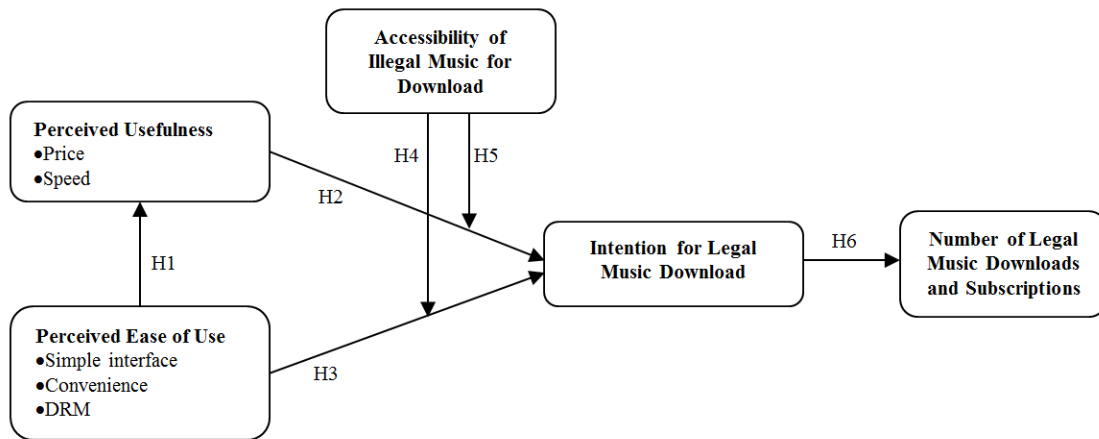


Figure 1. Proposed conceptual model

## 4.2. Construct definition

### 4.2.1. Perceived ease of use

This construct has been adopted from the technology acceptance model for the context of this study, i.e. music downloading. Perceived ease of use in the original TAM model refers to the users' feeling towards simplicity of the new technology. In the context of music downloading, studies have shown that customers of music downloading and online music stores appreciate convenience, i.e. portability and customizability, the most among other characteristics of the music downloading experience (Callaway, 2010). Drawing on the literature from the technology

acceptance model, we argue that simplicity of the interface is also among the characteristics of the downloading technology which affects customers' perception of ease of use (Koufaris, 2002).

Before we proceed to fully define the perceived ease of use, we should define the Digital Rights Management (DRM) Technology. DRM is a technology that is used by copyright holders to limit the use of the digital content after sale. In other words, DRM is a technology that prevents the utilization of the digital content in any way that is not anticipated by the publisher or copyright holder. Subramanya and Yi (2006, p.31) define DRM as follows: "Digital rights management broadly refers to a set of policies, techniques and tools that guide the proper use of digital content."

We argue that offering unprotected music (DRM free tracks) is also among the items that affect the users' perception about the ease of use in the context of the music downloading technology. DRM or copy protection is among the main drawbacks of music downloading technology. DRM protected tracks cannot be played on devices other than those on which they are downloaded to. Although some companies like EMI are slowly moving towards offering DRM-free tracks, these tracks are still being sold at a higher price and with limited availability (Digital Trends, 2008). Opponents of the DRM believe that there is no evidence to support the claim that DRM actually inhibits the copyright infringement. Instead, they assert that this technology only serves to the inconvenience of customers. They also argue that DRM helps incumbent businesses to suppress fair competition and innovation (EFF, 2012).

We define the “perceived ease of use” in the context of this study as “the extent to which customer believes that downloading from an online music store would be free from effort, i.e. the downloading experience is convenient, the downloading interface is simple, and downloaded tracks are DRM free.”

#### **4.2.2. Perceived usefulness**

This study adopts the “perceived usefulness” construct from the technology acceptance model (Davis, 1989) and redefines it in the context of music downloading. In the technology acceptance model, perceived usefulness refers to the beliefs of user about the idea that the new technology would enhance his/her job performance. In order to properly adapt this construct in the context of this study, we first investigate the “job performance” of customer in the setting of music downloading.

According to literature, music customers who prefer download over CD are those who prefer the lower price and higher speed over the full service (Callaway, 2010). Many researchers have referred to price as an important determinant of online customers’ shopping behavior (Sivadas et al., 2006; Stafford et al., 2006; Dass, 2005). Speed has also been mentioned as a key value proposition for internet shoppers in general and music downloaders specifically (Levin et al., 2004; Callaway and Hamilton, 2007). Demographically, music downloaders are mainly among the people with particularly busy schedules. Therefore speed is an important determinant of their

attitude towards their performance in a music downloading experience. Speed in this context could refer to internet connection speed, speed of finding the music tracks, and time saved from a commute to brick and mortar music stores (Callaway, 2010).

We define the “perceived usefulness” in the context of music downloading, as “the extent to which music downloader believes that using a particular music downloading technology or subscribing to an online music store, would enhance his/her downloading performance, i.e. the price of downloaded tracks is low and the speed of this downloading experience is high.”

### **4.3. Hypotheses development**

This study argues that the first two main constructs of technology acceptance model, as defined in the preceding section, and their effect on the user intention of system use, could be applied to the context of music downloading. In this paper, we consider online music stores and other music downloading technologies as computer systems. Therefore we assert that customers’ belief that purchasing music from online stores or downloading music via other technologies would be free from effort (perceived ease of use) is positively associated with their intention for online music purchasing or legal music download. Similarly, we argue that customers’ belief that downloading music will enhance their shopping performance (perceived usefulness) is positively related to their intention (positive or negative feeling about performing the target behavior i.e. downloading music) for online music purchasing or legal music download. Finally, drawing on the technology acceptance model, we also assert that customers’ belief that purchasing music

from online stores or downloading music via other technologies would be free from effort (perceived ease of use), is positively associated with their belief that downloading music will enhance their shopping performance (perceived usefulness). Therefore we hypothesize:

***H1.** Individuals, who show higher degrees of perceived ease of use, will also show higher degrees of perceived usefulness in the context of music downloading.*

***H2.** Individuals, who show higher degrees of perceived ease of use, will also show higher intention for legal music downloading.*

***H3.** Individuals, who show higher degrees of perceived usefulness, will also show higher intention for legal music downloading.*

Our proposed model only focuses on the behavior of legal music downloading and studies this phenomenon as a legitimate online shopping experience. However an important issue in the context of downloading music is the subject of music piracy or illegal downloading. The problem of illegal downloads, which can be performed via P2P (i.e. a peer-to-peer network or data communications in which no dedicated server is involved) or direct download clients, have caused great troubles for the music industry. Music industry is battling music piracy, and has to file lawsuits against website developers and consumers who are not abiding the copyright law (Easley, 2005). In 2007, a famous rock band announced that it was making its new album

available for download at any price that customers were willing to pay. The results were shocking. Only 38% of the customers paid something to get the album, while 62% downloaded the album for free (Hau, 2007).

We believe that without including the illegal downloads, our model would not be complete. Therefore we enter another parameter, “Accessibility of illegal music for download”, into our model. We define this parameter as “the extent to which an individual has the knowledge of and access to illegal music download technologies”. We believe that ease of access to illegal music downloading technologies, along with higher degrees of knowledge about these technologies will deteriorate two positive relationships between “perceived ease of use” and “perceived usefulness” and the users’ “intention for legal music downloading”. Therefore we hypothesize:

***H4, H5.** Two positive relationships between “perceived ease of use” and “perceived usefulness” and the users’ “intention for legal music downloading” is lowered among individuals who show higher degrees of “Accessibility of illegal music for download”.*

Technology acceptance model holds that individual’s intention to use a system, i.e. his/her positive or negative feeling about performing the target behavior, serves as a mediator of actual system use (Venkatesh et al., 2003). Drawing on the same line of reasoning, we argue that individual’s intentions for online music purchasing or using legal music download technologies

are positively associated with the actual system use, i.e. the number of legal music downloads or subscriptions to online music stores. Therefore we hypothesize that:

*H6. Individuals who show higher degrees of intention for legal music download, will perform a greater number of legal music downloads and subscriptions to online music stores.*

## **5. Research Method**

### **5.1. Target population**

According to Christensen et al. (2002) the best target populations for a disruptive innovation are either non consumers of the current technology, or the customers at the lower end of the market for current technology. By applying this principle to the context of our study, we find the best target population for music downloading technologies. According to literature (Levin et al., 2004; Callaway, 2010), the behaviors of college students in dealing with the music downloading technologies are different from non-college students. They generally represent a younger demographic and easily accept the new technologies. They are not used to conventional methods of purchasing music, e.g. buying CD from brick and mortar stores. Overall, college students are considered to be among either the non-consumers of the conventional technology of music, i.e. CD, or among the customers who fit into the low end of current CD market. Hence, this study considers college students as its target population.



## **5.2. Instrument development, Data Collection, and Statistical Analysis**

Survey instruments will be developed to operationalize and measure the constructs of the conceptual model. The questionnaire will include questions about demographic information, as well as questions like the number of tracks downloaded per week, number of music subscriptions, the type of device that users utilize for listening to the digital music, and the type of technology they use more, i.e. direct download, P2P, or subscriptions. Operationalization and measurement of the model constructs will be performed via several multi item scales.

A large number of email addresses of students of a large US university will be randomly selected from the university registrar and invitation emails containing the survey web address will be sent to the potential respondents. Follow-up reminders will be emailed at one week intervals.

Nonresponse bias will be assessed by comparing early respondents with later respondents on key variables (Armstrong and Overton, 1977).

Exploratory factor analysis (EFA) will be conducted with maximum likelihood extraction to identify underlying factors. Items that show poor psychometric properties will be eliminated. The Cronbach's alphas of the measurements will be examined to ensure acceptable reliability.

Confirmatory factor analysis (CFA) will be performed to test the measurement model using AMOS software. Constructs then will be tested for reliability, unidimensionality, convergent validity, and discriminant validity. The goodness-of-fit statistics will be calculated. The structural model suggested in this study will be tested using the maximum likelihood method

with AMOS software. The fit of the proposed structural model will be evaluated, and the hypothesis tests will be performed.

The results of the statistical analysis will be presented in detail. An in depth discussion will be presented to show the implications of the results and possible reasons for unsupported hypotheses. Limitations in generalizing the results of this study will be presented, and directions for future research will be proposed.

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