iTunes®: User Evaluation

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Abstract. This research was motivated by a previous study which indicates the ascension of the Apple®'s sales and the downfall of 14% of iTunes services. Therefore, the study intends to whether if iTunes have usability and user experience problems that prevent users from having the best possible experience, and if users prefer others softwares or devices for synchronizing tasks, like transferring songs from one device to another. The evaluation and interaction method selected for the tests conduced in this study were based on the framework of DECIDE by Preece, Sharp and Rogers [23], and concepts of usability engineering lifecycle established by Mayhew [24] and Ahram [22], in which a users observation technique applied with at least ten non-iTunes consumers. The results indicate some critical user experience scenario and points to several key problems to be addressed, especially after most of the testers couldn't solve the tasks provided. Therefore, some suggestions which were related to iTunes can be summarized for improving the menu and feedback options, as well as the function of transferring archives from computer to mobile and vice-versa, which should be more clear and easier to address, while letting the user know possible alternatives avaialable.

Keywords: Interaction evaluation · User evaluation · iTunes · Usability

1 Introduction

Considered one of the most valuable brands of world in technology field, Apple® has been known by its innovation and the focus of designing better products and service [1]. Created by Steve Jobs, Steve Wozniack and Ronald Wayne in 1976, Apple® started producing desktop computers. Nowadays, they expanded their products, not only making hardwares but also softwares and business services worldwide. iTunes, is Apple's main hub for applications and services, and it's used as central media server

for computers and mobile devices, mainly for Apple®, but also non-Apple® products [3]. iTunes, launched in 2001, it has innovated the digital market and became one of the company's major sub-brands at that time. This fact can be emphasized with the importance that the company gave in its financial report until 2014 [2, 3].

It is important to note that Apple® spends a large amount of funds in research and innovation year after year. As in 2013, it was reported that they invested 4.4 billion dollars on research and innovation [4]. All of this to ensure its competitiveness in the market and valuation by consumers. This investment is important because is a way of staying competitive on the market. Schumpeter [5] developed the concept of "Creative Destruction". The idea of the process that incessantly revolutionizes the economic structure from within, incessantly destroying the old model, incessantly creating a new revolutionary models. In that way, a new service or device can change the market if it addressed the consumers wants and needs. The iTunes was revolutionary and important for both reasons, but the current needs are different today. Nowadays, the society is more connected, globalized, without time, accustomed to abundance and excess and these changes came with the demand for products and softwares with better usability.

Knowing the diversity of functions that the software had, a focus was needed. To address this, an online form was applied with 93 Apple® users to know which one was the most essential. It was concluded that the synchronization was of main importantance. Therefore, the aim of this research was to evaluate the usability of the synchronization function in iTunes. The study was based on Preece, Sharp and Rogers framework which is called "DECIDE", for 6 steps in interaction evaluation and complemented by Nielsen and Norman guidelines.

2 Apple® iTunes

Launched in 2001, iTunes intended to change the way people buy, listen and manage multimedia (music and video content). Since then, a lot has changed, with the advent of Apple® mobile devices, like iPod, iPhone and iPad, iTunes also started to served as tool to synchronize all of them. It started to transfer files from one to another. So if you have a music file in your computer and want to listen to it in your iPhone, you could do this by synchronizing with iTunes. Another example of the function is to save a picture in a desktop that was taken using an iPad tablet device. That turned iTunes to an essential service for iOs users and one of Apple's most famous tools. It is important to highlight that "the main agent in the podcasting revolution has been iTunes" [6]. Over time, the market and technologies have evolved and Apple® wasn't the only one to change and seize many opportunities. Other companies observing trends saw the opportunity to offer entertainment service by streamings as Deezer, Netflix, Spotify, PLEX and many others. In 2016, Apple® was the most valuable brand in the world, at Forbes [7], with a brand value of US$ 154.1 billions. The Company is known for innovation, beauty and simplicity. However iTunes lost its commercial importance, and also decreased in market share losing 14% of it sales [3, 8]. The innovation in this particular service have not followed market trends and evolution.

Instead of evolving and changing, iTunes was just updating smaller chunks of services only, and innovation became constrained and difficult. The usability

philosophy of the company went against its own philosophy. It is important to note that the iPhone net sales was growing in recent years, with a slight drop in the last fiscal year. In the last two years it grew 52% and fell 12%, The company explains this decline as expected from continued growth. Unfortunately iTunes (iTunes Store) specific revenue is not revealed. It belongs to the category of "services" like Apple® Store, Mac App Store, Apple® Music, among others. It should be noticed that, in the last year, this segment had a sales increase of 22.4%, but the main tools that leveraged these sales was iCloud and Apple® Care [3, 4]. Anderson, Fornell and Lehman [9] demonstrated this in an indication of trade-offs between customer satisfaction and market share goals. They found that customer satisfaction actually may fall as market share increases. More recent study [10] shows that generating innovative products appears to remain a treasure for ensuring sustained competitive advantage and customer satisfaction while sustaining market shares. Faced with these challenges, iTunes is losing strength in the market and causing user dissatisfaction. On the other hand measurement of usability should be based on the definition of usability as quality in use with effectiveness, efficiency and satisfaction [11, 12].

3   Usability

To evaluate the quality of use from a product perspective, first is important to understand what is usability. The term defined by ISO 9241-11 [12] as "*the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*". For Shackel [13] usability has four main components in a Human-Machine System: user, task, tool and environment.

Analyzing this description, five aspects have fundamental role in the usability of a product, which are: specified users, effectiveness, efficiency, satisfaction and context of use. Effectiveness is related to the goals, whether the user reached them or not. Efficiency relates to the failing to conclude the tasks successfully as intended. And satisfaction measures the pleasure of using the product or service [12, 14]. For Bevan [15] usability is also a product-oriented to the user with the consideration in terms of the ease of use of the user interface, in a human factor approach.

The context of use is related to the environment that the user is in, it involves the variables that influence performance. Many factors could disturb or contribute to the experience of the product, for example: luminosity of screen or ambience and social interactions. That's why some interaction evaluations are made in the typical place of the user. Zhang and Adipat [16] demonstrates that product development should vary with the user's lifestyle and this style can serve as a standard guideline for the designer prior to the release of it.

Jeng [17] studied the evolution of the attributes of usability. It is possible to realize that there is divergence between the authors, not in concept, but in attributes. Based on this, usability attributes contribute to quality of use and provide the criteria of successful design [15]. In order to analyze the usability of product some methods should be followed. Thus, the users, the product, the context of use, the time and money to spend in the research are important aspects to decide which one apply. Therefore, there

are principles called "heuristics" that are related as standards to create a favorable interaction in the user-system relationship. One of the most known are the 10 heuristics by Nielsen [18, 19], listed as following: (1) Visibility of system status; (2) Match between system and the real world; (3) User control and freedom; (4) Consistency and standards; (5) Error prevention; (6) Recognition rather than recall; (7) Flexibility and efficiency of use; (8) Aesthetic and minimalist design; (9) Help users recognize, diagnose, and recover from errors; (10) Help and documentation.

Faulkner [20] exposes the benefits of usability testing. The test gives arguments related to the design of the product, an approach which is inexpensive to conduct and requires few users to the test experience. So, in a globalized world the quest for universal usability is increasing and became absoluted necessity. Its benefits stem from its relative low cost approach and testing to lead product success and user satisfaction [21].

4   Methodology

This research followed the steps of usability engineering lifecycle mentioned by usability researchers, for example [22]: (1) Requirements Definition; (2) User profile; (3) Contextual Task Analysis; (4) Competitive Analysis; (5) Goal Setting (usability specification matrix); (6) Interaction Evaluation.

The requirements definition correspond to the phase where the team lists the goals, functions and objectives that the product should meet, it guides the project when it is been developed [23]. Mayhew [24] recommends four types of analysis: user profile, contextual task analysis, limits of the platform and general principles of the project. It is important to highlight that Nielsen [18] suggested any number between five and ten evaluators.

This research does not full focus on the specific development of iTunes rather than the approach and unique user experience path followed and the evaluation of it usability goals that can help achieve enjoyable experience. Only the first two types were applied (user profile and contextual task analysis), as will be explained below.

The user profile describe the type of user that is going to use the product or be affected by it, called also stakeholders. Therefore, Cybis, Betiol and Faust [25] advises to trace personal attributes, abilities and skills. The contextual task analysis must define the: "user's global task goals, how they approach task, their information needs, input and outputs to task process and their model of task" [22]. As a result, this step intends to gather information of the use, by mapping its context and the usability of the system. This analysis helps creating a list of specifications for the project or the future, like: know user language, the way the he/she solves problems and others [25].

Ahram [22] recommends performing a preliminary focused research or pilot study, to gather information and data that can be necessary, that is, to know the product and users that will be analyzed: how it works, system specifications, meet representative users, find key actors and register case studies. After that, comes the task flow, when the possibilities of action should be organized in a hierarchically way and in order of interaction and priority [22, 25]. So a scheme with the possibilities and its consequences should be mapped as tree with their tasks and subtasks.

The competitive analysis also provides information to guide the designers involved by listing the strengths and weakness of the competition and may be a guide to success or failure. Then the next step is to identify the usability goals to guide the development team to design how the product should be. It is defined by the data collected from the user's profile and the contextual task analysis (CoTA). It is organized into seven phases to conclude it, they are: "*specify and categorize users, conduct CoTA, determine which usability attributes are relevant and set priorities, decide on measuring instrument, decide what measures will be taken from the measuring instrument, set performance levels for each usability attribute and summarize in a Usability Specification Matrix*" [23].

A usability attributes table must summarizes the user profile, tasks and environment characteristics. Then it will be used to create the Usability Specification Matrix, a table with the description of the usability attributes that gonna be evaluated, how it gonna be measured (tasks involved in each attribute) and its specific metric and goals to measure the level of the usability attribute [22]. Then usability tests to follow the framework described by Preece, Sharp and Rogers [23] called as DECIDE, that which letter corresponds to a phase of the research. The steps are: determine the goals, explore the questions, choose the evaluation approach and methods, identify the practical issues, decide how to deal with the ethical issues and evaluate, analyze, interpret and present the data, that will be more explained in the development section below.

5   Development

In order to analyze the usability of synchronization functionality in iTunes, the development of this research was divided into six steps: requirements definition, user profile, contextual task analysis, competitive analysis, goal setting (usability specification matrix) and interaction evaluation.

In the first step, requirements definition, a user profile was defined. According to Leswing [26], Apple® users, on average, have better economical situation than non-Apple® users, they are loyal to the brand (90% retention), have 50% higher per-capita incomes than others and frequently replaces their devices. In Brazil, the price of an Apple® device is much higher than those compared to the United States., not only because of the monetary conversion, but also due to high import taxes and cost of shipping. Last year, market was affected by a drop sales, going to less than 5% of market share in Brazil, which has the world's ninth largest economy by GDP and affected by recent economical recession [27].

Therefore, the user profile traced was higher than middle class people that has a device of other brands than Apple® mobile devices (iPhone, iPad or iPod), considering the possibility of synchronizing iTunes with computers. After that, the contextual task analysis, which was sought information from Apple® itself about iTunes features and mapped the services it can offer; then 2 typical users of the system were selected to recognize the most relevant utilities and functions in order to later interview and gather more information, measuring time and recording the routes traveled.

This phase was divided into: (1) Analysis of the iTunes manual; (2) Analysis of iTunes options (Task Flow); (3) Interview with standard users; (4) Search with iTunes

users; (5) Relevant usability attributes for search. Researchers studied the manual to know the functionalities of iTunes. It can be used in Apple® and pc computers and Apple® tablets and smartphones. The software allows users to: listen, watch and buy audio or video content, create playlists, listen to radios set by artists, use Genius to automatically create playlists from a selected song, do researches in music and video library, upload audios in a computer cloud and listen from any device connected to iTunes Match, sharing a music and video library with 6 persons, get to know the news and synchronize mobile devices with the computers.

Then, at the beginning of the task flow analysis it was noticed that iTunes had many options and ways to interact. Therefore, a flowchart of the program options was built, which intend to do a survey of actions possibilities of the program, as seen in Fig. 1. In
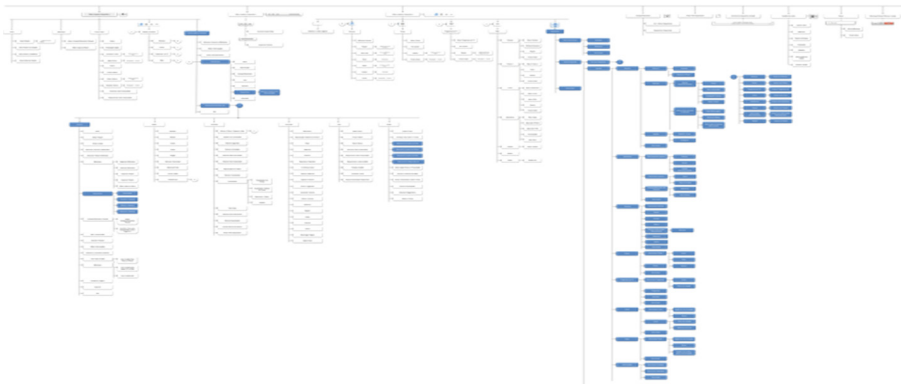

Fig. 1. Exemplery iTunes flowchart which intend to analyze the paths and options in the application.

this picture, it is possible to visualize the number of functions and different ways to navigation. The blue items indicate the synchronization paths.

It was possible to observe that iTunes has 246 different icons, not counting the repeats, and 7 path of repetition. The software had many alternative ways to conduct simple tasks. Another point was that 31.9% of the iTunes options are related to the mobile devices and 4% of these are outside the mobile icon. Analyzing the task flow, it was noticed that iTunes had many options and ways to interact making it difficult to use.

Based on the collected data, the next step involves an interview with 2 iTunes male users age: 36 (A user) and 38 (B user) years old, in order to understand the most used resources, time spent in each activity and to establish tasks for usability testing with user observation, it was conducted two semi-structured interviews with typical iTunes users. Both users are not very active, and they had the frequency of use per week was 1 and 2 times, respectively. The A user had already changed to another system, even though he was assiduous. The B user use iTunes by necessity.

After collecting and analyzing the data, it was realized that iTunes users, regardless of the operating system of their computers, use the service due to necessity and not for

pleasure, as their devices depend on it to be synchronized and believed that the difficulty in understanding the interface disrupts, as quoted "user B", who uses a computer with Windows platform. But "user A", who was a frequent user of the program, said that now he uses the service less tan before, because there are other better alternatives. He cites Spotify as the preferred application for music management nowadays, because it organizes playlists in a more intelligible way and has a greater variety of music than iTunes.

Therefore, although Apple® still does not offer these services as Netflix and other radio applications like Spotify Deezer or Rdio, it is still valid to evaluate the usability of iTunes in order to facilitate and optimize the processes of who depends To synchronize your devices. Therefore, the most important tasks cited by the users were: music download, create playlists and application synchronization.

Then, to be more precise, an online form was made and distributed to Apple® users to identify which function was used the most. The questionnaire created in Google Drive Forms, was published online in social networks of the team members and in different research groups. In the questionnaire users asked which of the 13 functionalities is used by them. The options were: listening music, watching videos, searching, podcasting, listening to the radio, creating playlists, using genius, iTunes Match, iTunes Connect, iTunes U, iTunes Store, synchronizations and catching up the news.

In total, 93 persons between 18 and above 51 years old answered it, of which 88% correspond to users between 18 to 35. The most function utilized was synchronization which reflects 61% of user responses. The other options were below 40% as can be
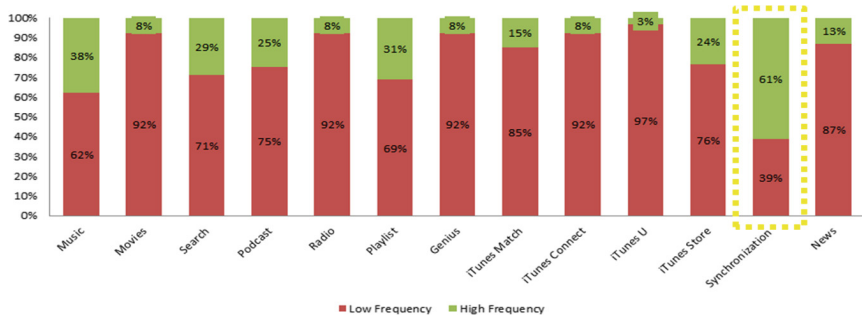

Fig. 2. Online survey responses about functionalities usage applied to Apple®'s users.

seen in Fig. 2. Bansed in these results, it was concluded to analyze only synchronization function.

After studying users profile, a list of usability attributes was created to be evaluated in the tests. Considering the range of options that iTunes offers, by its system layout and map navigation, the items chosen for evaluation of iTunes were: Learnability; Memorability; Efficiency; Subjective Perception.

Revisiting the usability concepts, where the interface of the systems should be attractive and user friendly, if the above attributes are not at the acceptable level for the

users, it results in a complicated program sensation, difficulties or prolonged time for their use, it may distract them.

These principles are based on the following aspects of usability: Intuition: Easy learning and Easy to remember how to use; Efficiency: Time performance and Sub-

Users	Environment	Tasks	Usability Attributes
Men and women	Work	Connect device	Intuition
Between 13 to 60 years old	Home	Access device	Efficiency
	Outside	Install free app	Subjective
Rich or middle people	No pressure	Synchronize 3 musics	Perception
Apple® users		Check music device	
		Describe step by step one task	

Fig. 3. Contextual task analysis.

jective Perception: Satisfaction. In the end of this step, Contextual Task Analysis, is built as shown in Fig. 3:

Competitive task analysis was made with Windows Media Player, as playlist creation software, some music competitors and Samsung Flow, as synchronization tool.

Spotify, Rdio and Deezer are mainly music streamings. The only exception is the first one that offers also podcasts and videos in real time. They have the advantage to have a large library and the user can listen online audios for free and offline, for a low cost. All softwares seems to have a clean and intuitive interface. Media Player is a multi platform program, that manage multimedia content in Windows computer. It already comes installed in that platforms can be synchronized with other devices in a easy way, but it is not possible to buy content in it.

For last, Samsung Flow is currently Apple®'s biggest competitor and has developed a system that values easy, simple to use menus and intuitive interface. According to Muller [28], it allows the user to send browser tabs from one device to another and even pause a movie on the tablet and continue watching from the same point in a smartphone, for example. If you do not want to use this tool, to synchronize the Android platform simply put the desired items in the synchronization list and synchronize. It's for free. So, they are a very strong competitors and a usability evaluation could identify the strengths and the weaknesses of iTunes to consolidate points of improvement. The next step before the interaction evaluation itself, is the goal setting.

For the elaboration of the usability specification matrix, it was necessary to select experienced users of iTunes. The team got 3 people, but the first test proved to be flawed, because the evaluated results did not use the program frequently and therefore had to be discarded. The evaluation with the other two allowed to map the attributes to be evaluated. Below is a Figure with the data of the two participants (Fig. 4).

Therefore, the last phase is the interaction evaluation with the users that will be explained below.

Attribute (by priority)	Measuring Instrument	Measuring Method (average)	Unacceptable Level	Minimum Level	Planned Level	Best Case Level
%Time in errors	all tasks	Percentage	25%	10%	0-10%	0%
# subsequent errors	all tasks	Number	>1	1	1	0
# difficulty in finding the correct choice	all tasks	Number	>2	2	1	0
% completed tasks correctly	all tasks	Percentage	<75%	75% a 89%	90% a 99%	100%
Time to add 3 musics	all tasks	Time	>02'00"	01'00-01'59"	0'30" - 00'59"	0'30"
% of frustration times	all tasks	Number	>2	2	1	0
Satisfaction with system	all tasks	Likert Scale	<2	3	4	5
Cognitive effort	all tasks	Quantitative	Very high	High	Medium	Low

Fig. 4. Usability especificación matrix

5.1 User Evaluation

As mentioned the study was based in the framework DECIDE, where the goals of the tests were: analyze if the interface is clear and consistent, check the usability of synchronization tool from iTunes and identify possible errors of feedback to the user. Then, a list of possible questions was made that could be applied in the tests. And as the authors advised was chosen the usability test as a paradigm associated with users observation technique. Practical questions was listed to be solved before the tests, as a conductive list of tasks to ask the user, a pre-test was scheduled to verify the possible errors and the users was selected. Eleven evaluators, conducted pre-testing. They have never had contact with iTunes. The users were frequent users of computers running Windows operating system and they had between 19 and 41 years old, being four males and six females. The evaluations were carried out in two different laboratories, and the iTunes used was running at Windows. All tests were recorded in the computer to analyse the path of the users, and also the voice of the interviewee. One of the task, in the test, was narrating all the actions and what they were thinking or feeling about it. According to the data collected during the test with the new-users, it was observed a great difficulty for them to perform the requested tasks. It is possible to see the final scenario in Fig. 5, below, that contains the usability matrix and the percentage or number of users by attributes.

In view of Fig. 5, results shows that final analysis was at the unacceptable level. Only 1.25% of the answers was at the better level, and only 6.25% above the acceptable level, what makes the scenario critical. It is important to observe that 70% of users attributed note three to the system, even without success or disliking the usability. That is proven when 50% of all the users had a minimum level of cognitive effort.

Attribute (by Priority)	Unacceptable	Minimum	Acceptable	Better Level
Time in Errors	80%	20%	0%	0%
# Subsequent Errors	100%	0%	0%	0%
# Difficulty in Finding the Right Option	100%	0%	0%	0%
% of Complete Tasks	70%	20%	0%	10%
Time to Insert Three Songs	90%	10%	0%	0%
# of Frustration Time	90%	10%	0%	0%
Satisfaction with the System	20%	70%	10%	0%
Cognitive Effort	20%	50%	30%	0%

Fig. 5. The final frame of usability especification matrix.

6   Discussion

After predictive evaluation with expert users, tests were performed with eleven novice users being one used for pre-testing. Through them, it was possible identify several flaws in the program. This is a sign that so many people are looking for other alternatives to listen to music and watch videos.

It was observed that iTunes has 246 different icons and a lot of repetition in the paths and only 31.9% of that options were related to the mobile devices. On the other hand, 61% of 93 users said that synchronization to mobile device was the most used. So, it was found in the usability analysis that the system is at an unacceptable level for use, in a critical scenario. Users spend more time than they need to perform an action and often get confused, lost, or misunderstood. The dissatisfaction and frustration were diagnosed at various times. This is due to the difficulty or inability to perform the task linked to the use of an "Apple®" program, or a company that grew by its innovative idea and simplicity. The iTunes definitely comes out of Apple®'s concepts. However, it was also possible to observe that, despite all the frustration and unacceptable actions, the power of the brand slightly increases the sense of denial to the system and transfers to the user.

This research allowed mapping of several program issues, mainly regarding the labeling and organization of menus and buttons, hidden feedback and deficiency in error prevention with texts that do not clearly state how to solve them. At that time the recommendations listed below are based on the research observed: (1) A reorganization of the layout of menus and buttons, not only in terms of aesthetics, but also in relation to labeling, positioning, grouping of similar functions, color and size; (2) Make it clear what the computer file is, what the device is, and what it will be transferred; (3) Make it visible the ability to drag and drop files on devices; (4) Reduce the number of steps needed to perform the tasks, such as: the synchronize button that appears in each synchronization screen, before the options to be downloaded appear; (5) Improve user feedback, either through color or location, because the current path was not saved, and without contrast, and check that all tasks have their result, because some did not appear; (6) Show the time remaining to complete tasks such as synchronization; (7) When an error occurs, instruct user clearly on how to address issue and propose

solutions; (8) Improve check boxes for both playlist and sync options; (9) Offer help in the native language of the user, either through the manual or some warning; (10) Allow the user to manipulate device information; (11) Make clear the differences between synchronize and apply functions or think of ways to better represent this task.

Finally, these were some priority diagnosed suggestions, which can help in the development of future prototypes with more interesting solutions for the iTunes interface to be tested as well.

7 Conclusion

Realizing that Apple® is losing its audience to audio streamers, it was decided to identify what the consumers were doing with iTunes. In a preliminary survey to identify this data, it has decided to analyze only the synchronization task, once that it exceeded the number of 50% of respondents regarding this use. For those reasons, this project aimed to evaluate the usability test of mobile synchronization task at iTunes.

It has been proven that usability is an important factor for a system, but it is tied to the user's context. Mainly if the context has symbolic meaning, in this case the satisfaction is not directly related with the step by step success, the or the time expended in the middle of the process, once the critical scenario is confirmed, and in the end of the process the satisfaction was intermediary. When the goal is complete, in this context of use, the effectiveness, the satisfaction and the efficiency are improve.

There are some limitation in this study. Firstly, the context was applied in the Brazilian Northeast, where the software is approached and viewed by the consumer as high added value products and a special brand. Secondly, the company sees iTunes as a service, and in services interactions, emotions and customers are further influenced by the context. And finally, it is necessary to do a more in-depth analysis of the discourses in the user's test.

Nonetheless, the following reflection is released: When consumer has another alternative to the synchronization task, how will it be with this service? Customer satisfaction and facility of use in a society where time is scarce, profitability sought and competition is fierce, as well as the real loss that iTunes is having of users and financial are factors that strengthen a reanalysis of this software.

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