Using the Technology Acceptance Model (TAM) in SAP Fiori

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Abstract: This article presents a case study that was carried out in two companies that have implemented SAP Fiori. The As-Is and To-Be description of the process in which SAP Fiori was implemented was performed. The advantages and disadvantages of using SAP Fiori were also identified. The Technology Acceptance Model (TAM) has been used in order to understand the aspects that most influence users to consider SAP Fiori as an added value, and how it optimizes the tasks of users. TAM has two variables that will influence the acceptance of a technology, which are: perceived ease of use and perceived utility.

Keywords: ERP; SAP Fiori; TAM; Mobile; Technology.

1 Introduction

Nowadays Technologies and Information Systems have a key role, improving the competitiveness of a company. The efficient management of a company is essential and since there are several software packages for this purpose, where Enterprise Resource Planning (ERP) is one of the most recognized because of its potential to promote more efficiency in decision-making. One of its characteristics is the ability to automate and integrate the business processes of organizations [1].

An ERP system is a technology infrastructure that can assist a company in integrating information from all internal departments with suppliers and customers. It links all areas of a company's internal functions and processes with the external ones in order to create a close relationship between customers and suppliers. ERP also allows information to be shared between different partners, supports the effectiveness of the supply chain management, and improves the flow of information. These should enable managers to make better decisions based on more accurate and up-to-date information [2].

To improve the efficiency and effectiveness of ERP system use, organizations need to research the factors that impact user satisfaction. In this area, the Technology Acceptance Model (TAM) is one of the most widely used models for explaining the be-

havioral intention and actual usage and can improve our understanding of how influence on actual usage could help increase efficiency and effectiveness of ERP system use.

Using ERP reduces significantly the time needed to complete a business process and helps sharing the information in the organization. The work environment for the employees is better when an ERP is implemented and more efficiency [3].

Martins & Alturas (2016) concluded that although an ERP is a representative investment in costs and time for companies, it has benefits in several perspectives, in the short and long term and in external and internal relations to the company [4].Thus, the ERP is a useful tool that companies use to improve Performance, make the best decisions and achieve competitive advantage.

This study intends to answer the research question: "What are the main aspects in which SAP Fiori is accepted as an added value by users?"

To answer this question, five objectives have been defined:

1. To understand and analyze the functionality of the application;
2. Assessing the advantages and disadvantages;
3. To understand if some of the daily tasks of users have become more effective with the SAP Fiori tool;
4. To understand if certain tasks of a user are carried out through the application and the limitations of the same;
5. Verify the acceptance of SAP Fiori application by applying the TAM model.

2 Literature Review

2.1 ERP

The ERP system is defined as a large applicational software package which helps to solve the fragmentation information issues in the organization. The ERP enables an automatic integration of the business key-process, providing a real time information of these process therefore, is possible to link the information between departments, sharing data and organization best practices [5], [6].

The ERP system was introduced by ERP providers, such as SAP (Systeme, Anwendungen, Produkt in der Datenverarbeitung), Oracle, PeopleSoft and others to replace old systems, providing integrated resources and a technology platform, that help companies to gain competitive advantage and allows to compete globally. To implement an ERP system is required to change the organizational behavior, takes a long time to be implemented and consumes a considerable amount of financial resources. Therefore, companies need to know clearly what type of ERP is necessary and how the system can affect the company before thinking about implementing the system [7].

2.2 SAP ERP

SAP is an abbreviation for the German company name “Systeme, Anwendungen, und Produkte in Datenverarbeitung”. Nowadays, SAP leading ERP, Supply Chain Management (SCM) e Customer Relationship Management (CRM). The main direct competitors are Oracle, Lawson, Infor, Sage, Microsoft Dynamics e NetSuite.

According to Sharma (2010), the SAP ERP can contribute for sales raising, increased productivity, reduction of purchase costs, reduction of inventories, reduction of assets, reduction of quality costs, elimination of physical inventory, improving cash flows and improving the productivity of indirect labor flows [8].

SAP R/3 consists of several modules and contains core features of a business. ERP is a system that integrates all the departments and functions of an organization into a single, central database. This allows to meet all the specific needs of each of the different sections of an organization (sales, billing, purchasing, warehouse management, production, maintenance, costs, among others).

2.3 Technology Acceptance Model (TAM)

The technology acceptance model was developed by Davis (1989), one of the main researchers in accepting the use of technologies. TAM has been widely developed and there has been an existence of different studies examining the acceptance behavior of the technology in different information systems.

TAM consists in two variants: perceived utility (PU) and perceived ease of use (PEOU) are the key to understand the computer acceptance behavior (Davis, 1989) PU is defined as "the degree to which a person believes that using a particular system would increase your work performance" [9] and PEOU is "the degree to which a person believes that using a particular system would be effortless" [9].

The two central hypotheses in TAM are PU and PEOU that influence positively attitude towards of using a new technology, which in influences their intention to use it. Finally, the intention is positively related to the actual use (see Fig. 1). TAM also believes that PEOU influence PU; as Davis explain in 1989: "the effort saved by improving perceived ease of use can be redistributed, allowing a person doing more work with the same effort" [9].

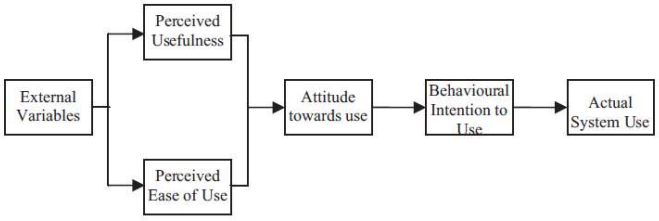

Fig. 1. Technology Acceptance Model (TAM) Davis (1989).

These two factors are influenced by variables. The main external factors that are usually manifested are social factors, cultural factors and political factors. Social factors include language, skills, and facilitating conditions. Political actors are mainly the impact of the use of technology on politics and political crises.

At the beginning of the 21st century and based on TAM, Venkatesh et al (2003), studied previous models and theories and formed the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT has four predictors of the behavioral intention of the users, being: performance expectancy; effort expectancy; social influence and facilitating conditions [10].

2.4 SAP Fiori

The world is constantly changing, and technology is at the center of everything we do. Younger generations have been born in a generation of rapid evolution of technology, and Millennium generation are integrated from the workforce with the mindset that simplicity is the key. We are a society owner of smartphones that instantly allows us to access social networks. Consequently, end users are accustomed to a new and improved experienced user (EX). The business must quickly follow this new requirement and realize that enterprise software can't be an exception. The business was forced to change over time to keep on leading, and SAP emerged as a leader in this evolution.

SAP quickly realized that it was necessary to create a task-based application that would easily complete the job, be consistent with the offer, and intuitive to work on any device. In May 2013, SAP was present with the launch of SAP Fiori as the new user experience in SAP.

Fiori was based on a framework known as UI5 that was developed on top of HTLM5, which emphasizes the user interface UI designed with user-centric applications. SAP has created a responsive and responsive UI for all screen sizes and runs on any device with an HTML5 compatible browser.

SAP heard the feedback that from almost the world and developed a set of applications, which includes the most frequently used transactions such as: Approval of purchase orders; creation of sales orders; information research, among others. HTML5 is easy to access seamlessly across desktops; tablets and smartphones. This collection of apps is called Fiori. The term Fiori is derived from the Italian word "flowers". SAP wants a beautiful UI, and it also intends to create user experience that is simple and elegant.

The new UX for SAP simplifies the old GUI and makes it compatible with any device and any screen size that supports HTML5, including mobile devices. This change is characterized by a big step for SAP, which has adopted a new technology and entire strategy for the UI.

With SAP Fiori, the applications have been developed from a user perspective, applications are user-centric, and characterized by being simple and relevant to a user role and designed to perform certain activities and tasks. Basically, the Fiori is an application that replaces SAP standard transactions and turns them into multiple, easy-to-use small applications becoming more fitted to each individual user use (Fig. 1).

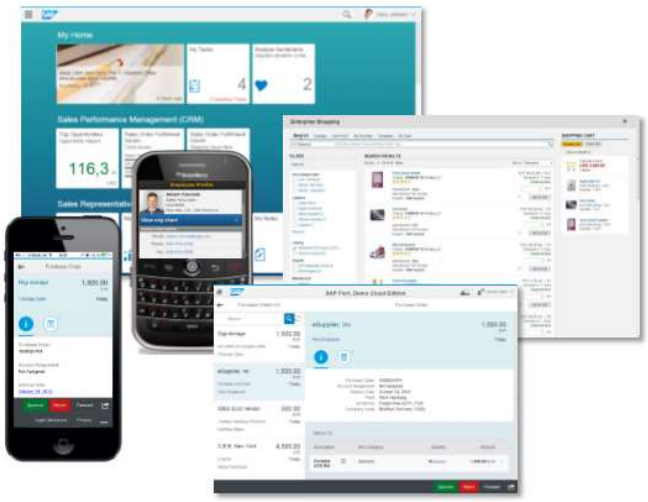

Fig. 2. SAP Fiori APP. SAP Product Road Map SAP User Interface Technologies (2015).

3 Methodology

After the theoretical framework of ERP systems, the Technology Acceptance Model (TAM) and SAP Fiori technology, it will be studied how the implementation of SAP Fiori is accepted or not by its users in accordance with TAM.

As previously mentioned, the research question of this study is: What are the mains aspects in which SAP Fiori is accepted as an added value by users?

This is an exploratory study, which intends to make a first approach to the problem. The research method adopted was the case study.

The research methodology adopted was qualitative. Based on the study of "Critical factors for successful implementation of enterprise systems" [11] and "Determinants of acceptance of ERP software training in business schools: Empirical investigation using UTAUT model" [12].

It was created an interview script and was applied to the two case studies "Be-Healthy" and "ItSolutions". In the interview, questions were analyzed to characterize the sample (Gender, age, department, functions and academic background), and questions to verify the acceptance of SAP Fiori by users.

The answers to these questions were obtained through interviews. To perform the analysis of results, we used a qualitative analysis software: "QDA Miner". It was made the analysis of interviews with key users about the implementation of SAP Fiori in ItSolutions and BeHealthy.

For the interviews, we used structured interviews with the purpose of collecting the perceptions of the users about SAP Fiori and the acceptance of this technology.

Table 1. Departments description of the respondents.

Interviewed	Department
PC_1	Compras
PC_2	Compras
PC_3	Administração
ANALYST_1	IT
ANALYST_2	Comercial
ANALYST_3	Comercial

We conducted a total of six individual interviews (Table 1), three of them about the implementation of SAP Fiori in ItSolutions and remaining three to the BeHealthy company. The interviews were made during April and May 2018. The interviews conducted at Itsolutions were face-to-face and the ones made at BeHealthy were conducted by mobile phone. The average duration of each interview was about 15 minutes and all interviews were recorded in audio format.

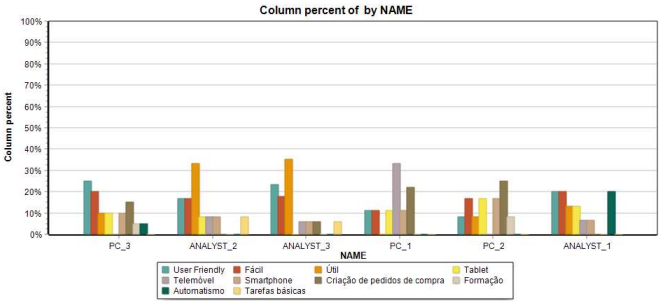

Fig. 3. Percentage of keywords referred by interviewed - Vertical bar chart Source: QDA Miner.

According to what is presented in the vertical bar graph (Fig. 3), the interviews were carried about the implementation of SAP Fiori (creation and approval of purchase orders) are: PC_1; PC_2 and PC_3. About 10% words that fell into the category of "user friendly", the word "useful" was mentioned in the 1st and 2nd interview about 10%, the word "easy" was also identified as being one of the words mentioned, about 16% in average of words mentioned. In addition to these, other words with expression, such as "creation of purchase orders", were also mentioned, about 20%, on average of the three interviews; finally, "mobile phone" and "tablet", with about 13%.

Regarding the interviews carried out of "HANALYST" project, there are: "ANALYST_1; ANALYST_2 and ANALYST_3".

The first interview (ANALYST_1) the words with the highest percentage of reference are: the word " automatism" with 20%, followed by the word "user friendly" with 18%, followed by the word "easy" either with 18%.

Therefore, the words that are included in the category of "user friendly", "useful", "easy", have great expression in the 2nd and 3rd interviews.

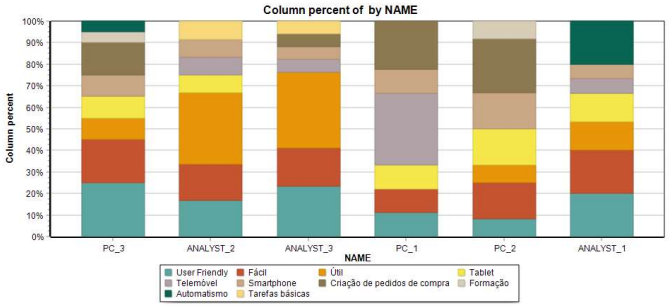

Fig. 4. Percentage of keywords referred by interviewee - Stacked bar chart
Source: QDA Miner

According to the stacked bar graph (Fig. 4), the interviews conducted in the context of the creation and approval of purchase orders, in the 3rd interview (PC_3), the word user friendly was referred to about 25%; easy, 20%; useful, 10%; tablet, 10%; smartphone, 10%; creation of purchase orders, 15%; training, 5%; and finally, automatism was referred in 5%.

In the second interview under the "HANALYST" project (ANALYST_2), about 18% of the words mentioned were user friendly; 14%, easy; 31% useful; 7%, tablet; 7%, mobile phone; 8% smartphone; and lastly, 9% basic tasks.

In the 3rd interview of the project "HANALYST" (ANALYST_3) about 22% of the words were user friendly; 17%, easy; 27%, useful; 5%, mobile phone; 5%, smartphone; 5%, creation of purchase orders; and lastly, 5%, basic tasks.

In the first interview of the project to create and approve purchase orders (PC_1), about 11% of the words were user friendly; 10%, easy; 10%, tablet; 33%, mobile phone; 10%, smartphone; finally, 22%, creation of purchase orders.

In the second interview of the project to create and approve purchase orders (PC_2), about 8% of the words were: user friendly; 16%, easy; 10%, useful; 18%, tablet; 18%, smartphone; 23%, creation of purchase orders; finally, 9%, training.

In the third interview of HANALYST (ANALYST_3) about 20% of the words referred to was automatism; 8%, smartphone; 10%, mobile phone; 15%, tablet; 10%, mobile phone; 8%, smartphone; and finally, 20%, automatism.

4 Conclusions

This study intends to answer the initial question: "What are the main aspects in which SAP Fiori is accepted as an added value by users?"

The proposed objectives were all achieved, including:

1. To understand and analyze the functionality of the application;
2. Assessing the advantages and disadvantages;
3. To understand if some of the daily tasks of users have become more effective with the SAP Fiori tool;

4. To understand if certain tasks of a user are carried out through the application and the limitations of the same;

5. Verify the acceptance of SAP Fiori application by applying the TAM model.

All the objectives have been met, namely:

1. The main functionalities of the SAP Fiori APP

In the HANALYST implementation are:

a) The identification of the necessary corrections to make possible migrate to a new database version;

b) The identification of the effort required for this migration;

c) Layout adaptable to any size of screen and mobile or fixed device;

d) Detailed information on the problems to be solved in each object;

e) Menu with options of easy access to different views, tables and graphs.

In the implementation of the creation and approval of purchase orders are:

a) Creation and /or approval of purchase orders in a more intuitive way;

b) Possibility to create and /or approve purchase orders through a mobile device;

c) Reduction of training time for the creation and /or approval of purchase orders;

d) Increase of the automation in the process of creation and /or approval of purchase orders.

2. Assess the advantages and disadvantages

The main advantages have already been mentioned previously for both implementations of SAP Fiori. As main disadvantages, we haven't the possibility to do all tasks in Fiori, but only the most basic tasks are performed in SAP Fiori.

3. To understand if some of the daily tasks of users become more effective with the SAP Fiori tool

As mentioned earlier, in the analysis of interviews, it is easier nowadays to perform tasks such as creating purchase orders and approving than before. Nowadays, with a simpler and intuitive layout, this task became easier.

Also, in the case of HANALYST, nowadays it is easier from a commercial point of view, to present a client a report with all the necessary changes to the migration to a HANA database. With an easy graphical presentation and the possibility of this presentation being demonstrated by a mobile device.

4. To understand if certain tasks of a user are carried out through the application and the limitations of the same

The process of creating and approving purchase orders started being made by SAP Fiori.

However, in the case of migration to a HANA database, one of the limitations of SAP Fiori is the impossibility of changing the code, it must be modified in a classic version (SAP GUI).

5. Verify acceptance of the SAP Fiori application by applying the TAM model.

According to TAM, there are several factors that will influence the acceptance of a technology. According this model, the perceived utility and perceived ease of use will influence the attitude towards the acceptance of a technology and, later, the behavioral intention to use that same technology.

In the case of perceived ease of use, what contributed most was in both implementations of SAP Fiori, is to be: intuitive, simple and easy to use this application. After

the implementation of SPA Fiori, the tasks that were previously performed with the classic version (SAP GUI), are now carried out in a simplest and quickest way.

In case of SAP Fiori the implementation for create and /or approve purchase orders, the most important factor was the fact that these two processes are simpler, faster and practical. These two tasks can be carried via mobile in any place.

In the case of the SAP Fiori HANALYST implementation, the usefulness of this new technology is that in nowadays is much easier and faster to obtain a list of all the modifications required for code correction when it is intended to migrate to a HANA database. The previously process was carried out much more slowly. With Fiori it was possible to realize how much time is spent on each activity needed to proceed with the correction of the code.

Having said this, there is a clear identification of utility and ease of use of the new technology, we can verify that the attitude towards use, and the behavioral intention of use, is effectively reflected in the use.

The main limitations to this work were: the fact that it was carried out with a reduced number of cases; The impossibility of a quantitative data processing due to the reduced number of cases is also identified as another of the limitations; The three interviews were made by phone, since the geographical distance made it impossible for them to be carried out in person.

The results of this work offer important implications as they can help managers better choose the ERP to implement in their company.

As a proposal of future work, it would be interesting to carry out the same study with more companies from different sectors; Realization of questionnaires instead of interviews, enabling a quantitative analysis; Validation of the TAM model in a more objective and not so generic way.

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