EVALUATION OF KNOWLEDGE SHARING IN A COLLABORATIVE SOFTWARE

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ABSTRACT

The widespread use of collaborative applications as a means of communication, research and collation of information, among others, has significantly accelerated the acquisition, dissemination, and especially the sharing of information and knowledge among individuals. Thus, understanding the factors influencing this process is crucial to the success of a software based on the contribution of people. In this research, among the various factors analyzed, it was found that the usability and the characteristics of individuals are crucial to assess knowledge sharing in a knowledge-based system, in this case, the social software PreçoPúblico. We chose to use questionnaire with 23 items as an evaluation tool that, based on two existing, refurbished and validated by pre-testing and statistical technique. Being 19 closed questions (categorical measures) and 4 open, descriptive. Results showed that users are predisposed to share their knowledge and information about product prices in the software. Still, it was shown that the system has a high degree of usability, despite some difficulties encountered by most respondents coming from the fact it is the first system to access them. The comments collected from the open questions suggest system improvements.

Key words: knowledge sharing, usability, individual factors, evaluation, PreçoPúblico.

1. INTRODUCTION

Collaborative tools are part of the everyday life of hundreds of millions of users all over the world, pointing to a significant change in the way people interact with applications in the internet, like the social networks facebook, MySpace, LinkedIn, Orkut and many others that collectively make up what is known as WEB 2.0. In this way, dozens of organizations in all the economic sectors are adopting said technologies to generate value to its stakeholders – be they actionists, clients, employees, citizens or societies generally speaking. It’s clear then, that we reached the limits between the simple and a big revolution: Simple due to the extreme ease of using, implementing and low cost of the tools; potencially revolutionary by the ease of reaching and engaging thousands or even millions of users to collaborate and interact (TERRA, 2009).

Han & Anantatmula (2006) affirm that the ease of access to the technological tools, specifically information and communication tools (TICS), are important to stimulate the collaborators to share knowledge, concluding that the ease of use and necessary training can persuade and incite the use of available technologies to share knowledge.

In this direction, afforded mainly by the ease of use and informal traits, Tseng, S.-M., & Huang, J. -S (2010) relate that Wikipedia has a relevant effect in the process of the organizations’ knowledge sharing.

Many dimensions are influential to knowledge sharing, among the individual factor (attitudes and behaviors) and the organization’s rules, the TICS (technological factors) can help the employees to receive knowledge, but not necessarily to guarantee their commitment, that’s why investing in technology can facilitate the flux of explicit knowledge, but will hardly contribute to the exchange of tacit knowledge, which has a bigger value and allows the generation of new ideas. (ORDAZ et al, 2009).

Systems of knowledge management, used to capture and distribute knowledge, normally require the users’ contribution instead of keeping the knowledge to themselves or transmitting it directly to the closest ones through conversations or annotations. These systems should, thus, stimulate the participation of individuals through rewards, be they tangible or intangible (KING & MARKSJAR, 2008).

As it’s been introduced up to this point, various studies investigate the factors that influence knowledge sharing, however, this research aims to separately measure those attributes to determine the intensity of knowledge sharing in a system based on knowledge. In this incumbency, the comportamental traits of the users and of the system itself, specifically in terms of usability, are examined.

This work designates itself, thus, to investigate under the aspects of individual traits and usability, a system based on knowledge, aiming to potentialize the sharing and use of knowledge by the users that utilize it.

Based on the above exposed, the question of this research presents itself:

What’s the intensity of knowledge sharing in a system based on knowledge with the users’ individual traits and usability as a basis?

2. KNOWLEDGE BASED SYSTEMS AND COLLABORATIVE TOOLS

To study knowledge sharing in a system, it’s necessary to learn what a technological artefact that transfers knowledge or informations between users understands, its characteristics and distinctions compared to other kinds of systems.
Firstly, one must highlight, as said in a literature revision about applications and knowledge managing technologies elaborated by Liao (2003), that there is a diversification of concepts according to the line of research, expertise and speciality of each author, being that some terminologies have concepts in common, as for example, specialist systems/artificial intelligence and systems based on knowledge.

Another take on this defines any information technology application which helps in any way managing actives of knowledge. Specialist systems, collaborative tools like groupware, data warehouses or even intranets are included in this class of software (Hendriks, 1999). On the other hand, Currie & Kerrin (2004), Hayes & Walsham (2000) and Mackinlay (2002) put forth that knowledge isn’t effectivelly shared when kept by information technology tools that involve static repositories like in an intranet, in which the knowledge can’t transmit the richness of context in which it was applied.

An emerging collaborative tool is social computing, characterized as digital systems developed from informations of social interest and context to improve the activity and performance of people and organizations (Chua, 2004). Kwafurunp & Wagner (2008) believe that social computing’s the tend for computing inside organizations that will represent an impacting turnaround for TI managing tools in today’s enterprises.

When speaking of technological tools that depend on massive collaboration of the users’ knowledge/informations, the success of implementing these kinds of systems, notwithstanding technological questions, is strongly related to (ambiental and human) factors like: quality of content, commitment to the use of a technology, users’ satisfaction, profile of the ones involved and motivation to use that technology (AURELIE, BECHINA, & NDLELA, 2007).

The next topic will introduce the process of knowledge sharing, its concepts and dimensions, showing the aspects that motivate people’s participation in a system based on knowledge.

### 3. KNOWLEDGE SHARING

Many terms found in the literature, like dissemination, distribution, partition, transference or knowledge sharing, are employed as synonyms to characterize the process in which knowledge migrates from one situation to another: between individuals and teams of people; from physical sources like data banks, documents, CD's, videos, books etc., to other recepting sources or to people and vice-versa (Tonet, 2005).

For Lin & Lee (2008), knowledge sharing equals a culture of social interaction involving the exchange of knowledge between the collaborators, experiences and competences. It can be individual, like, for example, talking with a colleague to help improve the performance in a given task, or organizational, like capture, organization, reutilization and transference of experiences based on knowledge existing in the organization.

There is a certain convergence in the authors about the aspects that influence knowledge sharing. Substantially, one can note in the literature two great groups or dimensions: individual factors and ambiental factors (cultural factors and technological factors) in which the individuals and technological artefacts are inserted. The studies of Kaiser, Kansy, Mueller-Seitz, & Ringlstetter (2009); M.-J. J. Lin, Hung, & C.-J. Chen (2009); Nan (2008); Tonet (2005) and Ye, H. Chen, & Jin (2008) give prominence, specially, to the individuals factors which, according to Vorakulpipat & Rezgui (2008) and Osterloh and Frey (2000), can be divided in: intrinsic (activities and behaviors that individuals naturally engage for their own benefit) and extrinsic (represented by the direct compensation that a person’s work or actions exert).

In another study, the model of research developed by Ye, H. Chen, & Jin (2008), whose goal to examine specifically knowledge sharing in virtual communities, considers also the aspect of system usability.

A research about knowledge management in information technology organizations under the collaborator’s perspective noticed that questions related to usability of technology like ease of accessing and finding informations were pointed by eighty per cent of the respondents as crucial to sharing knowledge (Han & Anantatmula, 2006). Nevertheless, another study pointed that students would like to use the collaborative system of annotations (PAMS 2.0) in instances of work groups due to the ease of use and stability (Su, S. J. H. Yang, Hwang, & Zhang, 2010).

The success of the Wikipedia tool can be explained by two values: the sociability and usability. The first, in a cybernetic context, allows establishing reward systems to stimulate the users’ participation and the second, by being friendly and allowing an easy interaction between the users and the system (TSENG & HUANG, 2010).

Next, the systems usability content will be presented with the aim to analyse its intensity in knowledge sharing by the way of technological tools.

### 4. USABILITY OF SYSTEMS

In an all-encompassing way, usability refers to a collective of concepts like time for executing a task, performance, user satisfaction, ease of learning, not provoking errors, solving the tasks with efficiency and effectiveness (ISO 2011, 1998; Neves et al., 2006; NIELSEN, 1993). Santos (2007) made a revision to the literature about usability by searching through the Brazilian data banks classed in the Qualis of CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) and obtained as results the standards adopted by authors Shackel, Jakob Nielsen, Bastien & Scapin, Jordan, Shneiderman and Quesenbery, in addition to the ISO usability norms. That revision was brought up to date and augmented with standards used by other authors. The similar attributes that are used by more than one author in ascending order are: memorization, error control, ease of learning, effectiveness, efficiency and satisfaction. Notice that the more recent works analysed are mostly based on the norm ISO 9241. The constitutive definition of each of these variables can be seen next:

- **Memorization / Ease of Remembering**: The system functionalities should be easy to remember, even after not using it for some time (NIELSEN, 1993).
- **Error Control**: Mechanisms capable of preventing, reducing and facilitating the retrieval of errors generated by the system (BASTIEN & SCAPIN, 1993).
- **Ease of Learning**: Ease of learning to accomplish a given task in the system without help from supporters (QUESENBERY 2001).
- **Effectiveness**: Precision and completeness with which users attain specific objectives, accessing the correct information or generating expected results (ISO, 2010).
- **Efficiency**: Resources consumed to attain objectives in the system (Abran et al., 2007).
- **Satisfaction**: Convenience and acceptability of the product measured through subjective and/or objective methods (Feliphe & Lavor, 2008).
5. RESEARCH METHOD

This study uses exploratory research, aiming to deepen the themes described in the previous chapter by means of bibliographical research in books and articles. It’s highlighted that apart from the syncretism seen in the investigative methods outlined above, in the course of this work, the need was felt to employ another kind of research, the descriptive one, aiming to describe and evaluate knowledge sharing in a system through the application of a questionnaire. In spite of the quantitative framing of this study, a qualitative approach was made, through questions open to each dimension of the variables ascertained by the research tool.

To select the tool for this research, questionnaires already in the literature were analysed, preferentially the validated ones that were pertinent to the object of the proposed research. Among the ascertained works, two tools became the basis to the construction of the questionnaire adapted to this study.

After the questionnaire’s elaboration, began the validation stage, which first was turned to a pilot-test, applied to three specialists, aiming an initial improvement, essentially related to the questions’ comprehension and scale of answers, as well as the correction of grammatical errors. After the needed adjustments to the pilot-test, the questionnaire was applied to 10 users to verify its trustworthiness. With the confirmation of trustworthiness having been made, the tool was applied to the sample configuring the research’s descriptive stage, where the collected data were analysed.

This study was applied to evaluate the web system called PrecoPúblico, a software with functionalities that cover some processes of knowledge managing, because, above all, it allows knowledge sharing by any individual through the publication of products and its prices, and also allowing the search of products through the internet.

The individuals’ knowledge sharing analysis in this software uses the following hypotheses:

H1) The level of satisfaction in relation to the attitudes and behaviors of the system users is high.
H2) The system has a high level of usability.
H3) The individuals’ knowledge sharing in the system is positively related to its usability.

Next, the variables used to measure the constructs of this research are demonstrated following the bibliographical survey that was developed, its concepts and measures of analysis of the investigation tool.

Table 1 – Summary of the constructs, their concepts and variables.

<table>
<thead>
<tr>
<th>Factors</th>
<th>What it is (conceptual definition)</th>
<th>How to analyse (standard)</th>
<th>Authors (reference)</th>
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<tbody>
<tr>
<td>Usability</td>
<td>Ensemble of concepts like time of execution for a task, performance, user’s satisfaction, ease of learning, not provoking errors, solving tasks with efficiency and effectiveness.</td>
<td>By the ease of learning</td>
<td>ISO 9241 (1998)</td>
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<td></td>
<td></td>
<td>By the efficiency</td>
<td>Neves ET al. (2006)</td>
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<td></td>
<td></td>
<td>By the effectiveness</td>
<td>NIELSEN (1993)</td>
</tr>
<tr>
<td>Individual Factors</td>
<td>Concepts and personal traits related to the individuals’ motivation to share knowledge.</td>
<td>By the satisfaction of helping others</td>
<td>Lin, Lee, Wang (2008)</td>
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<td>By the reciprocity</td>
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<td>By the reputation</td>
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<td>By the abilities and own knowledge</td>
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<td>By the commitment</td>
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Among the various factors studied in the revision of the literature, the option was made to investigate the individual ones and those referring to usability, fundamented by the context of the research, which embraces a technological tool. Thus, the comprehension of the attitudes of the users who use it and of their traits are inherent aspects and can influence the process of knowledge sharing in this scenery. Image 2 illustrates the composition of the constructs used in this research, including Usability (interventional) and Individual factors (independent) and the dependent construct knowledge sharing in a system.

The synthesis of definitions, standards and their respective authors, extracted from the theoretical background of each construct in this research, is presented in table 1.
attitudes: a) I Strongly Disagree; b) I Disagree; c) I don’t agree nor disagree; d) I Agree; e) I Strongly Agree.

Four of the twenty-three questions in the questionnaire are open, with the intention of getting closer to a qualitative approach, that in this tool, makes possible to collect any other perceptions different from the ones pre-formatted in the questions. Each construct from the questionnaire contains an open space to other considerations and suggestions.

6. ANALYSIS AND INTERPRETATION OF THE RESULTS

Some analyses are interesting in the basic data from respondents like, for example, the age of respondents, where a little more than half (52.8%) is between fifteen and twenty-eight years old, being that the rest’s between twenty-nine to sixty-four years old, putting in relief an even distribution of frequencies under this variable.

The major part of participants in the research has from twelve to sixteen years of experience in computer use and six to twenty years using the internet. Information that indicate that the sample collected has a representative intimacy with the use of computers and good experience using the internet, which characterizes it as a sample that can be generalized with users apt to evaluate the sharing proposed for the PreçoPúblico system.

The scores reveal that the users, through their own traits and attitudes, are motivated to share knowledge in the system’s context, confirming, thus, hypothesis H1 - The level of satisfaction in relation to the attitudes and behaviors of the system users is high. This is because all the variables analysed have an agreement result above 50%. On the other hand, the Recognition and Commitment dimensions attract attention to the software, as the percentuals of answers I don’t agree nor disagree, were representative in comparison to the other questions of the analysed items. For this reason, the need to create resources that divulge and elevate the users’ visibility is made evident, in the measure that they share their knowledge by means of the system. As an example, one could create a ranking with the images or names of the users who publish the most information or knowledge directly in the portal’s home page.

In the same direction, the neutrality level (33%) about the pride to take part in the PreçoPúblico software, refers to the reflection about all the other variables in the Individual traits construct facing knowledge sharing. An example: if a user feels no satisfaction in telling others he takes part in a project, that can be due to many other factors like lack of recognition of said attitude by other individuals who get this information, or even, due to the little visibility of the project itself, since it’s still in the divulgation stage and possesses, by consequence, not many publications of product prices.

The interpretation of reached results about the publication and price research, which measure the system usability construct, is based on the percentual variation existing among that dimension’s answers.

Confirming the H2 hypothesis - The system has a high degree of usability, both for publication and for price research, the scores show that the system’s easy to use in all the studied variables. However, the task of Publishing prices was considered more difficult to learn, more time-consuming and complex than the task Research prices. This fact suggests that it’s possible to create swifter mechanisms for the entry of data in the system as, for example, using a mobile device (cellphone, smartphone and others) with the bar code reader, capable of identifying a product’s characteristics to register it directly in PreçoPúblico, avoiding the manual entry of data.

In the questions about the System’s usability as a whole, the evaluation followed the already described results, confirming that users consider it as being easy to use, however, the scores of question seventeen (17), point to a representative percentage of neutrality in comparison to the other general questions about system usability, leaving a margin for reflection about what would justify this observation.

As in the research of Ye, H. Chen, & Jin (2008), it was made evident that system usability is also important to motivate knowledge sharing. It was discovered, also, that simplicity and quickness, respectively, are the variables that most influence knowledge sharing in the studied system, in spite of the little variation already explained in this section. Hypothesis H3 is, thus, confirmed - The individuals’ knowledge sharing in the system is positively related to its usability.

Individually interpreted, four main types of information were identified in the open answers: congratulations, inexperience/familiarization, outdated content and error reports or improvement.

Another perception refers to the necessity to create new resources that make the process of price publication easier. In this case, also, some are already in the process of development. Integration with social networks and mobile devices; and to solicit other informations besides the product’s price, are some examples that should potentize the “sharing of the experience acquired by the individual in the buying decision process which involves the search and evaluation of alternatives and the decision making, evidencing more completeness in the knowledge to be shared” (Juliani, 2008).

7. FINAL CONSIDERATIONS

The evaluation of the knowledge sharing process in a system based on knowledge has been reached by means of the research tool’s application, which made possible to collect the participants opinions, evidencing a high level of usability and predisposition by the users’ individual traits to share knowledge, as well as confirming the influence of usability in this process, specially over the attributes Simplicity and Quickness to accomplish tasks in the software.

The evaluation also demonstrates that, as shown through the representative neutral score in the individual factors Recognition and Commitment, it’s necessary to create resources capable of offering visibility to the individuals who share their knowledge with others through the system.

The open questions made it possible to collect suggestions of improvement, encouragements, errors, and showed that due to the major part of the participants having answered the questionnaire based on their first access to the system, some doubts related to the inexperience of using the software affected their answers.

Based on this study related to the high importance of individual factors and usability in the studied system, it’s recommended to developers the conception of collaborative softwares directed to the characteristics of people who will use it, being easy to use, as well as making cyclical evaluations of the knowledge sharing process as a way to spot the deficiencies and identifying its real needs to potentize the contribution of the users’ knowledge.

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