

## **EVALUATION OF THE KNOWLEDGE MANAGEMENT MECHANISMS OF BRAZILIAN NORTHEAST UNIVERSITIES HOSPITAL PORTALS**

### **Hélio Roberto Hékis**

Postdoctorate degree in Engineering by the University of Aveiro, Portugal  
Adjunct Professor of Production Engineering at Federal University of Grande do Norte,  
Brazil  
hekis1963@gmail.com (Brazil)

### **Kleber Cavalcante de Sousa**

M.S. student in Production Engineering at the Federal University of Rio Grande do Norte,  
Brazil  
Researcher of the Innovation Research Group at the Federal University of Rio Grande do  
Norte, Brazil  
kcsnat@gmail.com (Brazil)

### **Jamil Ramsi Farkat Diogenes**

M.S. Student in Production Engineering at Federal University of Rio Grande do Norte,  
Brazil  
Researcher of the "Núcleo Aplicado à Gestão e Inovação" at the Federal University of Rio  
Grande do Norte, Brazil  
farkatt@gmail.com (Brazil)

### **Ricardo Alexsandro de Medeiros Valentim**

Doctorate degree in Electric Engineering at the Federal University of Rio Grande do Norte,  
Brazil  
Adjunct Professor at Federal University of Grande do Norte, Brazil  
ricardo.valentim@ufrnet.br (Brazil)

### **Luis Miguel Domingues Fernandes Ferreira**

University of Aveiro, Portugal  
lferreira@ua.pt (Portugal)

## **ABSTRACT**

Hospital portals that manage health related data are becoming increasingly popular since they play an important role to provide, acquire and exchange information to its users. This study aims to verify how the hospital portals are contributing to the expansion of users knowledge by the analysis of interactive features associated with three mechanisms of knowledge management: Knowledge Access (KA); Knowledge Creation (KC); and Knowledge Transfer (KT). The study is exploratory, descriptive and qualitative, classified as a survey, and involves the standardization of data collection instruments (questionnaires and interviews) applied directly to people of a particular population to evaluate the knowledge management the portals present on the university hospitals from northeastern of Brazil. The results indicated that the proceeds of access to knowledge (AK) prevailed over other confirming the results found on the Asians and Americans hospital portals.

**Keywords:** Portals. Hospital. Knowledge Access. Knowledge creation.

## **Mecanismos da gestão do conhecimento para avaliação dos portais hospitalares universitários do nordeste brasileiro**

### **RESUMO**

Este trabalho objetiva-se verificar de que forma os portais hospitalares universitários localizados no Nordeste Brasileiro estão contribuindo para a ampliação do conhecimento de seus usuários a partir da análise de recursos interativos associados aos três mecanismos da gestão do conhecimento: Acesso ao Conhecimento (AC), Criação de Conhecimento (CC) e Transferência de Conhecimento (TC). O estudo é do tipo exploratório, descritivo e qualitativo, classificando-se como um Survey, cujo modelo desenvolvido através de uma adaptação de um estudo já realizado junto aos portais hospitalares da Ásia e da América do Norte, em 2007, que envolve a padronização de instrumentos de coleta de dados (questionários e entrevistas) aplicados diretamente às pessoas de uma população específica, para avaliar as ferramentas de gestão de conhecimento presentes nos portais hospitalares universitários da região Nordeste do Brasil. Os resultados indicaram que os recursos provenientes de acesso ao conhecimento

foram mais prevalentes que os demais, ratificando os resultados encontrados nas análises feitas nos portais hospitalares asiáticos e norte-americanos.

**Palavras-chave:** Portais Hospitalares. Acesso ao conhecimento. Criação de conhecimento. Transferência de conhecimento.

## 1 INTRODUCTION

The information and knowledge age is characterized by constant changes in society and the in the market; within this context the internet emerges as a valuable tool for distributing knowledge and to enable people worldwide to communicate (Lee, Goh & Chua, 2007).

Accordingly, it is noticeable the demand increase of individuals and organizations for information, often over the internet, especially information related to health, which is currently one of the most important issues among the ones accessed by users who carry out researches over the Web (Fox , 2012).

Thus, hospital organizations invest in the creation and maintenance of mechanisms for communicating with their customers and users, especially their websites, also known as hospital portals.

As from the knowledge management, it is possible to verify the way the hospital portals are contributing to broadening their members' knowledge. After checking such a scenario the following question arises: Which interactive features do the university portals of the Brazilian northeastern region offer in order to ease the knowledge management and the cooperation between hospitals and users?

In this context, this study aims to evaluate the interactive features of the university hospitals portals of the northeastern Brazil, seeking to facilitate knowledge management and cooperation between hospitals and users, based on three mechanisms: access to knowledge, knowledge creation and knowledge transfer.

Thus, the proposed evaluation will enable to identify the strengths and weaknesses of the investigated portals and then to compare the results obtained in this study with the research by Lee, Goh and Chua (2007), who applied a similar methodology to evaluate Asian and American hospital portals.

The work will be structured as follows: in the first section presents the introduction, the second section presents the theoretical basis, in the third section the methodological procedures are demonstrated, in the fourth section the results are described and analyzed, in the fifth section, the final considerations are presented followed by the bibliographic references.

## 2 LITERATURE REVIEW

In this section, theoretical grounds about knowledge management are presented, emphasizing the access to knowledge (AK), the knowledge creation (KC) and the knowledge transfer (KT).

### 2.1 KNOWLEDGE MANAGEMENT

For Nonaka (1994), knowledge management is not only a key factor in organizations, but also an inexhaustible source of competitive advantage. This will mean the need to apply and develop it in a participative way, sharing information with all employees of the organization (Lee, Goh & Chua, 2007).

Quinn, Baruch and Zien (1997) confirm the positive relationship between knowledge management (KM) and the generation of competitive advantage, mentioning that the knowledge management coordinated deployment provides a sustainable competitive advantage because it is being applied to people working in the organization, and not to physical resources which, according to Thomke and Reinertsen (1998), are easily imitable by competitors and less flexible to respond to the environment uncertainties.

According to Dixon (2000), knowledge boils down to meaningful links that people make between information and its corresponding application in action in a given context. Thus, knowledge management involves the integration of information processing capability and creative capacity of human beings in order to maximize the response capacity and flexibility of organizations (Zhang & Zhao, 2006).

It is still important to highlight that the knowledge management takes place through the encouragement for creativity, through the comprehensive use and exchange of knowledge among all the company employees, stimulating people to share what they know as well as creating a work environment where all worthwhile acquired experience can be viewed by everybody and applied to their activities in order to increase company productivity (Saito, 2012).

In this context, it can be noticed that the internet portals are effective tools to revolutionize the access to information in addition to being considered important tools for knowledge management (Cloete & Snyman, 2003; Lee, Goh & Chua, 2007; Hékis et al ., 2013).

Davenport and Prusak (1998) provide evidence that the main functionalities of a knowledge management structure are: the generation, the codification and the knowledge transfer. Lee, Goh and Chua (2007) in turn, highlight that the access to knowledge, its creation and transfer are the most relevant tools, and the ones that will be considered for the purpose of the present study.

## 2.2 ACCESS TO KNOWLEDGE (AK)

With technological advancement experienced by the internet spread, companies have used the access to knowledge (AK) mechanism not only as a new way to create new knowledge, but also as an opportunity to improve their ability to harness and manage knowledge (Siau, 2000). Accessing the network *World Wide Web*, it becomes possible to browse and find not only market information involving customers and suppliers but also information on manufacturing operations, service generation and management processes.

According to Castells (2006) the so called interactive computer networks have been increasingly developed, creating other ways and channels of communication, shaping habits, demands and interests, and simultaneously adapting to them. Thus the internet enables that considerable part of the communication becomes available spontaneously and covering different purposes.

Access to knowledge (AK) in this context corresponds to the mechanism through which users access a portal and its information. When analyzing hospital portals, the focus of this study, it is possible to know about its accessibility based on the search engines. The relevance of these portals can also be identified, by using the volume of accesses as a basis for classification (Lee, Goh & Chua, 2007).

It is therefore possible to examine the ease of finding and accessing the website, how the queries are made (observing if there is a tool for this), the ease of finding what one is looking for on the page, how the browsing is and what the access tools are. Another possible analysis is whether the user can customize the information, or if the organization can customize this information and if there are tools to facilitate the access to the portal, if people can easily browse the portal

content and if organization information is thoroughly provided in the portal page (Lee, Goh & Chua, 2007).

However, access to knowledge involves themes of the action, of the identity and of the freedom in three different aspects. First, the production and distribution of knowledge depend on informed agents who can keep the knowledge to their own advantage. Second, control over knowledge is organized around borders that define identities; these identities divide, on one side, those who are entitled to this knowledge, and on the other side, those who need it. Third, here lies the overcoming of the barriers between the beneficiaries and the victims of unequal access (Tilly, 2006).

According to Nonaka (1994), knowledge refers to personal beliefs that increase a person's ability to take effective measures and, as claimed by Davenport and Prusak (1998), it provides a framework for the evaluation and the incorporation of new experiences and information. The knowledge which has sound origin and is applied in the mind of knowledgeable people is not static and will change through the interaction with the environment.

In this sense, the hospital portals work as useful tools so that people can access and create information and also as a management tool and a mechanism for knowledge management quite helpful for hospitals in terms of access, creation and transfer of information (Lee, Goh & Chua, 2007).

Therefore, it is possible to say that access to knowledge makes available to society, in an easy and objective way, information that the individual considers useful. In the case of hospital portals, it can be verified that with this, the knowledge can be more organized and the faster return of information can generate new organizational ideas, *online* sharing, customization of some services, among other advantages which is of great use for society.

### 2.3 KNOWLEDGE CREATION (KC)

The creation of knowledge in organizations, according to Nonaka and Takeuchi (1997) can occur within an epistemological or ontological dimension. In the first case it is considered that knowledge can be tacit or explicit. It is the convergence between these types that allows the knowledge creation.

Tacit knowledge is a spontaneous knowledge acquired through daily life; it is object of curiosity and of the understanding of its operation. The explicit

knowledge, on the other hand, is considered to be of easier definition and explanation, less subjective since it can be documented, registered in words, data, figures, scientific and mathematical formulas, etc. (Polanyi, 1966).

Convergence between tacit and explicit knowledge may occur in four different ways: through socialization (tacit x tacit), through externalization (tacit x explicit), through combination (explicit x explicit) or through internalization (explicit x tacit). In the externalization, tacit knowledge turns into explicit insofar as the content, once internalized, can be transmitted, shared in documentary format, allowing other people to reach the understanding of it. Internalization, in turn, occurs when the enlargement of an explicit knowledge results in a new tacit knowledge (Nonaka & Takeuchi, 1997).

With regard to hospital portals, knowledge creation in their corporate digital environments presents itself as from the externalization of knowledge, when the institution's documents, the administrative and / or the bureaucratic ones, are made available to visitors who, in turn, have the possibility to internalize the information obtained regarding the institution.

## 2.4 KNOWLEDGE TRANSFER (KT)

Knowledge Transfer (KT) refers to the mechanism through which knowledge is transferred or shared between the organization and the users and among the users themselves having as objective the knowledge development through a cultural and an adequate training, allowing the correct interpretation of the information received (Lee, Goh & Chua, 2007).

It is necessary that people learn to make appropriate use of all the theoretical knowledge made available to them, meeting the company specific conditions. Thus, the knowledge transfer can be understood as replications of organizational routines and the knowledge is transmitted in an ongoing basis with cumulative effect (Szulanski, 2000).

Nonaka and Takeuchi (1997, 79). assert that an organization that wants to become "a company that generates knowledge" (*knowledge creating company*) must complete a "knowledge spiral" that goes from tacit to tacit, from explicit to explicit, from tacit to explicit and finally, from explicit to tacit. Therefore, knowledge must be articulated and then internalized in order to



become part of the knowledge base of each person. The spiral starts again after it has been completed, although in increasingly higher levels, thus broadening the knowledge application in other areas of the organization.

Thus, for knowledge sharing occurs, there must be a common language among people who work in the organization. The major hurdle is precisely on this point: very often the knowledge sharing involves innovative vocabulary for the recipients, or involves phrases that end up being decoded differently than the intended way thought by the sender (Hékis et al, 2013.).

Sveiby (1998, p. 49) states that "the meaning that a person expresses is never the same as the one generated in the mind of the person who receives it". It may also happen that the sender himself has difficulty to translate into words the knowledge he wants to share with others, and may even be possible that he himself does not have suitable words for it.

According to Szulanski (2000), knowledge sharing depends on the recipients' absorptive capacity, which is related to their previous knowledge and skills and to the motivation to seek and accept different or new knowledge. Lack of motivation, in this sense, may lead to attitudes of procrastination, rejection, sabotage, passiveness, acceptance in the implementation and use of the shared knowledge.

According to Dyer and Harbir (1998, p. 662) the human co-specialization develops as "partners in an alliance to develop experience working together and accumulate specialized information, language and *know-how*. This allows them to communicate efficiently and effectively, thereby reducing communication and mistakes, thus improving the quality and increasing the response speed to the market".

Knowledge transfer has been subject of several approaches. In this article, the focused knowledge transfer is the one that takes place as from the portal to the user and as from the user to the portal. Although limited, this notion captures many of the elements that focus the knowledge production and its application (Hékis et al., 2013).

### 3 METHODS AND RESEARCH TECHNIQUES

The research is of exploratory, descriptive and qualitative type, classified as a *survey*, whose technique involves the standardization of data collection

instruments (questionnaires and interviews) applied directly to people in a specific population, whose behavior and characteristics are the targeted aspects to be known. It is suitable for testing hypotheses, models and propositions theoretically substantiated (Forza, 2002).

This study was carried out with a sample of 11 hospitals that correspond to 100% of the federal university hospitals located in the Brazilian Northeast and registered at the Brazilian Association of University and Teaching Hospitals (Abrahue). These hospitals are identified in Table 1.

Table 1: Hospital portals covered by the research

UNIVERSITY HOSPITAL	STATE	LINKED INSTITUTION	EMAIL ADDRESS
Professor Alberto Antunes	Alagoas	UFAL	<a href="http://www.hupaaufal.org">http://www.hupaaufal.org</a>
Professor Edgard Santos	Bahia	UFBA	<a href="http://www.complexohupes.ufba.br">http://www.complexohupes.ufba.br</a>
Maternidade Climério de Oliveira	Bahia	UFBA	<a href="http://www.mco.ufba.br">http://www.mco.ufba.br</a>
Maternidade Escola Assis Chateaubriand	Ceará	UFC	<a href="http://www.meac.ufc.br/">http://www.meac.ufc.br/</a>
Walter Cantídio	Ceará	UFC	<a href="http://www.huwc.ufc.br">http://www.huwc.ufc.br</a>
Hospital Universitário da UFMA	Maranhão	UFMA	<a href="http://www.huufma.br/site">http://www.huufma.br/site</a>
Lauro Wanderley	Paraíba	UFPB	<a href="http://www.hulw.ufpb.br">http://www.hulw.ufpb.br</a>
Alcides Carneiro	Paraíba	UFCG	<a href="http://www.ufcg.edu.br/prt_ufcg/orgaos_sntares/hu/hu.php">http://www.ufcg.edu.br/prt_ufcg/orgaos_sntares/hu/hu.php</a>
Hospital das Clínicas Ana Bezerra	Pernambuco	UFPE	<a href="http://www.ufpe.br/hc">http://www.ufpe.br/hc</a>
Hospital Universitário da UFSE	Rio Grande do Norte	UFRN	<a href="http://www.huab.ufrn.br">http://www.huab.ufrn.br</a>
	Sergipe	UFSE	<a href="http://hospital.ufs.br">http://hospital.ufs.br</a>

Source: Prepared by the authors

The research took place in three stages. The first was the bringing into conformity the data collecting instrument: an adaptation in the form of *checklist*, of the same questionnaire used by Lee, Goh and Chua (2007). The adjustment carried out was planned in order to emphasize the portals assessment in the three mechanisms employed in the knowledge management - the access, the creation and the knowledge transfer.

The second stage corresponded to the *checklist* application, which happened through double accesses on each of the 11 portals encompassed in the

research. Several researchers accessed the portals between the months of July and September 2012. They proceeded to reading and observing on each page and subpage of the portal, in a 72-hour interval, simultaneously verifying the existence or non-existence of the features included in the *checklist*.

After completing the two opinions (individual of each portal), a third researcher (auditor) validated the two completed *checklists*. If both showed 100% compatibility on the mentioned features, the truthfulness was confirmed and the information was forwarded to data analysis. In cases of different notes, both researchers reworked their *checklist* at the same moment, in the presence of the third investigator (auditor), confirming the actual existing functionalities at each portal, making it possible, in the end, the routing of the information for analysis.

Table 2 shows the functionalities inserted in the *checklist* and used by researchers in the readings / observations carried out on the portals.

Table 2: Functionalities analyzed in the portals

ACCESS TO KNOWLEDGE (AK), KNOWLEDGE CREATION (KC) AND KNOWLEDGE TRANSFER (KT)		
(AK) Access: Is it easy to find and access the portal?	(AK) Query: is it easy to perform queries and is there a proper tool for such a purpose?	(AK) Results: is it easy to find what is sought after?
(AK) Browsing: is it easy to browse and to use the available tools?	(AK) Customized information: Can user customize the information?	(AK) Customized information: does the organization customize the information?
(AK) Accessibility: Are there tools to facilitate the access to the portal?	(AK) Accessibility: it is easy for people to have access to portal content?	(AK) Presentation of information: Is the information provided in the portal in a thorough and comprehensive way?
(KC) Is there knowledge creation?	(KC) Is there acquiring information [from] the user?	(KC) Is there data acquisition from the user domain? Existe aquisição dados de domínio do usuário?
(KT) Is there cooperation of the user with the organization?	(KT) Is there cooperation among users?	(KT) Are there synchronized supports?
(KT) Are there information alerts?	(KT) Is there support to users?	

Source: Prepared by the authors

## 4 PRESENTATION AND ANALYSIS OF RESULTS

When analyzing the hospital portals reviews, based on the adopted *checklist*, it was found that all university hospitals in northeastern Brazil use at least two mechanisms of the most important tools of knowledge management, according to Lee, Goh and Chua (2007) - access to knowledge (AK), knowledge creation (KC) and knowledge transfer (KT). In the study, it was also shown that only two portals, among the 11 selected, use an integrated combination of these mechanisms of knowledge management.

In the survey it was also identified the results for each of the dimensions related to knowledge management. Thus, aiming at facilitating the understanding, the results presentation will be done according to each dimension of knowledge.

### 4.1 ACCESS TO KNOWLEDGE (AK)

It was observed that all portals are accessible as from the search engines, to facilitate any user's browsing. They are found in the domains of federal universities whose hospitals are connected (except for the University Hospital Professor Alberto Antunes), whenever using the search term "federal hospitals" in research sites, or even when using the name of the institution, which is very positive, since Cloete & Snyman (2003) and Hékis et. al. (2013) emphasize that Internet portals are very effective tools to revolutionize the access to information for the users.

Table 3: Number of portals that have the functionalities described in the mechanism "access to knowledge"

ACCESS TO KNOWLEDGE (AK)	Nº OF PORTALS	%
Easy to find and access the portal	11	100
Ease of performing queries	7	63,7
Ease of finding what is sought	7	63,7

Ease of browsing	7	63,7
Personalization of information for users	4	36,2
Customization of information for users	8	72,7
Are there tools to provide easier access to the portal?	0	0
Ease of access the portal content	5	45,4
Does the portal make available the information on the organization?	9	81,8

Source: Prepared by the authors

In the research on query, results, browsing and accessibility, it was observed that in most of the pages, the information, *links*, query capabilities through accessible tabs are easily found, with the exception of the portals of the University Hospital Complex Professor Edgard Santos, University Hospital Lauro Wanderley, University Hospital Ana Bezerra and University Hospital of the Alcides Carneiro University, in which, although the information is made available, the advanced query tool - such as to expand or modify research and results - is not available, as outlined in Table 3 .

As for personalization and customization, only four of the hospital portals - Maternity Climério de Oliveira, University Hospital of UFSE, University Hospital Walter Cantídio / UFC and the University Hospital of UFMA - enable the user to give opinion, expose ideas, change size letter, in other words, they enable the user to customize the information in addition to providing customized information by the organization. In the other seven hospital portals it was not identified the possibility for the user to customize the acquired information. As for customization by the institutions, portals meet this item accordingly.

The information on all portals is presented in a comprehensive manner: location, phones, mission, and vision, among other data.

#### 4.2 KNOWLEDGE CREATION (KC)

When assessing the knowledge creation that visitors acquire when they access the portals studied, it was found that, in all of them, the knowledge

creation is generated through some news about hospitals and especially news about health, the exposure of projects and campaigns.

The study found that in only 54.5% of the portals evaluated, there is acquisition of user information, that is, in six portals the organization acquires information from users and only in three portals there is the acquisition of the IP domain data which identifies the user.

Table 4: Number of portals that have the functionalities described in the mechanism "knowledge creation"

KNOWLEDGE CREATION (KC)	Nº OF PORTALS	%
There is knowledge creation	11	100%
There is user information acquisition	6	54,5
There is acquisition of the IP domain data	3	27,3

Source: Prepared by the authors

In most hospital portals, there are no tools that enable the knowledge creation by the organization based on data and information collected from users, although there is knowledge creation in these portals. In most of them, the "Contact Us" or "Contact" tool is provided, so that users keep in touch, providing their opinion and contributing with their comments and suggestions. In such cases, the knowledge creation is restricted to what the visitor acquires, in other words, the information is focused on the hospital structuring, history and services offered, results and institutional data, as shown in Table 4.

It is also noticed that in the tabs of the Maternity Climério de Oliveira and the University Hospital Prof. Alberto Antunes, the knowledge creation is also complemented by the Ombudsman Office and by the contact forms and the users are enabled to interact and share information related to their opinions, comments and suggestions about the hospital, the services, and also on the portal.

In some portals, there is an Ombudsman Office service, which provides a form to be fulfilled by the users so that they can communicate, such as the portal of the Hospital of the UFPe, where the knowledge creation acquired by the visitor are some news about the hospital and mainly on health, with the exhibition of scientific projects and productions.

However the portals of the Maternity Climério (UFBa) and of the University Hospital Prof. Alberto Antunes (UFAL) make available opportunities for an interaction with users and among them, as they make available the contacts and the Ombudsman's schedules as well as forms for the users to keep contact and a very innovative and interesting room for testimonials. In this space, visitors are enabled to share information based on their experience with the hospital: they can compliment a procedure as well as criticize it. In the space, however, it appears only the disclosure of compliments. The latest comment is of 2011, which may denote two situations: either the information management of the portal administrators is flawed, or its use is very scarce to the point that nobody wished to testify throughout the first half of 2012.

With respect to the knowledge acquisition of user information, in regard to the receipt and processing of information and to the process improvement, it stood out the portal of the University Hospital Prof. Alberto Antunes (UFAL), which identifies and reports how many visitors are *online*, but does not report how many have already visited the portal. In other words, most portals do not get data from the user's domain or report how many visitors are *online*.

Some portals allow users to monitor and to interact with the communication service and with other users about news about the hospital through social networks, such as the Portal of Assis Chateaubriand Maternity-School Hospital.

#### 4.3 KNOWLEDGE TRANSFER (KT)

In the present study, it was observed that in all the portals there is knowledge transfer even if it is carried out in a superficial and limited way. This transfer happens, specially, as from the organization to the users, because of several information are offered to visitors who can make decisions as soon as they get possession of these pieces of information.

The study also showed that in only 18.1% of the hospitals surveyed, there are tools that provide cooperation between the users and the organization. No tools were identified that enable cooperation among users, neither support, or even synchronized support for users who need guidance or help for using the portal.

Table 5: Number of portals that have the functionalities described in the mechanism "knowledge transfer"

KNOWLEDGE TRANSFER (KT)	Nº OF PORTALS	%
There is cooperation between the users and the organization	2	18,1
There is cooperation among users	0	0
There is synchronized support	0	0
The portal presents information alert	0	0
The portal offers support to users	0	0

Source: Prepared by the authors

It is worth mentioning that in the studied portals no mechanisms were found to facilitate and encourage user collaboration with the Organization, except for the portals of Hospital das Clinicas of UFPe and of Hospital Climério de Oliveira of Federal University of Bahia, the latter with a mechanism quite interesting, that allows users to post testimonials about their experiences during their stay, or about the services provided by the hospital.

In the other portals, no mechanisms were found for integration among users, such as forums or spaces for their testimonials, data highlighted in Table 5.

A significant majority of portals offers as an integration tool with users only the "Contact" or "Contact Us" tool through a form which the user can fulfill and send through email. This tool only allows the organization to receive some



information from the user, which may or may not produce some knowledge through this transfer, but does not make possible the interaction among users.

In the other portals, no mechanisms or users' support tools were found in case they need them; also no tools to alert them of issues and topics of their interest.

Knowledge transfer has been the subject of several approaches. In this article, the focused knowledge transfer is the one that takes place from the portal to the user and from the user to the portal. Although limited, this notion captures many of the elements that are intended to the production of knowledge and its application.

## 5 FINAL CONSIDERATIONS

In this work, the strengths and weaknesses of hospitals portals in Northeastern Brazil were identified, and further, it was carried out comparisons with results obtained in the study of Lee, Goh and Chua (2007) to which it was applied a similar methodology to assess Asian and Americans hospital portals.

Although this study has been limited to the portals of university hospitals in the northeast region of Brazil, it is believed that the results are applicable to portals of any other domains, facilitating the information collection, organization and dissemination as well as the knowledge resources.

In this study, the interactive features of the portals of University Hospitals in the northeast region of Brazil were evaluated, identifying the mechanisms of knowledge management used and proving that the Hospital portals contribute to the users and organizations expansion of knowledge, and that the interactive features of the University portals in the northeastern region make it easier the knowledge management and the cooperation among hospitals and users.

Accordingly, it is concluded that the hospital portals surveyed, as well as the study by Lee, Goh and Chua (2007), offer different and diverse resources and information to its users. With regard to the access to knowledge the portals have search tools, tabs for accessing the pages, information about the hospital, but few can customize or personalize information. This demonstrates that the mechanism of access to knowledge (AK) was more prevalent than the mechanisms of knowledge creation (KC) and knowledge transfer (KT), which

coincides with the study carried out with the hospital portals in Asia and North America.

The identification with higher frequency of the access to knowledge (AK) mechanism suggests that it takes time for health professionals transform information about health care into health knowledge available to visitors or potential visitors through the use of the portal technology, which shows an important challenge for managers of hospital organizations regarding the issue of knowledge management.

Regarding the knowledge creation, most portals do not possess available tools so that users can contribute to this knowledge creation. Integration tools among users are, in most cases, the "Contact" or "Contact Us" tools.

The characteristics most commonly available to support the KT mechanism are the sharing of resources supply of catalog information, external *links* to other websites and information that contribute to the viewing by other users. Surprisingly, it was found that the KT support mechanism by the online collaboration among users is still lacking in many portals.

Furthermore, there are currently many portals that also provide information on health, but are not operated by hospitals. Thus, a future work could consider the evaluation of these portals and examine the differences between them and the hospital portals in terms of access, creation and transfer of health information and knowledge.

Thus, it is perceived the need to expand the access to knowledge tools, such as search, advanced search, personalization and customization, in such a way that users can get more access to knowledge.

Regarding to the knowledge creation (KC), it would be interesting the existence of tools in portals that enabled users to bring information that would permit the knowledge creation by the hospital, through greater interaction. And further, that portals provided information to users, in real time, about their assistance, informing the queues conditions for appointments, use of beds, doctors on call that day and other information that could be transmitted to the user before he leaves home to go to hospital.

## REFERENCES

- Associação Brasileira de Hospitais Universitários e de Ensino – Abrahue. (2012). *Hospitais Associados*. Recuperado em 13 de junho de 2013, de <http://www.abrahue.org.br/>.
- Castells, M. A. (2006). *Sociedade em rede* (9a ed.). São Paulo: Paz & Terra.
- Cloete, M. & Snyman, R. (2003). *The enterprise portal – is it knowledge management? Aslib Proceedings*, 55(4), 234-242.
- Davenport, T. H. & Prusak, L. (1998). *Conhecimento empresarial: como as organizações gerenciam o seu capital intelectual* (L. Peres Trad.). Rio de Janeiro: Campus.
- Dixon, N. M. (2000). *Common knowledge: how companies thrive by sharing what they know*. Boston: Harvard Business Press.
- Dyer, J. H. & Harbir, S. (1998). The relational view: cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660-679.
- Fox, S. (2012). *Press release – Health topics*. Recuperado em 22 de novembro de 2012, de <http://www.pewinternet.org/Press-Releases/2011/Health-Topics.aspx>.
- Forza, C. (2002). "Survey research in operations management: a process-based perspective". *International Journal of Operations & Production Management*, Vol. 22 Iss: 2, pp.152 – 194.
- Hékis, H. R., Souza, R. P., Queiroz, J. V., Queiroz, F. C. B. P., Oliveira, L. A. B. & Valentim, R. A. M. (2013). Implementation of a Six Sigma Project in a 3M division of Brazil. *International Journal of Quality and Reliability Management*, 30, 129-141.
- Lee, C. S., Goh, D., & Chua, A. (2007, December). Evaluation of hospital portals using knowledge management mechanisms. *Proceedings of the International Conference on Asian Digital Libraries ICADL*, 10, Hanoi, Vietnam. Lecture Notes in Computer Science 4822, 15-23.

- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14-37.
- Nonaka, I., Takeuchi, H. (1997). **Criação de conhecimento na empresa** (5a ed). Rio de Janeiro: Campus.
- Polanyi, M. (1966). *The tacit dimension*. London: Routledge and Kegan Paul.
- Quinn, J. B., Baruch, J. J. & Zien, K. A. (1997). *Innovation explosion: using intellect and software to revolutionize growth strategies*. New York:Free Press.
- Saito, A. A. (2012, fevereiro). Importância da gestão do conhecimento. *Você RH*. Recuperado em 10 de janeiro de 2013, de <http://www1.folha.uol.com.br/poder/1008084-em-meio-a-criese-mundial-agencia-sp-eleva-nota-de-credito-do-brasil.shtml>.
- Siau, K. (2000). Knowledge discovery as an aid to organizational creativity. *Journal of Creative Behavior*, 34(4), 248-258.
- Sveiby, K. E. (1998). A nova riqueza das organizações. Gerenciando e avaliando patrimônios do conhecimento. Rio de Janeiro: Campus.
- Szulanski, G. (2000). The process of knowledge transfer: a diachronic analysis of Stickness. *Organizational Behavior and Human Decision Processes*, 82(1), 9-27.
- Thomke, S. & Reinertsen, D. (1998). Agile product development: managing development flexibility in uncertain environments. *Califórnia Management Review*, 41(1), 8-30.
- Tilly, C. O. (2006). Acesso desigual ao conhecimento científico. *Tempo Social*, 18(2), 47-63. Recuperado em 13 de Janeiro de 2013, de <http://dx.doi.org/10.1590/S0103-20702006000200003>.
- Zhang, D. & Zhao, J. L. (2006). Knowledge management in organizations. *Journal of Database Management*, 17(1), 1-8.