DEFINITION OF A COLLABORATIVE WORKING MODEL TO THE LOGISTICS AREA

[1]*Dora Magalhães,* [2]*Maria Do Sameiro De Carvalho, and* [3]*Leonilde R. Varela*
Department of Production and Systems,
School of Engineering, University of Minho, Azurém Campus, Guimarães, Portugal,
dorasousamagalhaes@gmail.com, sameiro@dps.uminho.pt, leonilde@dps.uminho.pt

Abstract: In today's global economy, the collaboration has become an essential requirement for effective functioning of society. The emergence of Web 2.0 has been indicated as a set of tools to simplify collaboration. The aim of this project is to create an online enterprise community for all logistics employees of Bosch Car Multimedia division in the Bosch Group, for an internal collaboration of the entire Bosch Group based on an IBM Connections platform: Bosch Connect. An additional concern, collected throughout the project, was to bring employees to join the platform, making it a tool of your daily work. Through interviews and a surveys was possible to take the communication and collaboration needs of the target community and thus carry out its construction, based on Design for Six Sigma methodology. As a final result we created the community "Be One Logistics". Despite the limited time to achieve the results (4 months), it was possible to observe an adherence of 71% of the target population. Despite the relatively low number of users (41.7%), some important contributions were made in terms of content updates, and has been a major update in the wiki application, with 77% of the total generated content. Concerning the accesses, there was a balance between the uses of the various applications.

Keywords: Colaborative working model, logistics

1. Introduction

The emergence of Web 2.0 has been announced as a set of tools to facilitate collaboration [1]. The use of Web 2.0 technologies power the internet in a more interactive and collaborative way, increasing the social interactions of individuals and their commitment [2]. The collaboration can simplify and become more effective the development of processes, relatively to time and quality, exploring knowledge of specific people in these processes, inside the organization [3].

The Bosch Group is a clear example of globalization, where their entire organization crosses more than 150 countries. Since 1886, that Bosch innovates and remains competitive. Up to today, the communication has been performed around a network of documents, through static HTML pages and with low dynamic contents (Web 1.0). Bosch wants to overcome this state and achieve a communication across the Social Web, i.e., through social interactive tools on the internet (Web 2.0). It is in this context that appears the Enterprise 2.0 project that aims to become Bosch in a high connected enterprise, where the slogan is "Cooperate. Communicate. Create" [4]. Based and adapted from IBM Connection to Bosch Group, Bosch Connect is the internal platform of Enterprise 2.0 project. This platform offers a diversity of functionalities to increase efficiency of communication and collaboration among associates. It is in the context of using this type of collaborative platforms that this project emerges, exploring Bosch Connect in the logistics section of Car Multimedia division, according to the theme: "Definition of a Collaborative Working Model to the Logistics Area".

2. State Of Art
2.1. Collaboration in the Companies

In the 21st century, the economy is based on knowledge has been emerging, the information and communication knowledge's are crucial to the organization's success [5]. The modern organizations support and promote internal collaboration to improve the performance of their own processes [3].

The collaboration term is used when individuals and businesses work together for a common goal [6].

Vangen and Huxham, in 2006, cited in [7] defined collaborative advantage as the "synergy that can be achieved through the integration of resources and expertise of an organization with the other." One way of different ways to compete, customer value delivery and grow happens when a top manager chooses the approach to be collaborative network [8]. A business network can be any group of small and medium enterprises with common interests and goals. Companies within a business network collaborate with each other in order to pool their resources and capitalize on the shared assets.

All collaborative relationship between organizations leads to a network which is called collaborative network that depends on the level of relationship. A collaborative network can be defined as a system that

concludes about your entry, activity, mechanism, control and output [9].

For example, the supply chain is an important collaborative network for businesses.

According to Christopher, in 1992 [10], a supply chain is a network of organizations that connect suppliers, manufacturers and distributors in the different processes and activities that produce value in the form of products and services to final consumers.

2.2. Other aspects of collaboration and collaborative networks

Kanter, 1994 cited in [11] has presented five types of integration for the most generative collaborative relationships that include: strategic integration; tatic integration; operational integration; interpersonal integration and cultural integration. Coughlan, et al., in 2003 [11]), Todeva, and Knoke, in 2005 [12], ranked 13 forms of relations as a strategic collaboration between organizations, which include: (1) hierarchical relationships, (2) joint activities, (3) equity investments (4) cooperatives, (5) consortia of R & D, (6) strategic cooperation agreements, (7) advertisements, (8) Franchise (9), licensing (10), subcontracting networks, (11) industry standards groups, (12) sets of actions, (13) market relations.

There are several factors as reasons and benefits to encourage companies and organizations to collaborate with other companies including: market demand; acquisition of distribution facilities; gain access to new technologies, and technology convergence; learning and internalization of tacit skills, collective and associated capacities; to achieve economies of scale; achieve vertical integration, recreation and extent of supply connections, in order to adjust to environmental changes; diversify into new businesses; restructure, improve performance; share costs and resources; develop products, technologies, resources; reduce and diversify risks; develop technical standards; achieve competitive advantage; get cooperation from potential rivals or competitors (interrupting competitions / competitors); complementary products and services to markets; co-specialization; overcome legal / regulatory barriers; and legitimacy, following industry trends [12].

Based on Lehtonen, in 2006 [13], important attributes of collaborative relationships are: commitment, continuous development, the involvement of different organizational levels, mutual trust, openness and promise of mutual benefits. Velvet in 2005 presented a Conceptual framework for the partnership concept. In this embodiment the dimensions indicate the features that define the association, which in turn can be defined by a set of characteristics and these can be evaluated in a number of indicators.

Barratt in 2004 divides collaboration in the supply chain in two dimensions: the vertical collaboration and horizontal collaboration. In Figure 1 [6] expresses these two dimensions of collaboration.

A supply chain management network (and supply chain management, SCM) has certain fundamental attributes that include [14]:

- Low cost open connectivity;
- Very large and flexible multimedia data storage;
- System integration and channel;
- High level of self-service capabilities;
- Collection and analysis of intelligence;
- Collaborative exchange in the supply chain;
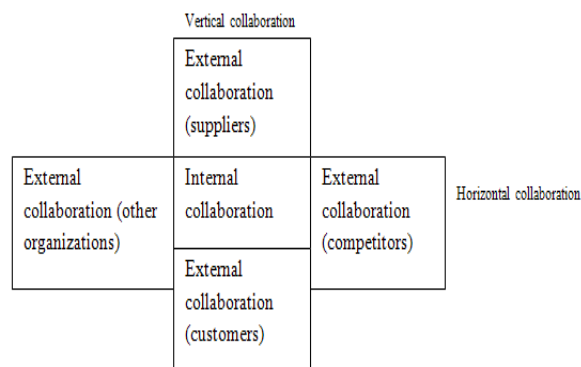- High security capabilities;
- New e-commerce capabilities.

Figure 1: General concept of collaboration: two main dimensions [6].

Bititci, Martinez, Albores and Parung, in 2004 [7], states that the creation of value in collaborative organizations must be a type situation "win-win-win" (or win-win-win) for all parties involved. They presented two perspectives of value to the understanding of value in the context of collaboration, including:

- Internal value (prospective business partners);
- External value (customer perspective).

Parung, Bititci, in 2008 [9], in his article presented a metric for collaborative network. This metric managers should measure all network elements, as follows, to measure the performance of the collaborative network (Figure 2, of Hosseinipour et al, in 2012.) [6]:

- Entry for collaboration, which is the contribution of each participant;
- Collaboration mechanism, which is the "health" of collaboration;
- Departure or return of collaboration, which is the result of collaborative activities.
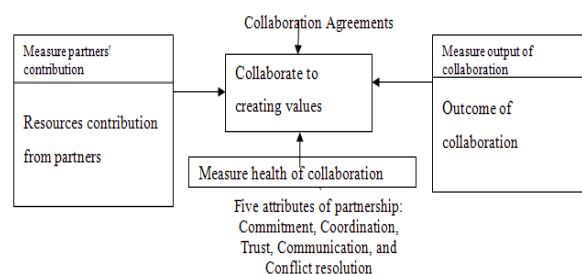

Figure 2: Interaction elements in collaborative networks [6, 9].

Due to globalization, most companies tend to cooperate with other companies. Strengthening global cooperation allows companies to focus on core-activities, which leads to organizations to organize networking. Savage,

in 1990, cited in [15] contrasted organizational characteristics of traditional bureaucratic organizations with the network organizations.

2.3. Motivation for performance evaluation in collaborative networks

Researchers have done some research and work in various fields such as logistics management, marketing, human resource management and management of intercompany transactions but have not done enough research on performance management [16] in the context of collaboration and collaborative networks [6].

Hosseinipour et al, in 2012, [6] did refer to as fundamental attributes of relations / collaborative networks: commitment, continuous development, involvement of different organizational levels, mutual trust, openness and promise of mutual benefits. Furthermore, attention is drawn to the collaborative advantage, to play an important role in business networks and supply strategy.

In [6] the authors also refer to the absence of a system to measure the performance of collaborative business and that this gap allows to foresee the need for managers need to come in designing performance management systems in collaborative companies. The realization of this reality was a motivation for this work, to contribute to the evaluation of the performance potential business partners during the training / renewal of agile / virtual enterprises [EA / V].

2.4. Web 2.0

The globalization keeps on going up. Nowadays, more organizations need to be able to operate in more complex environments [17]. The importance of the business communities, confirm that there is a change in the business models from a traditional and competitive hierarchical system, to a more collaborative environment and social network, that are considered two of the most import concepts of Web 2.0 [18]. The Web 2.0 technologies made some significant improvements, providing the users the necessary tools to adopt and promote the collaboration culture in the corporations [19]. The Web 2.0 is define as the "the philosophy of maximize the collective intelligence and additional values to each user, by sharing formal and dynamic information and trough the creation" [20].

Advantages and limitations of Web 2.0 Technologies

Wikis, blogs, podcasts, folksonomies (tags), mashups, social network, virtual words, crowdsourcing and RSS feed (Really Simple Syndication) are Web 2.0 technologies that allow companies to grow, in a profitable way, their productivity and competitiveness [21]. Reference [21] split the advantages that the users can gain from using Web 2.0, in six big groups, knowledge management, quick development of applications, relationship's management with the clients, collaboration and communication, innovation and formation. Nowadays, it is still not possible to measure the real impact of Web 2.0 in the business world [3]. Some technologies, such as wikis, blogs and social networks, have been developed more than other

Web 2.0 technologies, probably because of the fear of the unknown [22]. To assure all the advantages of these technologies, the companies will have to increase their surveillance on internet and invest in preventive measures [2].

Enterprise 2.0

Reference [23] created, in 2006, the term "Enterprise 2.0" to describe "the use of emerging social platforms in the companies, or between companies and their business partners or clients". Reference [24] says that "Enterprise 2.0" is the application of Web 2.0 technologies in an industrial environment, in order to allow the collaborators to share ideas, communicate, collaborate and create new contents. In this context, have been created a series of platforms, like IMB Connections and Zimbra Community, to offer tools that allow companies to link them socially and support the opinions and feedbacks from the users and platforms to manage contents form the users. Enterprise 2.0 offers to innovative organizations the opportunity use creativity of their collaborators and increase the productivity and aggregate additional value to their daily work [25]. Reference [26] refers that Enterprise 2.0 is more a combination of Web 2.0 tools, with a lighter software requirements and friendly user.

Implementation of Enterprise 2.0 and the resistance to its operation

To implement the Enterprise 2.0, interactive and collaborative, it is important that the company have technological and organizational conditions. The implementation process is a critical and complex procedure that requires a strategy plan to help the adoption of the new tool [27]. Despite the company's investment in more Enterprise 2.0 collaborative tools to support and share knowledge, to communicate and collaborate, most of them face a difficult challenge, the adoption of the tools by the collaborators [28]. Despite these interactive tools, not all collaborators are predisposed to adopt Enterprise 2.0 [25]. This factor or resistance by the target audience always appears to the when a new technology emerges. The resistance is known as the "Empty Quarter" [29] that is the group of users that decline the new technology. This could happen when there is a low technology interest, a repeated use of some technologies, a low corporative culture and a non-friendly and complex technology to learn. In conclusion, reference [29] believes that is essential that those collaborators should know the benefits of Enterprise 2.0, taking in consideration that it is a tool that will provide bigger and better access to knowledge and experiences to the company.

3. Problem description

In August 2012, Bosch Connect is officially released in Bosch Group with a pilot project in Diesel Systems division. A survey, conducted in February 2013, revealed that at least 36% of users have contributed to some topic in Bosch Connect and about 77% use the tool to 20% of their daily work [4]. In September 2013, Bosch Connect became available to all associates

through the internal intranet portal. In January 2, 2014, approximately 80% of all the associates were registered in Bosch Connect. However, only 33% of those were active users [4]. Given the data presented, there is the need to develop a project that aims to promote communication and collaboration among associates logistics Car Multimedia division, by building a community in Bosch Connect.

4. Proposed approach

To support all the process creation of the community, is selected the Design for Six Sigma (DFSS) methodology. This methodology emerges from the need to adapt the Six Sigma to designing projects, having as goal to design products, services and processes in the light of Six Sigma [30]. One of its main goals is to minimize the occurrence of unforeseen events that are traditionally associated with the introduction of new products, services and processes [31]. There are several variants of the methodology DFSS. For the context of this project, will be used the DMADV methodology, that is appropriated to design services processes and it addresses specifically to the remodeling processes. For the context of this project, the DMADV methodology will be used to design appropriate service processes, because it specifically addresses the processes of remodeling [32].

5. Project development

In the next sections will be presented each DMADV methodology phase to the development project.

5.1. Define Phase
The aim of this project is construct an online community to all the logistics associates in Car Multimedia division. The main resource of the project will be the Bosch Connect platform. To achieve the target, is defined the project plan, according the DMADV methodology steps:
a) Define phase: current phase;
b) Measure phase: Identify the target population, interviews to logistic leaders and surveys to the target population;
c) Analyze phase: Define critical characteristics to the community;
d) Design phase: Construct the community structure; and
e) Verify phase: Collect feedback, implement of improve action and presentation of future work proposal.

5.2. Measure Phase
The target population of this project is logistics associates in four geographically dispersed plants, Braga (Portugal), Hildesheim (Germany), Penang (Malaysia) and Wuhu (China), in a total of 146 persons. Through the interviews and the survey, was possible to collect all the target population needs. With the survey results, was verify that the adherence level to Bosch Connect is, at this moment, short. Many users do not access regularly to this platform, or simply do not use it (about 45% of the responders). The responders that already use regularly Bosch Connect, can give

important view of the platform, because they already know it. In the other hand, if they do not enjoy the platform, they can negatively influence the others users and do not be open to a new perspectives. Anyway, for all users is really necessary to show them the benefits and potentials associated with the use of Bosch Connect.

5.3. Analyze Phase
According to information collected in the interviews and surveys, is possible to conclude that the target population needs match. In Table 1, is presented all those needs.

Table 1. Target population needs, according the required and the application to use in the platform.

Themes to explore in the Community	Required in Interview	Survey	Application to use in Bosch Connect
Information Technology	X		Wiki
Plant and Central Projects	X		Wiki
WILCO Project	X		Subcommunity
LSC-CM Meetings	X		Subcommunity
Discussion about Bosch Connect potential	X		Forum
Share the Car Multimedia logistics news	X	X	Blog
Share best-practices	X	X	Ideation Blog
Logistics area's information		X	Wiki
Work Instructions		X	Wiki

5.4. Design Phase
The name selected to the logistics Car Multimedia community is "Be One Logistics". To define this community, was used all the applications mentioned in Table 1, in order to achieve all the respondents needs. In the Figure 3, is presented the overview of this community.

Figure 3: Overview of the "Be One Logistics" community.

5.5. Verify Phase

In the last phase of the DMADV methodology, is presented the verification and validation of the product developed [31]. In a qualitative level, is analyzed the several feedbacks received. Through these, is concludes that target population understood the importance of having training about Bosch Connect in order to become more effective and efficient the use of this platform and also the associates need to understood that their leaders understood and encourage the use of this platform. Additionally, it highlighted the importance of creating and keeping proximity with the community members, being constantly available for any clarification. In a quantitative level and among all collected indicators, the most important are those that are relating to participation in the "Be One Logistics" community. Concerning the number of members, 103 persons represent about 90% of respondents and 71% of the target population. However, it verified that the number of users (active members) is considerably low (41.7%) (Figure 4).
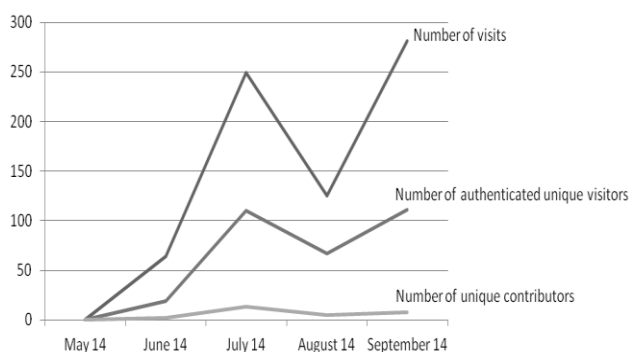

Figure 4: Participation in the "Be One Logistics" community

By analyzing the Figure 5, it is concluded that the community experienced at most 281 visits, in a month (accounting for all visitors, including anonymous users and repeat visitors). As for exclusive authenticated visitors, ie, those who that have logged in the community at least once, in each month, were at most 111 people. Both peaks of visits took place in September and the biggest drop in August, where the value is justified by the period of vacations in all the plants. In short, it is possible to verify that the number of accesses to the community progressively evolves. About to access to each application, it verified that there is a balance among all of them, highlighting only the wiki (31%) and the blog (30%).
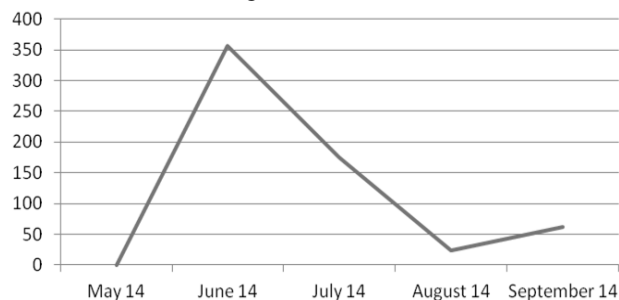

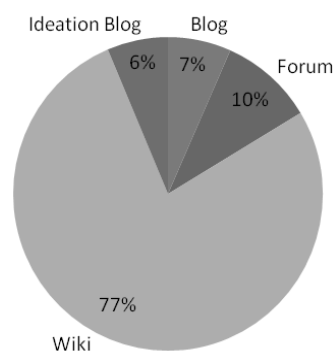*Figure 5: Number of total content update, per month*

Figure 6: Number of content updates, per application

Concerning the number of new updates (Figure 6), a total of 617 participations are obtained, being its peak in June with 357 contributions. Regarding the applications where this content was created, by Figure 6, is clearly verified that the element where there was obtained a higher content creation and update was wiki (77%), possibly due to the nature of application that, in each page edition count one update. With regard to future proposals, it is highlighted the exploration of Logistics area's information, keep the projects status updated, and the trainings to Bosch Connect platform. In short, all future work will be directed according to the community members needs, and will be received via their feedback.

6. Conclusions

Through the creation of the "Be One Logistics" community in Bosch Connect, was possible to achieve the goal of this project to improve communication and collaboration among logistics associates of Car Multimedia division. As final results, membership fee grew to 90% of respondents, 71% of the target population. Additionally, contributions in terms of content updates also grew, despite the relatively low number of users (41.7%, i.e., 43 of 103 members). Regarding the access, there was a balance between the use of various applications. On the other hand, was verified a higher content update in the wiki, with 77% of the total generated content. Finally, and not considering the vacation period (August) as significant, it is concluded that participation in the "Be One Logistics" community evolves gradually, in 4 months of use.

In this project, was identified some aspects that are considered limitations and influenced the development of this project. The first aspect is related to the fact that the target population is distributed by four distant countries. Related to the limited time of the project development is associated with lack of opportunity to obtain a larger community, given that, through the feedbacks received, the community will always evolve to follow the needs of its members. Furthermore, and as mentioned reference [24] about the implementation of the Enterprise 2.0, it was verified that the frequent use of Bosch Connect is also a lengthy adoption process. Finally, having aware the "Empty Quarter" by reference [29], is verified some resistance by some part of the target population in the use of this technology, either

during the investigation or in various stages of training, being quite negative because these people can influence their colleagues, negatively affecting the project.

Against all the limitations, is concluded that an essential factor for the success of the project is the involvement of the associates. It is possible to conclude that this project helped to bring all logistics associates of Car Multimedia division, particularly in terms of communication and collaboration. Finally, is concluded that this project has a wide margin of continuous evolution, since it must always be pursued by the target population needs.

7. Acknowledgment

8. References

[1] Chu, S. K.-W., & Kennedy, D. M. (2011). Using online collaborative tools for groups to co-construct knowledge. Online Information Review, 35(4), 581-597.

[2] Murugesan, S. (2007). Understanding Web 2.0. IT professional, 9(4), 34-41.

[3] Bianchini, D., De Antonellis, V., & Melchiori, M. (2012). Collaborative mashup development in Enterprise 2.0. Paper presented at the Proceedings of the Fifth Interop-Vlab. It Workshop on Complexity of Systems, Complexity of Short Papers for Seminar IM.

[4] Bosch. (2013). Basic Presentation "Enabling Enterprise 2.0": Internal Publications.

[5] Wijaya, S., Spruit, M., Scheper, W., & Versendaal, J. (2011). Web 2.0-based webstrategies for three different types of organizations. Computers in Human Behavior, 27(4), 1399-1407.

[6] Seyed Jafar Hosseinipour, Bijan Ganji Jamehshooran, and Navid Reza Boroomandalipoor, "The Collaborative Advantage in Management", 2012 2nd International Conference on Management and Artificial Intelligence, IPEDR Vol.35 (2012), IACSIT Press, Singapore.

[7] Bititci, Umit S., Martinez, V., Albores, P. and Parung, J., 2004, "Creating and managing value in collaborative networks", International Journal of Physical Distribution & Logistics Management, Vol. 34 No. 3/4, pp. 251-268.

[8] Abraham, Stan, 2005, "Stretching strategic thinking" Journal of STRATEGY & LEADERSHIP, VOL. 33 NO. 5, pp. 5-12.

[9] Parung, Joniarto, and Bititci, Umit S., 2008, "A metric for collaborative networks", Business Process Management Journal Vol. 14 No. 5, pp. 654-674.

[10] Christopher, M.L. (1992), Logistics & Supply Chain Management, Pitman Publishing, London.

[11] Coughlan, P., Coghlan, D., Lombard, F., Brennan, L., McNichols, T., Nolan, R., 2003, "Managing collaborative relationships in a period of discontinuity" International Journal of Operations & Production management, Vol.23 No.10, Pp.1246-1259.

[12] Todeva, Emanuela and Knoke, David, 2005, "Strategic alliances and models of collaboration", Management Decision, Vol. 43 No. 1, pp. 123-148.

[13] Lehtonen, Tero, 2006, "Collaborative relationships infacility services", Leadership & Organization Development Journal Vol. 27 No. 6, pp. 449-464.

[14] Horvath, Laura, 2001, "collaboration: the key to value creation in supply chain management", Supply Chain Management: An International Journal, Vol.6, No.5, pp.205-207.

[15] Harland, Christine M., Lamming, Richard C. and Cousins, Paul D., 1999, "Developing the concept of supply strategy", International Journal of Operations & Production Management, Vol. 19 No. 7, pp. 650-673.

[16] Busi, Marco, and Bititci, Umit S., 2006, "Collaborative performance management: present gaps and future research", International Journal of Productivity and Performance Management, Vol. 55 No. 1, pp. 7-25.

[17] Don, T., & Anthony, W. (2006). Wikinomics: How mass collaboration changes everything. Portfolio, Penguin Group.

[18] Lytras, M. D., & García, R. (2008). Semantic Web applications: a framework for industry and business exploitation–What is needed for the adoption of the Semantic Web from the market and industry. International Journal of Knowledge and Learning, 4(1), 93-108.

[19] Fuchs-Kittowski, F., Klassen, N., Faust, D., & Einhaus, J. (2009). A comparative study on the use of Web 2.0 in enterprises. Paper presented at the Proceedings 9th International Conference on Knowledge Management and Knowledge Technologies, Graz.

[20] Hoegg, R., Martignoni, R., Meckel, M., & Stanoevska-Slabeva, K. (2006). Overview of business models for Web 2.0 communities. Proceedings of GeNeMe, 2006, 23-37.

[21] Andriole, S. J. (2010). Business impact of Web 2.0 technologies. Communications of the ACM, 53(12), 67-79.

[22] Eales-Reynolds, L.-J., Gillham, D., Grech, C., Clarke, C., & Cornell, J. (2012). A study of the development of critical thinking skills using an innovative web 2.0 tool. Nurse education today, 32(7), 752-756.

[23] McAfee, A. (2006a). Enterprise 2.0: The dawn of emergent collaboration. MIT Sloan management review, 47(3), 21-28.

[24] Ramírez-Medina, J. A. (2009). Enterprise 2.0 readiness index. Paper presented at the Management of Engineering & Technology, 2009. PICMET 2009. Portland International Conference on.

[25] Bin Husin, M. H., & Swatman, P. M. (2010). Removing the barriers to Enterprise 2.0. Paper presented at the Technology and Society (ISTAS), 2010 IEEE International Symposium on.

[26] Rangaswami, M. R. (2006). The Birth of Enterprise 2.0 (S. H. Group Ed.).

[27] Consoli, D. (2013). A Conceptual Model to Implement an Interactive and Collaborative Enterprise 2.0. Informatica Economica, 17(3).

[28] Louw, R., & Mtsweni, J. (2013). The quest towards a winning Enterprise 2.0 collaboration technology adoption strategy. International Journal of Advanced Computer Science & Applications, 4(6).

[29] McAfee, A. (2006b). Evangelizing in the empty quarter. The Business Impact of IT:Worldpress.

[30] Chowdhury, S. (2002). Design for six sigma: Financial Times Prentice Hall.

[31] Hahn, G. J., Doganaksoy, N., & Hoerl, R. (2000). The evolution of six sigma. Quality Engineering, 12(3), 317-326.

[32] Yang, K. (2005). Design for Six Sigma for Service: McGraw-Hill Education.