The Impact of Collaboration in the Business Performance Perception: A Study on the Influencing Factors

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Abstract--**Collaboration is gaining importance, especially those in which there is the participation of external individuals or groups in the innovation process both in the academy and in companies. However, measuring the impact of collaboration on business performance is not a trivial task. Particularly if it is considered that business performance should be measured through not only accounting measures but on a wider range of factors like project efficiency, impact on the internal team, preparation for the future, among others. This paper investigates the different aspects that affect the perception of improvements in the business performance due to collaboration. Companies that are using collaboration platforms as a new business approach were interviewed, analyzing the collaboration purpose, Information Technology (IT) infrastructure and the user acceptance of IT resources. Results show the relationship among these factors, and how they influence the business performance perception.**

I. INTRODUCTION

The rapid progress of the social media, the increase of connected people through internet, the emergence of collaboration platforms and the evolution of the data analysis capacity are some of the aspects that are changing the way companies structure their business. In the actual market scenario, few are the companies that are able to rely only in their own internal resources to innovate and keep the pace in the competitive environment [29, 35].

Collaboration with external entities has become a powerful means of achieving established objectives in a more flexible, wider and rapid way. In the literature, collaboration is usually associated to new product development [9, 21, 25, 33]. However, not all collaboration leads to results related to the development of new products. Some type of collaboration might be related to the increase of the perceived value of one brand, as a result of creating the opportunity for customers to participate in discussion forums or communities.

To measure the business performance in this context is not an easy task. Collaboration results, as it occurs with innovation, is sometimes impossible to quantify and measure by traditional indicators, since it involves ideas, learning, knowledge building, competences and capabilities, aspects that are difficult to measure in a direct way [32]. According to Shenhar and Dvir [31], performance might be related also to the perception of a project success, analyzing five dimensions: project efficiency, customer impact, team impact, business direct success and future preparation. Another point, according to Venkatesh et al [38], to adopt a technology to improve performance, it should in first place, be accepted by the users. The performance and satisfaction resulting from the usage of an information system depend largely on the user acceptance of the particular system or platform.

Taking this into account, this paper analyses how the collaboration activity can improve the perception about the business performance, considering the influencing factors like IT infrastructure and user acceptance.

In the next section is presented a literature review about collaboration, information technology and user acceptance of new technology theories that underpin the present research.

II. LITERATURE REVIEW

A. Collaboration

In the actual dynamic business environment, firms are confronted with environmental changes that requires a new way to elaborate their business. Advances in technology, the internet, technology convergence and the spread of on-line communities are changing the way customers build their relationship with companies. The old structure, where the knowledge and the production capability were inside the four walls is increasingly changing to a new and open one. The knowledge is spread around the globe and in many cases, the production is based on collaboration communities [34, 35, 42].

According to Wirtz *et al.* [42], users in a Web 2.0 environment develop a collaborative relationship among them and with companies. Firms that want to remain competitive have to continuously develop and adapt their business models, considering the increased pervasiveness of social networks and relevance of user-generated content. In this environment, four factors are fundamental: social networking, interaction orientation; personalization/customization and user-added value, which are briefly described below:

- *Social networking*: refers to the human online interactions, usually built around some common objectives (relationship, business, tasks, evaluations, etc), and it is associated with a set of four sub-factors: social identity (who is and to where he belongs); social trust (confidence among the participants); virtual word-of-mouth and the increasing consumer power.
- *Interaction orientation*: refers to the firm´s ability to manage the increasing customer demands for a better and more significant relationship. This interaction orientation is manifested in four aspects: customer centricity; interaction configuration (what information are exchanged); customer response and cooperative value generation (ability to integrate customers into business processes).

- *Customization and personalization*: this aspect has been discussed for a long time, but the traditional view needs to be extended to the Web 2.0 environment. Three aspects have to be considered: personal customization; group customization and social customization.
- *User-added value*: probably the most important aspect been debated when a collaborative environment is considered. Important aspects to be considered are: user-generated content; user-generated creativity; user-generated innovation and sources of revenue.

Collaboration is the collective knowledge creation. The more companies develop their absorptive capacity better will be the results of this collaboration [8, 23]. Its focus might be internal collaboration or external collaboration. In the internal collaboration, workers and partners of one specific firm, but from different locations are virtually connected by technology means, in order to execute a task together. The participants are previously notified, there is a clear objective, a hierarchy and a process is established [7]. When the collaboration occurs with the external environment, individuals from outside the firm participate, sharing their knowledge to leverage innovation in the companies. In some cases, the participation might be directed by a firm, as it is the case of contests. However, even in these cases, the number, the profile of the participants and the outcomes are unknown. Collaboration in the open modality can embrace since idea generation until the production and commercialization of a new product or technology and can be operationalized through different ways. Three of these ways is described in this work – co-creation, open innovation and innovation accelerators [4, 13].

***Collaboration through co-creation*:**

The term co-creation was first used by Kambil *et al*. [20] as the value co-creation for customers. Consumers in co-creation plays a central role in value creation as collaborators or co-developers. Zhang and Chen [44] in their work mention that in co-creation, firms have to start to consider the consumer as part of their production and innovation process. The co-creation can be sponsored, when participants engage themselves in a co-creation activity started by a company to achieve some goal; or it can be autonomous, when individuals produce something, marketable or not, in a voluntary way, even when they use a company´s collaborative platforms.

Collaboration through open innovation

Open innovation is about enabling the innovation process, by sharing ideas, processes and technology with external entities aiming accelerate growth and differentiation. Companies those who do not work in a more open and collaborative way, probably will likely face serious competitive disadvantages, including running the risk of losing the ability to innovate in the long run [6, 14].

Some benefits of open innovation can be seen in the Table 1.

Notwithstanding all the positive perception around open innovation, there are still gaps about the understanding of how to operationalize the concepts. Also there is a lack of effective measurement systems that could evaluate the open *versus* closed approach [19]. Other barriers for implementing open innovation such as the inherent complexity of organizing a variety of partners which may use different governance modes, culture and the not-invented-here syndrome are also pointed among the impediments factors [6, 22, 37].

Piller and Ihl [28] proposed a conceptual typology of possible open innovation settings with three characteristics. Each one of them define the customer participation and the firm's process:

- the degree of freedom: is related to the tasks to be assigned to customers;
- the degree of collaboration: determines if the relationship will be more dyadic (single customer, individualized) or in network (collective participation); and
- the progress of the new product development (NPD): specifys if the customer will participate in the early stages of the innovation process (ideation, concept) or in the back end stages (design, testing).

TABLE 1. BENEFITS OF OPEN INNOVATION

Open innovation benefits	
Benefits	***Authors***
Increase the ability to innovate and reduce costs and the time-to-market	Enkel et al. [14]
Consists in a powerful framework encompassing the generation, capture and the use of external intellectual property inside the company.	West; Gallagher [41]
Increases the return of investments in innovation activities and in the intellectual capital.	Chesbrough [5]
Fosters the creation of knowledge communities, where the knowledge is freely shared among participants, without the usual limitation of the hierarchy. These communities are fertile places where companies can submit and also identify new ideas and technologies.	Fleming; Waguespack [15]
Projects risks and uncertainties are reduced once parts of the innovation process are delegated to external participants. This can occur in any of the innovation phases, that is to say, idea generation, selection, development and market.	Piller, Ihl [28] and Thomke; Hippel [36]
Open up the opportunity to access external expertise and technology competence, reducing development time, costs and risk.	Howells et al. [18]

This typology helps in the planning stages of the open innovation initiative, helping to clarify the roles customers will be playing and what are the expected outcomes in the end. Knowledge dispersion is another issue that has to be faced from companies that plan to implement an open innovation initiative. The main objective of open innovation is to identify and collect external knowledge, new to the company, to complement their internal capabilities. However, this knowledge is not concentrated in a repository, available and integrated, expecting to be accessed by the companies [26].

Collaboration through an innovation accelerator

Noticing the difficulty some companies are facing in implementing the open innovation strategy, some firms are emerging in the marketplace operating as facilitators or mediators by building virtual bridges between companies and customers. Basically, these intermediaries assist the companies to fill the gaps in the execution capabilities and the necessary knowledge to make the open innovation initiative more effective [30]. In the literature, there is a wide range of denominations for these companies, such as, brokers [3]that act as connectors between companies and customers; infomediaries [16] that through discussion foruns and communities add information related to companies and products; innomediaries [30] that concentrate on aggregating and disseminating customer-generated knowledge; and accelerators [12] among others. These companies can operate in only one of these characteristics or in a combination of them.

According to Sawhney [30], a single company can perform as infomediaries and innomediaries. The authors identify three mechanisms that innomediaries can have (Table 2)

B. IT role in Collaboration

IT in collaboration plays a central role as it allows that the outside environment can be connected to the firm´s inside environment. The technical architecture have to be prepared to be adaptable and flexible in order to support the constant changes in the marketplace and in the customer demands [39]. Prahalad and Krishnan [29] say that internal processes are the link between the organization strategies, the business model and the operations. These internal processes are influenced by the social architecture (organizational structure and the management model) and the technical architecture.

As seen in Figure 1, technical architecture can be divided in four levels – the first two lower levels are standard for the major companies and are focused in the operations efficiency and do not assure competitive differentiation. The others two upper levels are the ones that give differentiation, and are related to specific applications and business interfaces that allow the interaction with customers, suppliers, partners and stakeholders [29].

The importance of the competencies related to IT that allow the leverage of new business model, processes, relationships and even a whole new business scope is also cited by other authors like Anghern [1], McCarthy [24] and Helms *et al*. [17]. Ordanini and Rubera [27] mention in their work that besides internal technical resources, a company should be surrounded by skilled partners that quickly can give the functions and flexibility needed.

TABLE 2 – OPERATION MODES OF AN OPEN INNOVATION INTERMEDIARY COMPANY
(Source: adapted from [30])

	Customer network operator	***Customer community operator***	***Innovation marketplace operator***
Characteristics	Similar to customer forums that are realized by research companies. They recruit and keep a customer network, giving access to specific segments of these customer to companies.	Specialized in connecting companies to individuals in customer communities based in common interests.	Based on the concept of many to many. They connect groups of companies to groups of individuals.
Function	To build networks of customers and provide access to specific segments	Build and operate online communities for specific interests, lifestyles or products.	Create marketplaces for innovation between buyers and sellers of innovation
Source and type of knowledge	From individuals (mostly of them in the explicit mode)	Socially generated within communities (explicit and tacit)	Specialized expertise from innovative customers and researchers
Supported stages in the innovation process	Concept testing Test marketing	Ideation Product design	Discovery Ideation

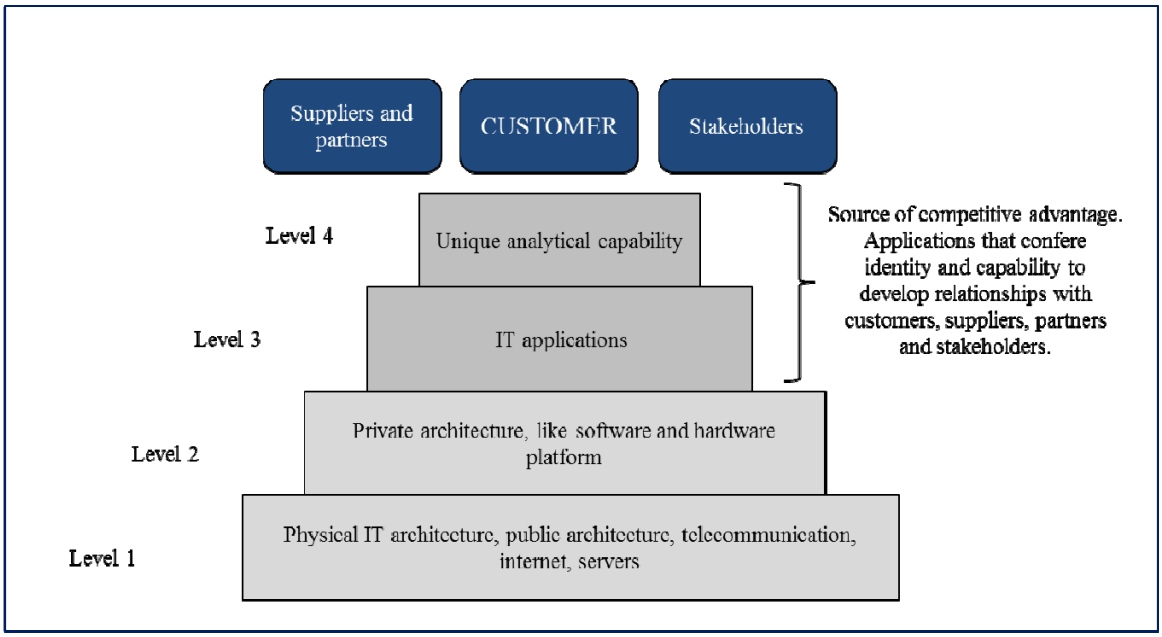

Figure 1– Technical architecture (adapted from [29])

C. User acceptance of a new technology

IT resources and infrastructure enable collaboration. However, if the users have issues in using the technology, it is not possible to collect all the benefits collaboration can bring to firms. Issues in user acceptance of a new technology appears to be one of the key factors that leads to a lower perception of performance of new systems adopted by companies. The utility perception and the facility of use are determining factors for the adoption or not of a new technology. People tends to use or not a new technology as they start to believe in the benefits it will bring to them and that it will help them to perform better in their works. Even if the utility perception is good, if they feel that they will need to spend many efforts to learn how to use it, it tends to be underused [10, 11].

Based on the perception that the user acceptance of a new technology is a determining factor for any business performance, after analyzing the main technology acceptance models found in the literature, Venkatesh *et al*. [38] presented a Unified Theory of Acceptance and Use of Technology (UTAUT). The basic concept underlying the user acceptance models is that the individual reactions to using information technology leads to the intentions to use it that reflects in the actual use of information technology (Figure 2).

Four influencing factors were identified that could change the user willingness to adopt a new technology: performance expectancy, effort expectancy, social influence and facilitating conditions.

- Performance expectancy: refers to the reliance level an individual has that if he uses the technology, the performance in his work will be better. This factor can be influenced by the perception of utility, extrinsic motivation, job-fit, relative advantage and outcome expectations.
- Effort expectancy: is associated to the degree if ease of use of the system and the influencers are the perceived ease of use, complexity and ease of use.
- Social influence: refers to the perception an individual has that important others believe the system should be used. Subjective norm, social factors and image can influence this factor.

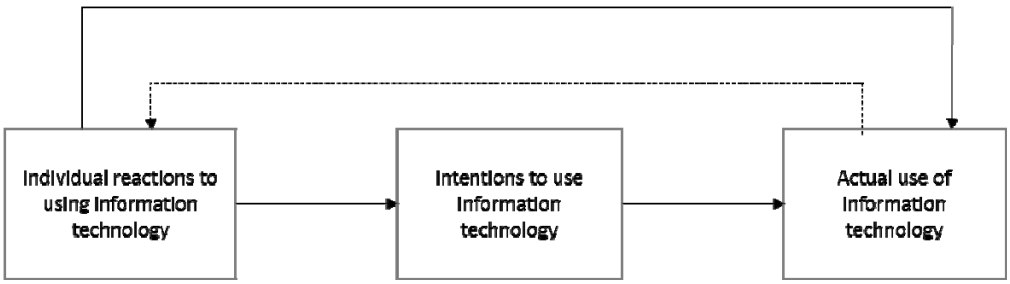

Figure 2. Basic concept underlying user acceptance models [38].

- Facilitating conditions: defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. This factor can be influenced by the perceived behavioral control, facilitating conditions and compatibility.

D. Business Performance Perception

In this paper, perception of business performance refers to the achieved results from the collaborative activity, and it might have different outcomes depending on the nature of the initial objectives. Shenhar and Dvir [31] define five dimensions to measure performance: project efficiency, customer impact, team impact, business direct success and future preparation. For this study, only the dimensions of project efficiency and future preparation were considered.

Although project efficiency (or the accomplishment of the established objectives) is a short-time method to measure performance (was the project completed on time? Did it achieve the cost target? was it done according to what was planned?), it is still an effective way to manage performance. Because of the increase of the competition and the shortening of the products and technology life-cycle, more and more organizations measure their efficiency and performance through specific projects conducted either in-house or in collaboration with outside organizations [2].

The other aspect to measure performance perception is how well collaboration activities contribute for the firm´s preparation for the future. Collaboration with external entities means that in many times, new technology or ideas will be generated, but not necessarily will be used on that moment. There are many collaboration initiatives whose goal is only the idea generation for the future. Thus, measuring how well one project will help an organization to prepare their infrastructure for the future and how they create new opportunities can bring interesting outcomes.

III. METHODOLOGICAL APPROACH

A qualitative research approach was adopted and developed through a case study, in two companies from different industries. According to authors like Voss *et al.*[40] and Yin [43], a case study is a valid approach where the aim is to understand a phenomenon that occurs within a context and the researcher have no control upon the events. Also, it is a valid approach when the research seeks to answer questions like "why have they been made?" or "How have they been implemented?". For the present research it is suitable once the main objective is to investigate how collaboration improve the perception about business performance, when considering influencing factors like IT and user acceptance. To achieve the results, the researches were carried out through semi-structured interviews with IT and marketing directors and managers. The script used as data collection instrument was the same for all two companies and was constructed to allow the identification of the most important points and the link between the theory and the practice.

Section I – Establishing general information about the company

Section II – Concepts collaboration in the companies (how collaboration techniques are been used in companies) and how it improves the perception of business performance.

The propositions for this study can be stated as below:

P1. Collaboration activities help companies to remain competitive in the highly changing environment as it is in today´s marketplace. By collaborating with external entities, a firm can increase their innovation capability [4, 35].

P2. User acceptance to a new technology might influence the collaboration activity, impacting the business performance perception [38].

P3. Aspects measured in the project efficiency and preparation for the future might be used as an indicator of increase on business performance perception [31]

IV. CASES AND RESULTS

The case study was conducted in three different companies that are using collaboration concepts in their operations. The Company A is a large Brazilian residential construction and real estate company, Company B is a multinational e-commerce company, specialized in offering customized products for their customers; and Company C is a digital technology company.

Company A

Over the past four years, significant strategic changes are occurring in the real estate market, especially in large home builders, regarding to the use of social media as a channel of relationship with customers and stakeholders. Driven by the rise of the economy and the emergence of a new consumer that uses the Internet as the universe of information and opinions, these companies saw in the social media a great opportunity to accelerate innovation and information diffusion.

In 2011, this company launched an action on Facebook that allowed users to participate in the creation of a new building. It was asked to the public to submit suggestions of names for the new building; ideas for sustainability, apartments, leisure and technology; and other free ideas that could innovate this business. The goal was to engage future and actual customers since the beginning of the project. In addition, the public could help the marketing campaign creation, contributing with their suggestions.

All the submitted ideas were analyzed by a group of the firm´s professionals and they were responsible for the selection and final choice of the best ones. After this period, the company tested the architectural feasibility, technical and practice of some of the ideas shared by the participants. In the middle of 2013, the new project, entirely built using consumer ideas were approved to be constructed.

Company B

This is an e-Commerce company, created to operate only in the virtual space and to be globally present. Their objective is to sell customized products with creations made by customers. 60% of their commercialized product ideas and designs are created and submitted by users. Only 40% of the commercialized products and designs come from well know labels like Marvel, Disney, Hallmark, and so on.

One of the challenges faced by the company is to keep their web site constantly offering new products and ideas for the market. Their headcount in marketing and new product creation is very low, so the way to keep new products and ideas in the pipeline is to relay on constant customer submissions. The way they found to implement this was first to assure the usability of their web site by constantly investigating the issues raised and keeping an open conversation with users. Another way was to create and maintain a community of co-creators around the world that can sustain their innovation capability and assure their unique differentiation in the marketplace. Through customer collaboration, Company B is capable to keep a continuous repository for new ideas and create an emotional linkage with the customers. Many of the co-creators have a considerable part of their incomes coming from the company B´s sales.

Company C

Company C is a holding of eight different companies, all of them focused in offering technological solutions like Competitive Intelligence, Social Media, Games, CRM/ERP, e-learning among others, for their customers. When the company was created about seventeen years ago, they did not created a brand that could link all the eight companies. In 2013 they decided to launch a contest through a collaborative platform in order to get ideas for a new brand. Collaborating with an innovation accelerator company they challenged design universities students and young entrepreneurs (up to 30 years old) to submit a complete project of a brand creation. In two months, 49 new brand ideas were submitted and the concepts were analyzed and voted internally from the different people working in Company C.

The Company C´s open innovation initiative result was that they were able to get a fully new brand, all the brand instructions and the communication plan ready in just two months. They achieved this result in a much quicker time and lower costs than if they had done this through a traditional advertising company. Now, almost one year later, the Company C brand is fully implemented and recognized in the market as a digital company.

V. CASE ANALYSIS

This study analyzed three different collaboration cases. Starting with Company A, their collaboration strategy followed a more open innovation trend and managed to deal with success with the four aspects Wirtz *et al.* [42] mention that is important to build a new strategy in the web 2.0 environment: Social networking, interaction orientation, customization and personalization and user-added value. Facebook is a very popular and user friendly social media. There is no technological difficulties in using it and users have fun participating on a collaborative activity because of the many interactions they have. Looking at the influencers used in the UTAUT model of Venkatesh *et al.* [38], all the influencing factor that could interfere in the individual intention to use technology were overcome. Managers of Company A state that this collaboration project helped them to achieve their goal of having consumers participating in a building project. Participants submitted more than 3,000 new ideas from which part of them were used to project the new building. However, there are still many good and innovative new ideas that is part now of their "shelf" of new building ideas.

Company B follows the co-creation model of collaboration. Regarding to the aspects mentioned by Wirtz *et al* [42], as the same way as Company A, all of the four aspects can be observed. However, the social networking aspect is more focused to engage users in a loyalty relationship with the company and not so to promote interaction among participants. This community is a communication chanel in wich users feel that Company B listen to what they are saying, try to solve usability issues and is interested in helping them in the task of submitting new ideas. The relationship between collaborators and the company follow a more dyadic model, probably because once users sell their creation through firm´s platform, sometimes, they become competitors. The user acceptance to a new technology might represent a barrier in some cases, especially in regions where the technology is not so mature. To be able to expand their operation for more than 16 countries, Company C maintain a strong support staff with knowledge in the language and country characteristics to help in the task of using the platform. These efforts are key to maintain a 100% virtual operation model and achieve their strategy to act globally.

Company C decided to explore the power and the knowledge of the crowd. Once they were a holding of eight companies, the tentative to create a brand by themselves would be a very tough task. So they decided to present the challenge to persons outside the company to bring them new ideas and concepts. Although they are a digital company, they decided to use an innovation accelerator company to run the initiative, assuring by this way the transparency and the fairness. Another point considered was the technological aspect. Once they planned to launch a punctual challenge, they did not want to risk the success of the project because of issues in the usability. Choosing a company that has a large and proven experience in launching this kind of contests, they did not have to deal with technology acceptance issues. The facility to connect the right public (main Universities and young entrepreneurs) to their contest was also considered.

In all the cases, collaboration represents a breakthrough strategy in their operation. However, in the company A, it is

TABLE 3. PROPOSITIONS ANALYSIS

Proposition	Discussion	Result
P1. Collaboration activities help companies to remain competitive in the highly changing environment as it is in today´s marketplace. By collaborating with external entities, a firm can increase their innovation capability [4, 35].	Due to the rapid changes in the market, companies can not rely only in their internal structure to innovate. In all the three cases, by opening their needs to the crowd, they could achieve quicker responses and answers for their questions.	Accept
P2. User acceptance to a new technology might influence the collaboration activity, impacting the business performance perception [38].	All the companies dispensed special attention for the technology acceptance aspect. Company A decided to adopt the Facebook as their collaboration platform. The aimed public for their initiative was very heterogeneous in terms of age, economic level, region, gender, etc, so, choosing a popular social media as their collaboration platform was key to achieve the objective. In the case of Company B, they understand that the success and increase in number of submission depend on the facilitating conditions that users find while using the platform. Finally, Company C decided to choose an external company to run their collaboration initiative because they understood that this external company were already known by the public they were aiming.	Accept
P3. Aspects measured in the project efficiency and preparation for the future might be used as an indicator of increase on business performance perception [31]	In all the cases, both efficiency and preparation for the future were cited as a differentiator among the benefits of running a collaborative initiative.	Accept

an emerging strategy while in the company B it was created to operate in a collaborative environment, presenting better and more immediate results. For company C, the collaboration represented an opportunity to experiment the benefits of open innovation like time and cost savings.

Although differences in the main motivator to adopt collaboration in their strategies, for all the studied cases, the aspect of preparation for the future was very important. As cited by Shenhar and Dvir [31], preparation for the future is a benefit that needs time to measure> Therefore at the moment of this reserach were developed, the companies had no figures to prove the benefits. However, all three say that due to the initiative, they have new ideas and products in the pipeline that could help their operation in the next years.

It is possible to describe the following, regarding to the propositions stated for this study (Table 3).

VI. CONCLUSION

From the cases studies, it is possible to conclude that collaboration results influence the business performance perception. It was investigated three different collaboration models. The motivators to adopt the initiative, technological aspects and aimed public were different among the cases, but in all of them, two aspects are cited in common – the project efficiency and the preparation for the future. Companies cite that these two aspects are one of the most significant. among all the benefits collaboration can bring to them The results also confirm the three propositions that were stated for this study.

Collaboration techniques are growingly considered in the companies strategies. With the advances in IT and the increase of web applications' capabilities over the past two decades, the alternatives companies can choose to run a collaboration initiative is flourishing. Literature revision and the studied cases show also that it is important to revisit companies that have adopted the collaboration strategy in the first years of its appearance, in order to try to establish a better method to quantify the collaboration benefits, mainly those linked to the preparation for the future aspects. No generalization can be done based only in three case studies. However, considering the growth tendency and the IT evolution, studies like this could the understanding on how external factors can influence the collaborative activity and how to measure it in a more efficient way.

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REFERENCES

[1] Angehrn, A., "Designing Mature Internet Business Strategies: The ICDT Model," *European Management Journal,* vol. 15, pp. 361-369, 1997.

[2] Barrows, E. and A. Neely, *Managing Performance in Turbulent Times: Analytics and Insight*: Wiley, 2011.

[3] Bessant, J. and H. Rush, "Building bridges for innovation: the role of consultants in technology transfer," *Research Policy,* vol. 24, pp. 97-114, 1995.

[4] Chesbrough, H., "Managing open innovation," *Research-Technology Management,* vol. 47, pp. 23-26, Jan-Feb 2004.

[5] Chesbrough, H., *Open Innovation: The Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Prress, 2003.

[6] Chesbrough, H., *Open Innovation: The new imperative for creating and profiting from technology*: Harvard Business Press, 2006.

[7] Chudoba, K. M., E. Wynn, M. Lu, and M. B. Watson-Manheim, "How virtual are we? Measuring virtuality and understanding its impact in a global organization," *Information Systems Journal,* vol. 15, 2005.

[8] Cohen, W. M. and D. A. Levinthal, "A new perspective on learning and innovation," *Administrative Science Quarterly,* vol. 35, pp. 128-152, 1990.

[9] Dahan, E. and J. R. Hauser, "The Virtual Customer," *Journal of Product Innovation Management,* vol. 19, pp. 332-354, 2002.

[10] Davis, F. D., "Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology," *Mis Quarterly,* vol. 13, pp. 319-340, 1989.

[11] Davis, F. D., "User Acceptance of Information Technology>: System Characteristics, User Perceptions and Behavioral Impacts," *International Journal of Man-Machine Studies,* vol. 38, pp. 475-487, 1993.

[12] Diener, K. and F. T. Piller, "The market for open innovation," RWTH-TIM Group, AACHEN University2010.

[13] Dodgson, M., D. Gann, and A. Salter, "The role of technology in the shift towards open innovation: the case of Procter & Gamble," *R&D Management,* vol. 36, pp. 333-346, 2006.

[14] Enkel, E., O. Gassmann, and H. Chesbrough, "Open R&D and open innovation: exploring the phenomenon," *R & D Management,* vol. 39, pp. 311-316, Sep 2009.

[15] Fleming, L. and D. M. Waguespack, "Brokerage, boundary spanning, and leadership in open innovation communities," *Organization Science,* vol. 18, pp. 165-180, Mar-Apr 2007.

[16] Hagel, J. and J. Rayport, "The coming battle for customer information," *Harvard Business Review,* vol. 75, 1997.

[17] Helms, M. M., M. Ahmadi, W. J. K. Jih, and L. P. Ettkin, "Technologies in support of mass customization strategy: Exploring the linkages between e-commerce and knowledge management," *Computers in Industry,* vol. 59, pp. 351-363, 2008.

[18] Howells, J., D. Gagliardi, and K. Malik, "The growth and management of R&D outsourcing: evidence from uk pharmaceuticals.," *R&D Management,* vol. 38, pp. 205-219, 2008.

[19] Huizingh, E. K. R. E., "Open innovation: State of the art and future perspectives," *Technovation,* vol. 31, pp. 2-9, Jan 2011.

[20] Kambil, A., G. B. Friesen, and A. Sundaram, "Co-creation: A new source of value " *Outlook,* vol. 2, 1999.

[21] Kirschbaum, R., "Open innovation in practice," *Research-Technology Management,* vol. 48, pp. 24-28, 2005.

[22] Lichtenthaler, U., "Open Innovation in Practice: An Analysis of Strategic Approaches to Technology Transactions," *Engineering Management, IEEE Transactions on,* vol. 55, pp. 148-157, 2008.

[23] Lichtenthaler, U., "Open innovation: Past research, current debates, and future directions," *Academy of Management Perspectives,* vol. 25, 2011.

[24] McCarthy I. P., "Special issue editorial: the what, why and how of mass customization," *Production, Planning & Control,* vol. 15, pp. 347-351, 2004.

[25] Nambisan, S., "Designing virtual customer environments for new produt development: Toward Theory," *Academy of Management Review,* vol. 27, pp. 392-413, 2002.

[26] O'Reilly, P. and P. Finnegan, "Intermediaries in inter-organisational networks: building a theory of electronic marketplace performance," *European Journal of Information Systems,* vol. 19, pp. 462-480, Aug 2010.

[27] Ordanini, A. and G. Rubera, "A theoretical framework and empirical analysis on e-commerce.," *Information & Management,* vol. 47, pp. 60-67, 2010.

[28] Piller, F. and C. Ihl, "Open Innovation with Customers. Foundations, Competences and International Trends," RWTH Aachen University, Aachen2009.

[29] Prahalad, C. K. and M. S. Krishnan , Eds., *A nova era da inovação*. São Paulo: Ed. Campus, 2008.

[30] Sawhney, M., E. Prandelli, and G. Verona, "The Power of Innomediation," *Mit Sloan Management Review,* vol. 44, pp. 77-82, Winter2003 2003.

[31] Shenhar, A. J. and D. Dvir, *Reinventing Project Management: The Diamond Approach To Successful Growth And Innovation*: Harvard Business Review Press, 2013.

[32] Smith, K. H., "Measuring Innovation," in *The Oxford Handbook of Innovation*, ed New York: Oxford University Press, 2005.

[33] Swink, M., "Building collaborative innovation capability," *Research Technology Management,* vol. 49, 2006.

[34] Tapscott, D., "Rethinking strategy in a networked world," *Strategy + Business,* vol. 24, 2001.

[35] Tapscott, D. and A. D. Williams, *Wikinomics - Como a colaboração em massa pode mudar o seu negócio*: Ed. Nova Fronteira, 2007.

[36] Thomke, S. and E. von Hippel, "Customers as innovators - A new way to create value," *Harvard Business Review,* vol. 80, pp. 74-+, Apr 2002.

[37] van de Vrande, V., C. Lemmens, and W. Vanhaverbeke, "Choosing governance modes for external technology sourcing," *R&D Management,* vol. 36, 2006.

[38] Venkatesh, V., M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information Technology: Toward a Unified View," *Mis Quarterly,* vol. 27, pp. 425-478, 2003.

[39] Venkatraman, N. and C. Henderson, "Real Strategies for Virtual Organization," *Sloan Management Review,* vol. 40, 1998.

[40] Voss, C., N. Tsikriktsis, and M. Frohlich, "Case research in operations management," *International Journal of Operations & Production Management,* vol. 22, pp. 195-219, 2002.

[41] West, J. and S. Gallagher, "Challenges of open innovation: the paradox of firm investment in open-source software," *R&D Management,* vol. 36, 2006.

[42] Wirtz, B. W., O. Schilke, and S. Ullrich, "Strategic Development of Business Models: Implications of the Web 2.0 for Creating Value on the Internet," *Long Range Planning,* vol. 43, pp. 272-290, 2010.

[43] Yin, R. K., *Estudo de Caso: Planejamento e Métodos*, 3a ed.: Bookman, 2005.

[44] Zhang, X. and R. Q. Chen, "Examining the mechanism of the value co-creation with customers," *International Journal of Production Economics,* vol. 116, pp. 242-250, Dec 2008.