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9P. Development of a Virtual Business Community in an Agricultural Cluster

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Abstract

Virtual business communities (VBC) are social aggregations, based on Information and Communication Technology (ICT) platforms, created to sustain activities of agents of a specific industry or sector that are economically and socially linked. To study the main challenges in creating a VBC to support a not-well-structured agricultural cluster, we developed and tested an ICT platform and analyzed its implementation process. The design research method grounded this process. The main result of this work in-progress is the analysis of challenges faced on the community level and on the economic agents' level regarding the development of an ICT platform in order to build a VBC.

Keywords

Business community; information and communication technology; design research; inter-organizational change; agricultural cluster.

1. Introduction

Performing research on the impacts of Information and Communication Technology (ICT) on agricultural clusters in developing countries was recommended by Banker et al. (2011). These authors argue that ICT has the potential to affect the lives of millions of people and that its impacts have been inadequately examined by researchers.

Clusters are socioeconomic entities characterized by geographic concentrations of interconnected economic agents (producers, suppliers, service providers, and institutions), working together in economically and socially linked activities (Morosini, 2004; Bathelt & Glückler, 2011). The physical proximity may favour commonalities, increasing collective efficiency and knowledge exchange.

Agricultural clusters are formed by economic agents running agricultural activities in geographic locations without precise boundaries. Brazilian agricultural economic agents are frequently small-scaled and family based - 48% of rural properties are smaller than 10 ha. (IBGE, 2009). As a consequence, some agricultural clusters are not well structured organizations, as there is no clear comprehension about how its agents are organized, interact and perform business.

Studies about market organizations (in particular commodity trade platforms) focused on the impact of ICT on business, including lower transaction costs for buyers and sellers, seven-

day-week operations, better price and product information, better visibility of the pricing process, disintermediation, and a more streamlined supply chain (Banker et al. 2011; Kambil & Van Heck, 1998). In order to study new formats of market organizations and clusters, we adopted the concept of Virtual Business Community (VBC) presented by Markus and Loebbecke (2013), which refers to a network of economic agents, including buyers, sellers, suppliers, financial agents and R&D institutions, located in several geographical areas, supported by an ICT platform in order to structure and increase interactions and to develop virtual proximity. These ICT platforms are supported by applications of mobile telephony, broadband, and multiple computing platforms and devices that enable information and services tailored to specific needs to develop new formats of market organizations (Franco et al 2011; Begole, 2011).

Economy and ICT based literature mainly focus on technology and focus on the benefits obtained with clusters, market organizations and VBC. However, current literature does not emphasize the development process and the challenges faced to obtain these benefits. Therefore our research goal is to identify the main challenges in developing a VBC to support a not well structured cluster. In order to attain this goal, we developed and tested an ICT platform and we analyzed its implementation process. This platform provides information services, communication and business transactions available anywhere (across different computing platforms) at any time (allowing synchronous and asynchronous interactions). This platform is also sensitive to users' context (location, information needs, time constraints, user profiles) (Franco et al 2011).

Since 2011, we are working on the development of a VBC for a not well structured agricultural cluster of flower growers in Southern Brazil. The idea is to bring together buyers and sellers to allow collaboration and the creation of business alliances between firms, in order to achieve a better collective efficiency through joint market demands, shared costs and logistics. The services of the VBC were developed collaboratively with intensive user participation, founded on the design research method (Vaishnavi & Kuechler, 2004), that also allows systematic knowledge building. As the research is ongoing, we intend to analyze the challenges concerning the development of an ICT platform in order to build a VBC.

In the remainder of this paper we present the theoretical background underpinning our study, we describe the research method adopted, the results already obtained, and discussions and conclusions.

2. Theoretical Background

There are two main elements grounding our research VBC and inter-organizational change.

2.1 Virtual Business Communities

Virtual communities are social aggregations that emerge from the Net when a number of people carry on public discussions (or activities) in an interval long enough to form nets of personal relationships (Rheingold, 1993). Using this concept in the business sphere and relating it to market organizations, Markus and Loebbecke (2013) proposed the definition of business community (BC), as "the overlapping ecosystems of competing orchestrators in defined areas of business activities ...". Ecosystems are formed by a loose set of organizations engaged to produce and deliver products for a firm (or an institutional association) (Iansiti & Levien, 2004), which need to become proactive in developing mutually beneficial relationships (Moore, 1993). These communities need interoperability

and information exchanges and are supported by customizable or tailored digital platforms (Markus & Buy, 2012).

The success of a VBC, according to Spaulding (2010), depends on an attitude of contribution and on dedication of resources, in order to build a critical mass and to match community and business needs. Hashim et al. (2012) emphasized that this success relies on the willingness of the community members to be a part of the community and to continuously participate. Regarding ecosystems, Moore (1993) presented important questions concerning the success of these organizations: the existence of a structure of community leadership, and the requirement of “giving before getting” that members face at the start of the process of information and knowledge sharing.

If the economic agents of a BC (cluster) have a lack of shared knowledge about the (inter-) organizational structure and about how the cluster operates, and if there are few consolidated institutions and associations that enforce business and ethical rules, this socioeconomic entity can be characterized as not well structured. Berkowitz and Wolff (2000) define organizational structure as the framework of how economic agents are organized in terms of operating rules, distribution of work, and governance, giving members guidelines on how to proceed. These authors assume that an organization is not well structured if there is a weak knowledge about how the organization is put together, how it works, how members are accepted, how leadership is chosen and how decisions are made.

Although economic agents of a cluster prioritize their economic well-being, optimization does not fully determine their decisions. Networks of social and institutional relations, such as trustworthiness and distribution of knowledge also influence these decisions. In this context, the relational approach to economy (Bathelt & Glückler, 2011) offers interdisciplinary theoretical foundations covering economic, sociological and cultural perspectives. This approach focuses on processes, such as interactions and inter-organizational communication. It also relies on the ability of producing and distributing products and services on the market.

2.2 ICT enabled inter-organizational changes

VBC in this study refers to a cluster formed by economic agents – buyers, sellers, suppliers, financial agents and R&D institutions – (Morosini, 2004; Bathelt & Glückler, 2011), supported by a tailored ICT platform (Markus & Buy, 2012) that enhances virtual proximity and business processes. This VBC is not well structured (Berkowitz & Wolff, 2000).

ICT platforms provide data and business interoperability for interactions among economic agents of a BC (Markus & Buy, 2012). The platform’s development and the simultaneous structuration of the community depend on an intensive participation of their economic agents in order to change established interorganizational processes and the structure of the structure. The adoption of the platform transforms current business processes and turns personal interactions into virtual ones. Consequently, the usage of the platform may enhance information exchange between agents, fostering deeper relationships, and may also support the emergence of a structuration process of the community based on a collective knowledge structuration process, which is defined by Human and Provan (2000) as a legitimacy building process. This process encompasses a generalized perception that the activities and the structure of the community are desirable and appropriate, and it represents an important condition to the VBC consolidation. The legitimacy building process requires changes in the way interactions between the agents are performed, changes in how the new organizational

form is understood, and how this community is recognized by internal and external members of the community.

Kim et al. (2006) identified constraints to interorganizational change processes in networks. They called it network inertia, where inertia means a persistent resistance to change organizational ties previously developed. These constraints may be of internal nature – e.g. established routines, culture, and practices -, of external nature – e.g. market and production technologies, external legitimacy -, and might result from the position organization have in the community – e.g. status - and from the ties they have with others. Economic agent's inertia may appear when traditional clusters change to a VBC.

3. Research Method

We developed a VBC for an agricultural cluster. The agents of this cluster planned to increase collective efficiency with their products in order to obtain competitive gains, and showed to be motivated to participate on the VBC development process. This cluster is located in the South of Brazil, is not well structured, and its members (more than 200) are flower growers, suppliers, wholesalers, retailers, and representatives of governmental agencies and associations.

We adopted the design research method (Gregor & Hevner, 2013; Vaishnavi & Kuechler, 2004) in our research. This method allows a systematic knowledge building process through the development of an ICT artifact, supporting researchers to create a new artifact and to analyze its implementation. In our research, the artifact is an ICT platform to support the VBC. We complemented the design research stages with actions intended to validate the platform (Borenstein, 1998).

The research design we followed comprises five main stages:

- (1) **Problem awareness** – involves the understanding of how the cluster works and of what are the competitiveness factors that the use of a VBC can improve.
- (2) **Suggestions (including face validation)** – consists of a first try at designing and face validating the ICT platform which supports the community.
- (3) **Development (including user validation)** – involves the development of the prototype, its validation by users, and actions to structure the VBC such as definition of business processes and definition of governance structures.
- (4) **Evaluation (including field test validation)** – comprises the introduction of the artifact in the field, in order to evaluate the effects of its use. Before the Conclusion stage, the development process of the VBC may include, interactively, new cycles of Suggestions, Development and Evaluations.
- (5) **Conclusion** – indicates termination of project. It is time to assess and structure lessons learned and knowledge generated by the development and use of the ICT artifact, including operation improvement and theory.

We collected different types of secondary and primary data – reports, websites, supplier catalogues, semi-structured interviews, e-mails, observation notes. In order to manage this process, we organized a detailed research protocol, as well as data collection and data storage procedures. We also organized systematic notes concerning participants' needs and the actions we performed. Collected data was transcribed and coded by two members of the research team, and was analyzed adopting content analysis. Our content analysis was based on terms based on the literature review – communication, trust, cooperation, change,

leadership, “giving before getting”, etc. – and on terms which emerged from the field – for example apprehension, perceived value, elements of the business model. All information gathered was analyzed together in order to perform triangulation.

4. Results

The results are presented following the design stages above and are organized according the platform development process and the community structuration actions. The Development and the Evaluation stages are still in progress.

4.1 Problem Awareness

The project started at March 2011. We contacted agents of the flower growers’ cluster and we analyzed academic studies about the sector and the website of the most important association (AFLORI). A partnership with AFLORI was started which allowed researchers to interview representative informants to gather information.

The first step to develop the ICT **platform** consisted in identifying the main factors that affect business’ competitiveness in the cluster, in order to develop services that could enhance such factors. Based on a literature review, on 23 interviews with flower growers, suppliers, wholesalers, retailers, representatives of governmental agencies and associations, and based on meetings and on e-mails exchanged, Rigoni et al. (2013) developed a semi-structured questionnaire to assess cluster competitive factors. These competitiveness factors generated the first definitions of the ICT platform - a ubiquitous computing, information services concerning offer and demand of products, and communication devices to support interactions between members of the community – in order to enhance interaction.

4.2 Suggestions

Based on the competitiveness assessment of the cluster, we defined 21 information services of the **platform**. These services expressed the needs of members of the embryonic community. We grouped the services in four categories: external entities (market, suppliers, regulatory and legal information); supplies (human, production, transportation and other resources); training (technology, finance, market analysis, research and development) and business services (offer, demand, marketing and sell out). These services should enable collaboration and new forms of business. Implementing all of them would result in a highly complex platform and would demand a considerable amount of resources and time. To reduce this complexity we adopted an interactive and incremental design process.

To select the most important ICT services users could access first, we performed two meetings with members of the community. Two services had been chosen: demand of products - quantities and location -, and offer of products to all members of the VBC, reducing the time currently spent to sell their products, most of them of perishable nature. One member commented, “If I’m aware of where the demand is, I have the opportunity to attend it even if I need to buy products from my competitors to supply urgent demands”.

Since the cluster is not well structured, there is no consolidated neither legitimate institution to lead the process of defining product standards and business rules and to ensure governance in the **community**. AFLORI, a producer association and our main partner in the development process, explained that they were not prepared yet to assume this role. Members decided that information about product prices should not be included on the platform, avoiding disputes

and preventing reverse auctions that could favor larger producers or wholesalers. At this stage, users must confirm the process of buying or selling by phone or by e-mail, the same presently practiced procedure.

The project started with two categories of products (cut flowers and ornamental plants) considering its higher aggregate value. This decision influenced the structuration of the community by defining producers and retailers able to participate on the first run of the implementation process.

Flower growers and researchers performed a **face validation** of the alpha version of the platform. They analyzed the services offered, the system's layout, and the usability of the platform and they defined the presentation of individual and global offers - by product and location -; a mechanism to match offer and demand; a communication device on the platform; non-restricted access to all community members; and non-inclusion of product prices.

The prototype and its usage procedures were validated again by community members. They decided to start the prototype development with cut flowers; they defined members who should include products on the database and who should organize revisions of the transactions; they decided to organize a collective effort to invite a minimum of 40 members to the VBC; and they asked for a members' reputation assessment mechanism.

An unintended issue was the development of a common understanding (a sense making) process of the business model of the cluster. This framework was used to elicit agents' knowledge in order to get the whole picture about the cluster.

4.3 Development

In order to develop the **platform**, researchers organized meetings with the technical team. To support Internet, Android and iPhone mobile platforms, C#, JavaScript and trigger.io coding languages were adopted. Technical and budgetary restrictions required the integration of Google Groups on the platform to offer a communication tool.

User validation initially encompassed the alpha version of the **platform** and actions to structure the VBC. The objectives of the community and the platform were presented, and researchers distributed a first version of the user manual to all participants. They defined the hardware to access the platform: desktops, notebooks, smartphones and any other device with Internet connection. As improvements participants recommended the inclusion of ornamental plants, the development of reports concerning offers and demands, and the organization of a help desk.

Improvements to the **community** consisted of: an unification of categories of products (cut flowers, in-vase flowers, ornamental plants, landscape gardening, and grass); an expansion of the product catalogue; the invitation of new members; the development of a communication channel to address members' questions (managed by the research team); the definition of a procedure to be executed manually by members in order to update offers and demands. An agreement term to participate at the VBC and to allow researchers to use collected data for research purposes was also signed and the term to start the field test was defined.

We organized a second session to present and validate another version of the platform and to develop the community. Suggested improvements to the **platform** were: fixing bugs; development of information filtering mechanisms; inclusion of landscape gardening plants;

development of a member reputation assessment mechanism; and inclusion of a communication service. Suggested improvements to the **VBC** were: an expansion of the product database and the inclusion of their scientific names; the consolidation of a procedure to record and validate new products; and the invitation of new members, in particular wholesalers and retailers.

A third session was organized with the same purpose of the previous ones. Improvements to the **platform** comprised: the inclusion of products' images, an e-mail service to inform users the post of new offers or demands; and adoption of different colors on the display to better distinguish offer and demand. Improvements to the **VBC** consisted of an expansion of the product catalogue to 273 plants (32 cut flowers, and 241 ornamental and landscape plants) and the expansion of the member database (currently composed by only 25 members, with not enough wholesalers and retailers to render transactions on the platform more effective). As AFLORI was not able to fund the organization of the community, we searched for public resources in order to finance infrastructure, and to cover community structure costs (maintenance of product and member databases, helpdesk, governance). A new term to start the field test was also discussed.

Figure 1 presents an illustration of the beta 3 version developed, including offer and demand of products, filtered reports of products, quantities and location, a product catalogue, a communication facility, and procedures to register members and products.

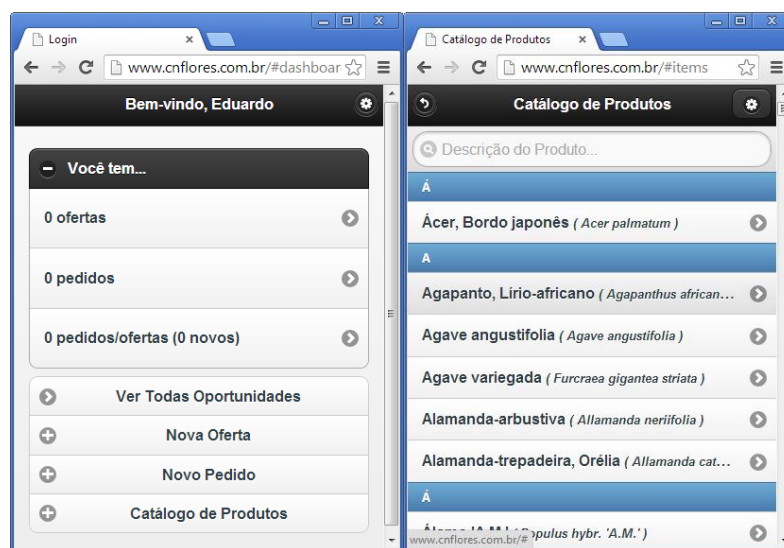


Figure 1: Screen snapshots of the platform showing transactions of one member and of the product catalogue

To develop the **community**, participants defined who should include or remove products on/from the platform and who should manage the inclusion or exclusion of members at/from the community. Participants also discussed the platform usage procedures and who should take part of the supervisor's group which, in the future, could assume leadership and a governance role. The development of a forum was also decided. In order to promote the VBC and to recruit new participants, whose number was still very low, the Federal Ministry of Agriculture organized a seminar to discuss the value chain of flower production and distribution. Researchers and representatives of AFLORI participated at this meeting.

4.4 Evaluation

The development of the **community** took more time than expected and the field test of the ICT platform was delayed. The main reasons we identified were:

- participants reported a “lack of real conditions” when asked to start real offers and demands using the platform, perhaps meaning not enough diversity due to the small number of agents and products registered. They also revealed doubts about the value of the VBC, and showed a lack of confidence on some community members;
- some producers revealed fear concerning changes in their business processes and in giving information about their (individual) clients, products and business to competitors before starting the field test and receiving demands when they were asked to invite new members to increase the small number participating and to register more products;
- small economic agents did not felt comfortable using the platform, they also experienced communication infrastructure problems in their properties;
- no effective leadership emerged in the community;
- technical problems with the platform resulted from not on time versions, from a delayed inclusion of some services demanded, and from a deficient server infrastructure with the required maintenance services;
- an absence of disclosure of the project.

These reasons contrasted with an optimistic climate observed during the development and validation meetings. After discussions between researchers and participants, new actions had been decided. The most important were:

- to increase the divulgation of the project, through meetings organized by government institutions and by other entities -, through electronic media, and through the development of an enlarged website of the flower community www.cnflores.com.br, including more information about the community;
- to expand the community with not previously contacted agents (retailers, landscape gardeners, construction enterprises);
- to improve actions to develop an entity to lead the community;
- to foster community member discussions about new forms of effective cooperation in order to improve efficiency and sales and about internal legitimacy of the community;
- to reassess the perception of the VBC value to members;
- to get new research funds approved to finance operation costs of the VBC;
- to include new services on the platform, like logistics, a key cost factor to market flowers, and a geographical referenced map of offers and demands to improve cooperation;
- to increase the product mix.

Many of these actions are already in progress. We intend to evaluate them again with members of the community and restart the Development and the Evaluation stages soon.

5 Discussions and Conclusion

In this paper we presented the design process of a VBC developed to support a not well structured agricultural cluster. We identified theoretical and empirical challenges in this ICT-enabled development process. We started the project based on two assumptions stemming from two underlying conceptual foundations, grounded on the relational economy approach and on the design research process: (1) the development of a tailored an accessible ICT platform offers economic value to users and offers the possibility to foster social relationships

that will promote its use; and (2) the development and usage of the ICT platform will promote the structuration of the VBC.

The tailored ICT platform was developed to match community and business needs based on a cluster competitiveness assessment and on requirements defined by participants, such as services to reduce losses by unsold products, reduction of products' time-to-market, the non-inclusion of bids at the start of the project, and a multiple access platform.

The development of the VBC implied to arrange elements of a not well organized cluster. At the economic agent level, it concerned perceived value, information sharing ("giving before acting"), product standards, business processes and social interaction. At the institutional level it concerned the development of quality standards of products, a better identification of products and an expansion of the participant database. It also fostered leadership and structuration of a distinct organization, such as the orchestrator defined by Markus and Loebbecke (2013), in charge of consolidating and regulating interorganizational business procedures and ethical rules (governance).

However, some of these elements have still not been implemented and the research and development process of the VBC progressed slowly and almost got stuck. Consequently, an important question about the main challenges arose. These challenges emerged from the most important elements observed and analyzed, and from the literature reviewed. They are presented on Table 1.

Elements		Challenges
Community	Platform	
Community level: leadership, governance, business processes		Agents inertia in relation to interorganizational changes, different entity in charge of coordination
Individual level: "giving before getting", sharing of information		Becoming proactive in developing mutually beneficial relationships, perceived value
Development process: participation of members, funding		Internal legitimacy External legitimacy
	Technical characteristics: services, accessibility, structure	Design Method, funding
	Development and validation process	Design Method

Table 1: Summary of main findings

The main challenge to the VBC resulted from inertia towards the interorganizational change process (Kim et al., 2006). Participants revealed a persistent resistance to change organizational ties previously developed, originating from established routines, culture, and practices. This inertia inhibited a more effective participation for attending new community members, proactive attitudes in sharing information before the platform was effectively field tested, and the creation of a distinct entity structuration. The existence of a structure of community leadership is an important question concerning the success of VBC (Moore, 1993), in particular in agricultural VBC, where agents usually transfer some decision autonomy to a distinct entity (e.g. market organizations, cooperative associations) in return of coordination (APO, 2004).

Another important challenge was internal and external legitimacy, which encompass a generalized perception that the activities and the structure of the community are desirable and appropriate to the members of the VBC. Economic agents of the cluster had more or less

strong ties concerning economic and social relationships and the legitimacy of the cluster seems to be under construction. There is no inherently clear perception about internal and external legitimacy. Wry et al. (2011) argued that legitimacy is more likely to be achieved when members of the community articulate a clearly defined collective identity story with the purpose of identifying the objectives and core practices of the community. This challenge needs time and a collective effort to be accomplished.

Related to the design method, the analysis of the circumscription process of knowledge (Vaishnavi & Kuechler, 2004) indicates that it generates understanding that could only be gained from the construction of an artifact. This understanding process helped developers during the development of the platform, and is a consequence of its predominantly technological view. But the method did not guide developers in actions related to the (inter)organizational context in order to develop and organize the community. Consequently, when facing the design process of an ICT platform to support not structured BC, it seems promising to adopt the principle of intervening in the organization explained by Sein et al. (2011), an important element of their Action Design Research.

Some limitations are inherent to this study since it is still in progress. They mainly concern the structuration process of the community in order to minimize interorganizational inertia and additional funding. But even if these actions are not concluded yet, the elements reported in this article, related to the development of an ICT platform to support a VBC in a not well structured setting, are not frequently found in the literature.

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