VIRTUAL COMMUNITIES OF PRACTICE: EXAMINING THE MOTIVATIONS AND CONSTRAINTS IN THEIR KNOWLEDGE CREATION AND KNOWLEDGE TRANSFER PROCESSES[1]

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The rapid pace of change compels organizations to be innovative in order to maintain a sustainable competitive advantage. Such innovation is supported by the generation of new ideas, which in turn depends on access to new knowledge. Innovative solutions and processes are unlikely to be developed by an individual but rather by a group of people, working together. As Newell *et al*. (2006) point out, innovation depends on managing knowledge transfer and situated learning (Lave and Wenger 1991). One group of people that share and create new knowledge is a Community of Practice (CoP). Communities of Practice are places which provide a sound basis for organizational learning. This encourages knowledge creation and acquisition, thus improving organizational performance, leveraging innovation and consequently increasing competitiveness.

Virtual Communities of Practice (VCoPs) can perform a central role in promoting communication and collaboration between members who are dispersed in both time and space (Bradshaw *et al.* 2004). Nevertheless, it is known that not all the CoPs and VCoPs have the same performance or results. This means that there are factors that enable or constrain the process of knowledge creation. With this in mind, we developed a case study in order to identify both the motivations and the constraints that members of an organization experience when taking part in the knowledge creating processes of the VCoPs to which they belong.

Our results show that when the organizational culture values knowledge sharing and creation, employees tend to feel it is part of their professional ”duty” to contribute towards organizational development, by supporting their colleagues and making available their personal knowledge; together, they are contributing to the success of the organisation. VCoPs are, also, understood to be important for professional and personal development; opportunities for development and organizational culture are motivating factors for participation in these structures. Contrary to previous reports in the literature, no interviewee referred to direct financial rewards as a motivation factor for participation in VCoP but all found it difficult to identify any constraints. Most identified the difficulty in aligning objectives established by the management with justification for the time spent in the VCoP. The interviewees also

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said that technology is not a constraint; on the contrary, it enables dialogue and exchange of ideas between people who are separated in time and space.

Keywords: Innovation, Communities of Practice, Virtual Communities of Practice, knowledge creation, knowledge transfer.

1. INTRODUCTION

With accelerated market volatility, faster response times and increased globalization, business environments are going through a major transformation and firms have intensified their search for strategies which can give them competitive advantage. This requires that companies continuously differentiate their products: that is, firms must constantly innovate. Innovation takes place when new ideas are implemented as products, processes or services, generating value for the firm (Popadiuk and Choo 2006, p. 309).

With such a demand for new ideas, it is often the case that no one individual can satisfy this. Often, individuals when performing knowledge intensive tasks or faced with new problems, rely on informal relationships and engage in interactions to reduce uncertainty, generate ideas and create and use new knowledge. These informally established groups of self-organized individuals, working on similar problems, help each other to broaden their knowledge base and share perspectives about their work practices; this often results in the learning and innovation environment that has been labeled as a Community of Practice (CoP). In the context of this paper, we are concerned with Virtual Communities of Practice (VCoP), which are those where their members use ICT as their primary mode of interaction (Dubé *et al.* 2006, p. 147).

This paper is organized as follows: the next section, drawing on a literature review, synthesises both the motivations and the constraints that members of an organization experience when taking part in the knowledge creating processes of the VCoPs to which they belong; the third section describes a case study, taking place in Portugal, in order to identify these experiences. It details the methodology used and presents the results of the interviews with members of the VCoP within three multinationals. Results are also discussed. Finally, some conclusions on this research are drawn.

1.1. VCoPs: What are these?

In the literature, there is not yet a consensual definition of a CoP (Lindkvist 2002, p.1189).There is even some degree of contradiction, especially in relation to CoPs supported by ICT (VCoPs). This difficulty is due to the fact that CoPs are more than a concept, they are a learning process (Kirschner and Lai 2007, p.128).

The term Community of Practice was used for the first time by Lave and Wenger (1991) to characterize,

> "(…) *a system of relationships between people, activities and the "world", developing with time and in relation with other tangential and overlapping communities of practice*" (*op. cit.*, p.98).

In the scope of this study, a CoP must be understood as:

> *A self organized group of people who want to be motivated by common interests related to their daily practice; this group of people is self organized with the objective of developing their knowledge and improving their performance, by interaction with others in the group.*

Despite the various definitions of a CoP occurring in the literature, it is possible to identify some common aspects (Correia *et al*. 2008):

a) **CoP informal character** – unlike the organizational departments or work teams, CoPs emerge naturally and informally;
b) **Visions concerning learning** – the CoPs are privileged places for learning. This is the result of problem solving by the group; CoPs make available the space and the context where the required interaction takes place;
c) **The presence in the community is always voluntary** – it is motivated by the need that people feel to discuss their practice (field of knowledge where they perform some kind of regular activity) with the aim of increasing their knowledge and thus improve their performance;
d) **Self organized systems –** the way CoPs work is defined by the members, throughout the cycle of community life;
e) **It has no predefined time dimension** – its duration depends on the interest of members in keeping alive the community;
f) **There are no imposed power relations** – the power within the CoP is not formally defined or defined by hierarchical ranking; on the contrary, the importance of each member arises naturally and takes into consideration his(her) knowledge of the community's domain;
g) **Usually there is a large diversity of members** – there are both junior and more experienced members.

CoPs are not defined in this way in all organizations, nor even by all authors (Liao *et al.* 2007); several terms are used, although most with similar meaning. In the research performed we identified various designations such as: "Technical Clubs" (Wenger 1998), "Learning Communities" (Saint-Onge and Wallace 2003, p.34), "Knowledge Communities", "Thematic Groups", "Learning Networks" (Liao *et al.* 2007; Wenger 1998), "Skills Networks" (Liao *et al.* 2007), "Practice Networks" (Brown and Duguid 2001), "Skills Communities" (Smith 2005); in this context and according to the characteristics presented, these must all be considered as CoPs.

1.2. VCoPs: What is their role in organizations?

VCoPs have an important role in the creation of organizational knowledge. VCoPs provide the following benefits for organizations:

- They facilitate organizational learning and promote the organizational memory (they are the forum for sharing experiences, information and knowledge and for knowledge creation (Tarmizi and Zigurs 2006, p.8); they preserve tacit knowledge (Ardichvili *et al.* 2002, p.3); they facilitate communication (Wenger 2000, p.8), and accelerate

collaboration between the members (Wenger *et al.* 2002);
- They contribute to organizational development since members and collaborators are the same;
- They increase efficiency of knowledge utilization (Lesser and Storck 2001, p.837, Saint-Onge ans Wallace 2003, p.68);
- They increase the quality of processes thus improving competitive advantage;
- They contribute to innovation – knowledge, experience and ideas are exchanged and debated; these are critical elements for innovation (Coakes and Smith 2007, p.76, Zboralski *et al.* 2004);

VCoPs can be described as virtual spaces where learning takes place. However, learning and innovating are closely related to practice; since learning is required for innovation to take place, these VCoP structures are ideally suited for the development of innovation activities. Justesen (2004, p.82) and Fiore (2007, p.857) refer to VCoPs as the social "containers" of incremental innovation.

1.3. VCoPs: Motivations and Constraints in The Knowledge Creation Process

Knowledge creation in VCoPs is conditioned by several factors that can motivate or constrain this process.
In the literature we identified several factors, as explained in the following paragraphs:

- Intrinsic factors (Soft) – members get involved in acts of knowledge creation, motivated by factors related to their personality and the satisfaction they feel by sharing their knowledge with others (Krogh and Grand 2002).
- Extrinsic factors (Hard) – financial rewards, direct or indirect for sharing or creating knowledge (Hall and Graham 2004). If members consider the cost/benefit relationship positive, they will get involved in these processes, otherwise they will stop sharing (Kelly and Thibaut 1978). These factors are considered as short term motivations (Sharratt and Usoro 2003, p.191), and are important to attract new members to the community, but in the medium and long term they provoke more problems than benefits (Hall and Graham 2004).
- Organizational factors – these relate to the context in which the group operates. For instance, if the group to which the members belong does not allow the development of feelings of trust (Roberts 2006), they tend not to share their knowledge and are afraid to ask questions (Krogh and Grand 2002). In the group being studied, we identified the following factors:

  - ✓ Trust, in the shared environment, (Lee *et al.* 2002, p.751) as a facilitator of communication (Sharratt and Usoro 2003, p.190) and collaboration (Nahapiet and Ghoshal 1998; Newell *et al.* 2007);
  - ✓ Competence has also been identified as an important factor for the involvement of members in the community (Nahapiet and Ghoshal 1998);
  - ✓ Moral obligation – members feel the moral obligation to repay what they have gained from the organizational CoP (Ardichvili *et al.* 2002, p.11). Another factor often referred to in the literature

is access to information and to specialists in a certain field (Wasko and Faraj 2000, p.169);

- ✓ Organizational culture - the involvement of workers in the process of knowledge development is conditioned by cultural factors (e.g. Bock *et al.* 2005, Kim and Lee 2005, p.3), a culture that motivates and rewards knowledge sharing creates advantageous conditions for the development of knowledge creation. Values, language and common frameworks (Davenport and Prusak 2003; Sharratt and Usoro 2003) or 'opportunity structures' can provide a fertile environment within the community (Krogh and Grand 2002). A shared vision and well-chosen organizational objectives also influence this process, because they promote a feeling of involvement and a willingness to contribute within the workforce (Kim and Lee 2005).

- Technological factors – among the constraint factors associated with technology, the values related with non-verbal language (*e.g.* cues, rituals) so essential to tacit knowledge sharing, is lost to a VCoP (Krogh and Grand 2002). This constraint is offset to some extent by the ease of access afforded by information technology, increasing the possibilities of communicating and collaborating to resolve problems, while also allowing access to more information (Sharratt and Usoro 2003). These aspects of technology can thus be considered as either motivating or constraining knowledge creation in virtual environments. Technology should therefore allow members to socialize, be easy to use (user friendly) and offer an assessment of the "health" of the community (*e.g.*, number of registered members, number of active members, number of knowledge artifacts and their production dates) (Preece and Maloney-Krichmar 2003, p.25).

2. The case study

2.1. Methodological Approach

The research design uses a case study approach (Saunders *et al.* 2003, p.93; Yin 2003); to increase the scientific rigour a multiple case study was developed for three organizations, each one with several "case units", *i.e* in each organization two or three VCoP are analysed (Benbasat *et al.* 1987; Yin 2003). In such circumstances, it is possible to obtain enough data to promote intra and inter organizational analysis and in this way increase the study's relevance.

This is an exploratory study; its aim is to explore the concepts, causes and facts, which determine people's attitudes. It takes a qualitative approach to the collection and analysis of data (Creswell 2003, pp.212-15, Flick 2005, p.271). The process of gathering data occurred in two phases:

- Phase A - comprised the non-structured interviews (Ghiglione and Matalon 2005, p.105, Miles and Huberman 1994, Saunders et al. 2003, p.248) involving the leaders of VCoPs, with the objective of refining the theoretical model developed from the literature review, by application of a questionnaire. This also served to characterize the VCoP under study (Dubé et al. 2006);

- Phase B - comprised the semi-structured interviews (Flick 2005, Ghiglione and Matalon 2005, p.105, Zafeiriou et al. 2001, p.86). Its framework was developed using the theoretical model of the previous phase and involved the members of a VCoP (Barañano 2004, p. 93) Its objective was to verify the framework, as it related to the motivations and constraints felt by the members.

2.2. Data analysis and discussion of results

Data was gathered in three multinationals of the IT sector, operating in Portugal. These organizations were chosen as knowledge-based organizations (Engwall and Kipping 2002).

In the organizations under study, we identified several types of VCoP:

i) **Strategic Communities** – the objective is the creation of competitive advantage and innovation. The members of these communities usually assume tasks at the highest level, or are considered to be experts in the domain. Normally, they also belong to operational communities in the field. They correspond to the epistemic communities presented by Amin and Roberts (2008);

ii) **Operational communities** of professionals that assume tasks at an intermediary level (*e.g.*, communities of project managers or sales people). These communities usually have the objective of developing knowledge (to improve the performance of collaborators) and the creation of competitive advantage and innovation (taking as a starting point, the knowledge created in the community);

iii) **Operational communities with a more technical interest** (*e.g.*, community of software development professionals) with the objective of improving the performance of collaborators;

iv) **Operational communities with interest in activity sectors, as distinct from professional areas**. They can be found in the commercial sector and their objective is to develop knowledge of how the activity sector, to which they belong, acts and works (*e.g.*, communities for the governmental sector or big enterprises);

v) ***Ad-hoc* communities** that emerge naturally from the requirements of the organizational collaborators; for instance, when a new technology or a new professional interest emerges spontaneously. Some of these communities evolve to become operational communities or even strategic communities, while others disappear when the knowledge domain of the VCoP is no longer important.

In Phase A, interviews were conducted via e-mail, since we were not able to arrange interviews face-to-face; according to the literature, this does not compromise the results of the study (Jansen *et al.* 2007, Meho 2006, p.1285). We interviewed seven people in this phase.

Data from Phase B was gathered by both face-to-face interviews and through instant messaging. The first method was preferred because it allowed personal contact. The second was necessary to accommodate the timetables of the interviewees; again, this does not compromise the study (Fontes and O'Mahony 2008, p. 2, 4; Mann and Stewart 2000).

In Phase B seven interviews were arranged with members of the VCoP, of which 5 had more then 5 years of professional experience (senior members) and 2 could be considered as junior, as they had less then 5 years of professional experience.

The initial outcome of these was that – as referred to by Wenger *et. al.* (2002) – the interviewees belonged to several CoPs, simultaneously. Not only is this finding in line with what those authors call a constellation of communities, it also became evident that the level of involvement of each interviewee in the different communities depends on the proximity of the CoP domain in relation to the professional functions of the informants.
The other major results of Phase B follow – first the motivating factors and then the constraints. Quotations from the interviews are used to support the evidence collected.

2.2.1. Motivating factors

The results show some interesting conclusions. None of the interviewees referred to direct extrinsic factors, such as financial rewards, as an issue to encourage people to actively participate in the VCoP.

A factor that all interviewees referred to as vital for their participation and involvement in VCoP is access to the necessary knowledge to perform their daily tasks; this explains why the closer the domain of the VCoP is to their professional tasks, the greater will be their involvement within that VCoP, as these informants pointed out:

> "*as I need to obtain information on* [domain of interest of a specific VCoP], *than on* [compares with the domain of a different VCoP in which this informant participates less frequently]" (interview 2D)

> "*....interest in the same knowledge, in a group which share similar interests and information. Common learning interests and above all in the practical application of what is learned; whenever interests are similar* [VCoP] *help us a lot in our day-to-day routines, in taking the best decisions and they* [VCoP] *help us in knowledge creation and in learning; as one never knows everything, the VCoP allows us, apart from the information and knowledge sharing, to learn always more even if it is only in providing new perspectives we never thought of before*" (interview 2C).

Another example of this proximity relation between the domain of the VCoP and the professional tasks of the participants is the comparison made by another interviewee between the types of activity performed in two different VCoPs. This informant claims that:

> "*in the two VCoP I use daily, the activities I perform for the first VCoP are to:*
> *i) obtain information*
> *ii) exchange ideas*
> *iii)contribute with information for the VCoP*
> *As for the other VCoP, I only use it to obtain information*" (interview 2A).

There is also a generalized tendency to consider that success and even professional survival depends on membership of these communities. Individuals are also motivated by the fact that the VCoP allows access to a huge amount of information and

knowledge, which might be denied in other circumstances. This information and/or knowledge might be the key for the success of the individual or organization.

Another factor, also considered as an important advantage of VCoP and which works both as a strong motivator towards participation in VCoP, is access to knowledge, experts and to business techniques and practices which one cannot obtain through day-to-day experience, as illustrated by the following quote:

"*we are the only ones in Portugal who can provide these solutions, so it is necessary and natural that we should go abroad to look for responses to our questions* [..], *to obtain knowledge which is not available here* [...], *to access experts, people who have experience in the domain*" (interview 2B).

VCoPs also provide support towards decision making, as highlighted by the following two quotations,

"*I feel supported in the decisions I take*" (interview 2C);

"*helps a lot in the decisions taken on a daily basis* [within the professional activity]" (interview 2C).

The respondents also reported collective benefits as motivation for the involvement in VCoP, such as an increase in service quality and development of skills of all members of the organization.

"*increase in the service quality and skills of all members.*" (interview 1.A.).

"*knowing how it is done abroad, the effects it can produce and how it is done here*" [performance improvement] (interview 2.A.).

A worldwide VCoP (as in one of the VCoP we studied) enables access to knowledge of the different circumstances that collaborators experience daily. This allows them to be better prepared for a situation that might occur in the future or that is similar to one identified previously in the community.

"*the knowledge gained from other experiences, contact with other realities"; "access to knowledge that in Portugal could not be obtained because they are different realities*" (interview 2.B.).

More,

"(…) because knowledge creation comes from information exchange between different realities. This factor will also help me to improve my knowledge of people that participate in the community" (interview 2.A.).

"*possibility of joining with persons from different geographical places, with the necessary skills, in a simple and quick way*" (interview 1.A.).

This will be translated into improvements in, individual and organizational productivity.

Another respondent refers clearly to the importance and role of culture, in particular the organizational environment in the operation of a VCoP, when he states that "*the* [name of the enterprise] *has this spirit of help*".

The involvement in problem solving and knowledge sharing through VCoP is a natural act that does not depend on

any specific factor, except that it is a feeling of belonging in the organization:

> "*I see it as natural because, in similar projects, there sometimes arises the same kind of problem*" (interview 2.D.).

Another respondent also agrees that the organization has a crucial role in motivating collaborators to get involved with this kind of structure, placing the role of management as vital in recognizing and valuing the contributions of each collaborator for organizational problem solving and for the development of the existing VCoPs repository of knowledge:

> *"yes, because it is necessary to value the participation of other members in the hierarchy. Otherwise, the time spent in the activities of knowledge sharing would be seen as a waste of production time. This is achieved by recognition down the hierarchical chain, so that each member can participate and communicate with others about their problems or the way they could have been solved"* (interview 1.B.).

Management therefore plays an important role in motivation for involvement in these communities in two ways: through publicity of VCoPs and through the recognition of value of those collaborators who contribute most for these communities, as one of the respondents said: "through

i) *regular information about new things and discussion forums in the VCoP,*
ii) *reward for those who contribute most and best,*
iii) *international recognition for the same"* (interview 2.A.).

From these interviews, it emerges that rewarding factors are only symbolic in nature; information dissemination about the existence of the VCoP, its activity and recognition of its merit, in particular the emphasis on international recognition, is sufficient. These results confirm previous research (Hall 2001a, 2001b, 2003; Henderson and Cockburn 2006; Rioux 2000; Sawyer *et al.* 2000; Smith and Farquhar 2000; Wasko e Faraj 2000).

The problem of face-to-face meetings was also pointed out and is an important motivation issue regarding involvement in participation in the VCoP. As an example, one of the interviewees answering the question, "*Does the organization encourage you to participate in the VCoP?*" replied, "*Yes, completely*" and indicated ways of in which the company encouraged its staff with face to face meetings:

> "*On the last Friday of each month, we have a meeting with all the collaborators of the [name of the organization] called [name of the meeting], where we share any information that we might think is useful.*" (interview 2.C.).

We also found in the statements of the interviewees the issue of reciprocity as a motivating mechanism to participate in collaborating acts in VCoP.

> "*I know what it feels like to need help and so I answer"* [he is referring to questions placed by the community by other members]. *I also obtain answers. It is cultural.*" (interview 2.B.).

2.2.2. Constraining factors

The most important factors designated as barriers to active participation in the community, are lack of time for these activities and the difficulty to reconcile them with the daily professional stress situation. These barriers are more evident in activities that imply longer time such as knowledge sharing and creation. This factor has been referred to by all respondents.

> "*sometimes we receive the email and we even know the answer but we do not have time*" (interview 2.B.).

> "*we cannot have an attitude of intensive sharing due to time* [constraints]" (interview 2.D.).

> "*availability (of time) to condense, transform and reuse knowledge* " (interview 1.B.).

In this last quote, another barrier to knowledge sharing is said to be information confidentiality.

> "*this is the difficulty of presenting information in a comprehensive way, without revealing the context in which it has been applied*" (interview 1.B.).

Some constraints have also been identified, in aspects related with culture and organizational issues, which limit the sharing, reuse and creation of knowledge in the communities. One of those concerns the lack of recognition, by the management, when sharing and making available information and knowledge. Another constraint relates to the lack of knowledge concerning the existence of a VCoP in the organization. Another issue is the fact that the member of the community believes he / she has nothing new (and nothing of value) to add to the community and as such he / she does not make available his / her knowledge.

Another inhibiting factor is the lack of opportunity to participate, because there might be no one asking for help in the area in which members work. While the consultation of information is a daily activity, the need for help is related with problems concerning the professional tasks of each person. Knowledge creation and sharing depends, mostly, on the requests for help or clarification from a third party.

> "*the reason is that, when we have the consultations, we are clearly looking for the resolution of technical problems for which there is a direct answer. The exchange of ideas is rare because it concerns more conceptual problems and these situations are even rarer. Communities also do not give that kind of answer in the same direct way as is given in the first case. That is why there is a tendency to have a consultation; in the second case, this consultation is not so frequent*" (interview 2.A).

In terms of intangible factors, interviewees said that there is a natural human tendency to use existing knowledge artifacts since "using" new ones takes extra time and effort. This category only emerged in data gathered from the interviewees; it does not appear in the literature. These issues concern the learning and innovation process. Members see these processes as consuming additional time and resources; not all of them want to make this investment

> "*There's a natural tendency for just using what's available, to transform it; innovation takes time and additional effort*" (interview D).

Another barrier relates to the characteristics of each member; readiness to learn will vary from person to person, as this quotation illustrates:

> "*It takes time to learn, and not everybody will be able to achieve the same level.*" (interview D).

Some cultural differences and literacy difficulties, due to the fact that all members do not have the same mother language, have been pointed out. The communication among collaborators throughout the world is also affected by cultural differences (*e.g.*, expressions that are used in a certain country and that can be misunderstood or not understood at all by persons of other countries). This can give rise to a breakdown in communication.
Another issue concerns the existence of a large number of knowledge artifacts with little or no relevance to the work of members.

The technological aspects have been widely referred to in the literature as constraints preventing an active involvement in the communities. Within this category there are the problems related to the difficulty of access to the community. This manifests itself in slow response times, poor web design, the lack of tools to extract information efficiently and tools that are difficult to use and not adequate to the requirements of the knowledge sharing process. These factors are so important that one of the interviewees considers that technological limitations are the only constraint to knowledge sharing:

> "*For me, at a personal level in terms of willing to share, there are no barriers, just lack of tools / systems allowing the keeping and gathering of knowledge in an easy way while ensuring that it is always updated (the personal contact with other members is not always possible, efficient and effective)*" (interview F).

3. Conclusions and recommendations

With this study, our aim was to contribute towards the identification and analysis of factors motivating and constraining knowledge creation and sharing in organizational VCoPs, from the perspective of professionals who work in Portugal.
We find that, according to the respondents, the most important factor for people's involvement in VCoP is the organizational culture – namely, the recognition which the organization gives to contributions made by collaborators and the guidance provided, in the sense that people should help each other in order to solve day-to-day problems.

The importance and the need for VCoPs as places for knowledge and information sharing is also evident. People feel recognized and appreciated; this feeling is due to the organizational culture and the balance each collaborator feels during the time spent in contributing to the VCoP and their daily tasks.

This study also discovered that there is a greater predisposition of the members to obtain or even make available information rather than being involved in,

a) knowledge creation activities,
b) collaboration or,
c) innovation.

Although the most important reasons for this is lack of time and opportunity we consider that this study did not have the necessary means to verify if these were the real reasons. To probe deeper

would require a higher number of interviews to be performed; additional data through observation of the way respondents get involved in their daily activities would need to be obtained; the collaborators would need to be studied during their actual involvement with the VCoP and a deeper understanding of the culture and the reward framework used in the organizations researched.

Another important result is the fact that no interviewee said that extrinsic or direct rewards, such as salary increases or monetary prizes were necessary inducements to get involved in the VCoP.

As for the influence of technology, maybe because the enterprises under study were all from the IT sector, none of the interviewees referred to this factor as motivating or constraining.

4. Suggestions for further investigation

In order to obtain results that can be generalized it will be necessary to perform other studies with similar objectives, within companies of different economic sectors, develop more cases and eventually use other methods for data collection, apart from interviews (*e.g.* questionnaires and observations).

Further studies, in enterprises where their financial capital would be totally, or almost all Portuguese, would be useful for comparison with the results obtained from this study; in such circumstances the study would allow research into the influence of the organizational culture in the enterprises.

It has also been possible to identify in the literature review and in the interaction with the enterprises under study, the following areas of interest to be further researched in the domain of the VCoP, taking into account the role performed by VCoP in improving organizational performance, namely:

i) How to recognize and implement a VCoP in a top down approach. CoPs and VCops can be found in most organizations but in some cases managers do not know of their existence. This lack of knowledge can lead to VCoP identification and implementation problems that might be important when management decides to implement a knowledge management strategy based on VCoPs;

ii) How to profit from the existing knowledge in a VCoP, in order to maximize investment in these structures. This is a fundamental issue, because there are several works in the literature referring to a positive relationship between the VCoP and organizational performance; however, it was not possible to identify those practical applications which might provide insights as to how organizations can obtain profit from the knowledge created in the VCoP and how this can be transformed into organizational knowledge, leading to product and service innovation;

iii) Development of reliable metrics to assess the profitability of time spent by each member's involvement in a particular VCoP; this would enable organizations to recognise and account for such time as profit-making instead of cost-incurring;

iv) Knowing the motivations and constraints that exist in the creation and sharing processes as well as in the innovation activities, in the context of the professional inter-organizational VCoP.

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