POLITECNICO DI MILANO

School of Industrial and Information Engineering

MASTER OF SCIENCE IN MANAGEMENT ENGINEERING

COMMUNITIES OF PRACTICE IN OIL AND GAS INDUSTRY

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Academic Year 2017/2018

ACKNOWLEDGEMENT

I thank first of all Professor LUCA GASTALDI, who allowed me to undertake this thesis work, directing it with great knowledge and always showing the maximum availability and precision throughout the whole drafting period. Without him, this work would not have come to life.

A special thank you goes to my family, to my mum, my dad and my brother, who believed in me during these 2 years university. It's only their belief and support that I could undertake this important training that allowed me to grow and realize what could have remained only a dream. They have also been source of inspiration for how they have shown me every day to commit to what you love.

Thanks to all my friends, from INDIA, from MILAN some dear to me since my childhood, many moments spent together, as well as help whenever necessary.

A sincere thanks goes to my classmates from the POLIMI, with whom I shared the commitments of this path and starting point of my life, deserving people from whom I have learned a lot and to whom I wish the best success.

Finally, I would like to thank Politecnico di Milano, all my professors throughout the course who helped me gain knowledge throughout these 2years

For all,
Thank you.

ABSTRACT

Individuals knowledge does not transform easily into organizational knowledge even with the implementation of knowledge repositories. Rather, individuals tend to hoard knowledge for various reasons. The aim of this study is to develop an integrative understanding of the factors supporting or inhibiting individuals' knowledge-sharing intentions This research makes a contribution in this respect analyzing the implementation of "Communities of practice" in OIL and GAS Industry. The information collected for the analysis comes from a questionnaire administered to 325 participants in the learning communities. and hypothesised it with Perceived consequences, Social factors and Quality that are believed to influence individuals' knowledge sharing intentions. through a field survey of employees from PETROBRAS, we confirm our hypothesis that attitudes toward and subjective norms with regard to knowledge sharing as well as Perceived consequences affect individuals' intentions to share knowledge. Additionally, we find that anticipated reciprocal relationships affect individuals' attitudes toward knowledge sharing while both sense of self-worth and organizational climate affect subjective norms. This paper outlines an approach to determine key performance indicators and metrics for knowledge management (KM) in communities of practice. The approach is based on analysis of the KM literature on (i) types of knowledge, (ii) processes of knowledge development and social learning, and (iii) metrics for KM, such as from the Intellectual Capital Method. To embed communities of practice and KM processes in an organizational context, we introduce our Knowledge Governance Framework, which combines knowledge resources, KM, and organizational objectives

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1. DEFINITION OF COMMUNITIES OF PRACTICE

The concept of Communities of practice(CoP) was first introduced by Etienne Wenger and Lave(Lave & Wenger, 1991)They observed that, in the traditional master–apprentice relationship, the apprentice becomes a member of the profession's community by sharing life with the master and learning the profession gradually and naturally. That is, the concept of CoP was not originated as a Knowledge Management(KM) related organizational structure but as a context for a special type of organizational learning.

The concept of CoP thus evolved from the social context for situated learning to the organizational structure supporting KM implementation. (Davenport & Prusak, 2000) identifies a CoP as a structure to resolve the issues and challenges an organization faces, and argues that an organization can increase its knowledge and human capital through the social capital accumulated by CoP activities.

(Wenger, 2002) defined a CoP as ''groups of people informally bound together by shared expertise and passion for a joint enterprise'' and predicted that a CoP will be an organizational structure for the 21st century beyond the traditional team structure.

Among a variety of approaches to KM in organizations (Choi & Lee, Lee & Kim, & Wiig, 1997) the community-based approach has been considered as one of the most effective tools for knowledge creation and transfer (Brown & Duguid & Wegner & Synder, 2000). The approach emphasizes dialogue through social networks (person-to-person contact), and helps to informally share knowledge which is obtained from experienced and skilled people. A virtual community may be understood as one of the knowledge community types via Computer-Mediated Communications (CMC)

A CoP can evolve naturally because of the members' common interest in a particular domain or area, or it can be created deliberately with the goal of gaining knowledge related to a specific field. It is through the process of sharing information and experiences with the group that members learn from each other, and have an opportunity to develop personally and professionally.

1.1 Managing and Sustaining CoP's

The importance for effective CoPs is illustrated by Gold et al. (2001), who explain that successful KM initiatives enable organisations to become more innovative, better coordinate their efforts, rapidly commercialise new products, anticipate surprises, become more responsive to market change and reduce the redundancy of the knowledge and information available to them. Several authors have examined the specific issues that contribute to CoP effectiveness and have proposed a number of critical success factors. (Vestal, 2004)identify the following factors necessary for CoP success

Individuals

Members of communities of practice are thought to be more efficient and effective conduits of information and experiences. (Brown & Duguid & Wegner & Synder, 2000) argue that organizations tend to provide manuals to meet the training needs of their employees, CoPs help foster the process of storytelling among colleagues which, in turn, helps them strengthen their skills on the job.

Studies have shown that workers spend a third of their time looking for information and are five times more likely to turn to a co-worker rather than an explicit source of information (book, manual, or database) (Davenport & Prusak, 2000)Time is saved by conferring with members of a CoP. Members of the community have tacit knowledge, which can be difficult to store and retrieve outside. For example, one person can share the best way to handle a situation based on his experiences, which may enable the other person to avoid mistakes and shorten the learning curve. In a CoP, members can openly discuss and brainstorm about a project, which can lead to new capabilities. The type of information that is shared and learned in a CoP is boundless clarifies the difference between tacit knowledge, or knowing how, and explicit knowledge, or knowing what. Performing optimally in a job requires being able to convert theory into practice. Communities of practice help the individual bridge the gap between knowing what and knowing how

As members of communities of practice, individuals report increased communication with people (professionals, interested parties, hobbyists), less dependence on geographic proximity, and the generation of new knowledge.

Social presence

Communicating with others in a community of practice involves creating social presence. (Tu, 2002) defines social presence as "the degree of salience of another person in an interaction and the consequent salience of an interpersonal relationship". It is believed that social presence affects how likely an individual is of participating in a CoP (especially in online environments). Management of a community of practice often faces many barriers that inhibit individuals from engaging in knowledge exchange. Some of the reasons for these barriers are egos and personal attacks, large overwhelming CoPs, and time constraints.

Motivation

Motivation to share knowledge is critical to success in communities of practice. Studies show that members are motivated to become active participants in a CoP when they view knowledge as meant for the public good, a moral obligation and/or as a community interest. (Ardichvilli, Page, & Wentling, 2003)Members of a community of practice can also be motivated to participate by using methods such as tangible returns (promotion, raises or bonuses), intangible returns (reputation, self-esteem) and community interest (exchange of practice related knowledge, interaction).

Collaboration

Collaboration is essential to ensuring that communities of practice thrive. Research has found that certain factors can indicate a higher level of collaboration in knowledge exchange in a business network. (Sveiby & Simon, 2002)found that more seasoned colleagues tend to foster a more collaborative culture. Additionally they noted that a higher educational level also predicts a tendency to favor collaboration.

1.2 Benefits

Social capital is said to be a multi-dimensional concept, with both public and private facets (Bourdieu, 1991). That is, social capital may provide value to both the individual and the group as a whole. Through informal connections that participants build in their community of practice, and in the process of sharing their expertise, learning from others, and participating in the group, members are said to be acquiring social capital especially those members who demonstrate expertise and experience.

(Wasko & Faraj, 2001) describe three kinds of knowledge: "knowledge as object", "knowledge embedded within individuals", and "knowledge embedded in a community". Communities of Practice have become associated with finding, sharing, transferring, and archiving knowledge, as well as making explicit "expertise", or tacit knowledge. Tacit knowledge is considered to be those valuable context-based experiences that cannot easily be captured, codified and stored (Davenport & Prusak, 2000) also (Hildreth & Kimble 2002).

Because knowledge management is seen "primarily as a problem of capturing, organizing, and retrieving information, evoking notions of databases, documents, query languages, and data mining" (Thomas & Kellogg, 2001), the community of practice, collectively and individually, is considered a rich potential source of helpful information in the form of actual experiences; in other words, best practices.

Thus, for knowledge management, a community of practice is one source of content and context that if codified, documented and archived can be accessed for later use.

1.3 Cultivating successful COP's

What makes a community of practice succeed depends on the purpose and objective of the community as well as the interests and resources of the members of that community. (Wenger, 2002) identified seven actions that could be taken in order to cultivate communities of practice:

1. Design the community to evolve naturally – Because the nature of a community of practice is dynamic, in that the interests, goals, and members are subject to change, CoP forums should be designed to support shifts in focus.

2. Create opportunities for open dialog within and with outside perspectives – While the members and their knowledge are the CoP's most valuable resource, it is also beneficial to look outside of the CoP to understand the different possibilities for achieving their learning goals.

3. Welcome and allow different levels of participation – Wenger identifies 3 main levels of participation. 1) The core group who participate intensely in the community through discussions and projects. This group typically takes on leadership roles in guiding the group 2) The active group who attend and participate regularly, but not to the level of the leaders. 3) The peripheral group who, while they are passive participants in the community, still learn from their level of involvement. Wenger notes the third group typically represents the majority of the community.

4. Develop both public and private community spaces – While CoPs typically operate in public spaces where all members share, discuss and explore ideas, they should also offer private exchanges. Different members of the CoP could coordinate relationships among members and resources in an individualized approach based on specific needs.

5. Focus on the value of the community – CoPs should create opportunities for participants to explicitly discuss the value and productivity of their participation in the group.

6. Combine familiarity and excitement – CoPs should offer the expected learning opportunities as part of their structure, and opportunities for members to shape their learning experience together by brainstorming and examining the conventional and radical wisdom related to their topic.

7. Find and nurture a regular rhythm for the community – CoPs should coordinate a thriving cycle of activities and events that allow for the members to regularly meet, reflect, and evolve. The rhythm, or pace, should maintain an anticipated level of engagement to sustain the vibrancy of the community, yet not be so fast-paced that it becomes unwieldy and overwhelming in its intensity.

2. COMMUNITIES OF PRACTICE IN OIL AND GAS SECTOR

The oil and gas industry has been at the forefront of both the development and deployment of knowledge management techniques as a result of several factors, such as technology and market changes in the oil and gas sector, rapid advancements in the ICT.

A key observation from our study was the role of KM as a major force changing thinking and management practices among the oil and gas companies. (Grant, 2013) Motives for adopting the KM, are Following radical organizational decentralization, KM viewed as mechanism for achieving lateral coordination, as a natural complement to strategic planning and career management as an integrating mechanism, was driven primarily by its desire to improve efficiency in E&P and in refining through improved identification and transfer of best practices, desire to improve upstream performance through more effective linking of people to people and people to information, impetus for KM came from need to link rapidly advancing data management with systems that linked human expertise in globally distributed operations.

KM played a part through forecasting/scheduling and process and technique innovation. And to improve speed and convenience, KM initiatives have expanded to address point-of-sale technology adoption and procedure effectiveness.

Three areas are covered: KM strategy and implementation, people aspects of KM and metrics for KM performance. There are several potential lessons for organizations: the need for KM to be driven by senior management if it is to have any notable success; the use of people-centred techniques for sharing tacit knowledge and IT tools for sharing explicit knowledge; the importance of selling solutions to project teams to obtain employee support for KM; peer recognition has a more sustainable impact than financial reward; and KM measurement should be considered as a way of improving its impact, rather than justifying expenditure.

The companies have undergone a major change in their dominant logic. Twenty years ago management in the oil and gas sector was viewed in engineering terms: tangible inputs—finance, equipment, and people—were deployed to acquire physical assets—oil and gas reserves—which were then transformed into marketable end products through a vertically-integrated system. Since the early 1990s, the oil and gas companies have recognized that they are operating is a knowledge-based business where superior performance is achieved through the early identification and appraisal of opportunities and their speedy exploitation. These factors were especially relevant to the international, shareholder-owned oil and gas companies. While the national oil companies could rely upon their ownership of low- cost reserves as the basis for their continued pre-eminence in oil and gas production, the majors had to rely upon their superior technology, management systems, innovation, and learning capabilities for their competitive advantage. Conditions specific to the oil and gas industry further suggest the potential of knowledge management to provide solutions to some of the most critical problems faced by the industry. The Society for Petroleum Engineers (SPE) estimated that years of cumulative experience and knowledge will be lost to the industry in the next10 years due to retirement of petroleum engineers and other technical staff. Knowledge management offers a means of limited the potentially devastating effects of the continuous knowledge loss of due to retirement & downsizing

For these reasons, we undertook a detailed study of the evolution of knowledge management practices among a sample of oil and gas companies (including not only petroleum producers but al also oilfield service companies). Our goal was to use the learning from the experiences of these companies to provide guidance to companies' in their use of knowledge management (KM), primarily in the petroleum sector, but also for other companies.

A key observation from our study was the role of KM as a major force changing thinking and management practices among the oil and gas companies. Not only did all the companies we surveyed institute KM systems and processes, at most of these companies senior managers offered explicit recognition of the important of all of these companies testified to the importance of knowledge management within corporate

management systems as a whole and as a major contributor to performance enhancements.

3. FRAMEWORK OF KNOWLEDGE MANAGEMENT

Knowledge management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organisation. It refers to a multidisciplinary approach to achieving organisational objectives by making the best use of knowledge.

Many large companies, public institutions and non-profit organisations have resources dedicated to internal KM efforts, often as a part of their business strategy, IT, or human resource management departments. Several consulting companies provide advice regarding KM to these organisations.

Knowledge management efforts typically focus on organisational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organisation. These efforts overlap with organisational learning and may be distinguished from that by a greater focus on the management of knowledge as a strategic asset and on encouraging the sharing of knowledge. KM is an enabler of organisational learning.

Different frameworks for distinguishing between different 'types of' knowledge exist. One proposed framework for categorizing the dimensions of knowledge distinguishes tacit knowledge and explicit knowledge.

3.1 Tacit and Explicit Knowledge.

Tacit knowledge represents internalised knowledge that an individual may not be consciously aware of, such as to accomplish particular tasks. At the opposite end of the spectrum, explicit knowledge represents knowledge that the individual holds consciously in mental focus, in a form that can easily be communicated to others.

(Nonaka, 1995) proposed a model (SECI, for Socialization, Externalization, Combination, Internalization) which considers a spiralling interaction between explicit knowledge and tacit knowledge. In this model, knowledge follows a cycle in which implicit knowledge is 'extracted' to become explicit knowledge (Walsham, 2003), and explicit knowledge is 're-internalised' into implicit knowledge.

Early research suggested that KM needs to convert internalised tacit knowledge into explicit knowledge to share it, and the same effort must permit individuals to internalise and make personally meaningful any codified knowledge retrieved from the KM effort

Some of the most interesting and fruitful areas of KM occur at the interface of tacit and explicit knowledge. For example:

• In order to utilize tacit knowledge more fully, companies have sought to convert tacit knowledge into explicit knowledge. Most companies have instituted project reviews where "lessons learned" are distilled and entered into a database.

• Most companies have used IT in order to increase the efficiency of person-to-person transfers of tacit knowledge. For example, most of the companies we studied have instituted some form of "expert locator" or "corporate yellow pages" that enables individuals with particular experiential knowledge to be identified and contacted.

• Most of the knowledge being managed by the companies comprises both tacit and explicit knowledge. For example, one of the most important areas of KM among the oil and gas companies is best practices transfer. Best practices tend to be recognized through explicit performance data, but their analysis and transfer requires substantial levels of tacit knowledge both at the level of individual expertise and in organizational routines.

Strategies

Knowledge may be accessed at three stages: before, during, or after KM-related activities. Organisations have tried knowledge capture incentives, including making content submission mandatory and incorporating rewards into Performance measurement plans. Considerable controversy exists over whether such incentives work and no consensus has emerged.

One strategy to KM involves actively managing knowledge (push strategy).In such an instance, individuals strive to explicitly encode their knowledge into a shared knowledge repository, such as a database, as well as retrieving knowledge they need that other individuals have provided (codification).

Another strategy involves individuals making knowledge requests of experts associated with a particular subject on an ad hoc basis (pull strategy).In such an instance, expert individual(s) provide insights to requestor (personalisation).

Cop is one among such strategies for the implementation of KM.

Motivations

Multiple motivations lead organisations to undertake KM. Typical considerations include:

- Making available increased knowledge content in the development and provision of products and services
- Achieving shorter development cycles
- Facilitating and managing innovation and organisational learning
- Leveraging expertise across the organisation
- Increasing network connectivity between internal and external individuals
- Managing business environments and allowing employees to obtain relevant insights and ideas appropriate to their work
- Solving intractable or wicked problems
- Managing intellectual capital and assets in the workforce (such as the expertise and know-how possessed by key individuals or stored in repositories)

3.2 SYSTEMS AND TOOLS FOR MANAGING KNOWLEDGE: IT

Regardless of which approach firms have taken, IT was an important facilitator for many of the technology and people-based activities important to knowledge management success. As argued by (PH, 2003) some companies have relied heavily on information technology and the codification of information to reach their knowledge management objectives. Others emphasize a less formal and more-people oriented approach to knowledge management.

Databases

Information technology has facilitated the assembly of databases (Beynon–Davies, 2003) that can serve as corporate memories for important information including best practices, technical and managerial performance data, company yellow pages, and supplier and customer information.

Software Tools

An important aspect of databases is the ability to link them and make them widely accessible. Software tools associated with databases help users navigate, find and apply useful information relatively quickly and at a low cost. (Grant R. M., 2013) suggests that several databases linked by Oracle's web-based ConText search engine to develop an integrated document management system.

Portals

Another important aspect of IT-enabled KM is the ability to provide users a personalized, single point of access for the applications and content they need. For this purpose, Internet portals are especially useful. A portal is a single gateway through which employees, customers, or partners can retrieve and share knowledge. Portals can help reduce the inconvenience and inefficiency caused by using multiple applications by integrating a wide range of application programs so that information can be exchanged and shared irrespective of a type of application.

Groupware

Collaboration software and groupware make it possible for groups and teams to interactively share knowledge. (Schmidt, 1999) Groupware helps create a shared space where users can exchange knowledge and manage common tasks and resources. Various types of groupware have helped the creation of virtual communities to enable the management of knowledge.

Interest in knowledge management has been spurred by accelerating rates of technological and market change that have resulted in innovation and learning becoming increasingly important for business success and by rapid advances in information and communications technology (ICT)

3.3 SYSTEMS AND TOOLS FOR MANAGING KNOWLEDGE: PEOPLE-BASED

While the initial impetus for KM was advances in IT, during the past five years the major driver behind KM has been the desire to leverage employee-based tacit knowledge. The challenge for the companies has been to go beyond occasional bilateral knowledge exchanges, to form interactive groups that share knowledge in a rich, continuous and dynamic manner. Since 1998, all the oil and gas majors have established informal or semi-formal groupings of employees that share common technical or professional interests for the explicit purpose of sharing knowledge. These knowledge-sharing groups go under a range of different names.

4. LATEST ENDEAVOURS IN THE COMMUNITIES OF PRACTICE

The CoP concept has undergone significant changes during the past years. Originally introduced in the context of Lave and Wenger's seminal research towards a "social theory of learning", a CoPs was seen as an "active system about which participants share understandings concerning what they are doing and what that means" For Etienne Wenger, learning is central to human identity. In this context, a community of practice is a group of individuals participating in communal activity, and experiencing/continuously creating their shared identity through engaging in and contributing to the practices of their communities.

 (Lave & Wenger, 1991) saw the acquisition of knowledge as a social process where people can participate in communal learning at different levels depending on their level of authority or seniority in the group, i.e. whether they are a newcomer to the group or have been a member for a long time. Central to their notion of a CoP as a means of acquiring knowledge is the process by which a newcomer learns from the group

KM was seen as a new and innovative solution to many of these problems, however in practice, much of what was called Knowledge Management was often little more than Information Management re-badged and simply dealt with structured data using a capture, codify and store approach (Wilson, 2002) More recently, there has been recognition of the importance of more subtle, softer types of knowledge that needs to be shared. This raises the question as to how this sort of knowledge might be 'managed'. A certain type of community, the Community of Practice (CoP) has been identified as being a group where such types of knowledge are nurtured, shared and sustained (Hildreth and Kimble, 2002).

A primary focus of (Wenger, 2002) work is on learning as social participation, the individual as an active participant in the practices of social communities, and in the construction of his/her identity through these communities

(Wenger E. M., 2002) marks a decisive shift of Wenger's own writing into a new discourse, confirming trends now both focuses on the value of the community of practice as a management tool and abandons the early example of routine office work

to refocus on "innovation" and problem solving, it stands apart as a manual and inspirational text for practitioners on the formation of informal groups for learning in large companies.

(J. Koh, 2004) Examined how the level of community knowledge sharing activity leads to virtual community outcomes and whether such community outcomes are related to loyalty toward the virtual community. (Chao-Min Chiu, 2006) construct a model for investigating the motivations behind people's knowledge sharing in virtual communities. The study holds that the facets of social capital, social interaction ties, trust, norm of reciprocity, identification, shared vision and shared language will influence individuals' knowledge sharing in virtual communities. They argue that outcome expectations community-related outcome expectations and personal outcome expectations

(Torstein Nesheim, 2011) analyze how formal, horizontal knowledge communities contribute to knowledge application. In large, complex organizations employees face multiple roles that compete for their time and may be conflicting. The paper seeks to analyze the interplay between the communities, the line organization, and the employees; specifically, to examine how the quality of management of the communities, the attitudes of line managers, and the employees' motivation for participating in the communities facilitate knowledge application, (Jeon, 2011) attempts to identify the factors and relationships that influence community of practice (CoP) members' knowledge-sharing attitudes, intentions, and behaviors.

To respond to this changed environment organizations are moving away from the structures of the past that are based on hierarchies, discrete groups and teams and moving towards those based on more fluid and emergent organizational forms such as networks and communities. In addition to the pace of change, globalisation is another pressure that is brought to bear on modern organizations.

5. THEORITICAL BACKGROUND

This study regards knowledge-sharing behavior in CoPs as an individual's social psychological process, in which one's attitude affects intention, and intention subsequently influences the individual's behavior. In order to determine which factors affect CoP members' knowledge sharing attitudes, intentions, and behaviors, the research adopted some background theories

People who come to a virtual community are not just seeking information or knowledge and solving problem; they also treat it as a place to meet other people, to seek support, friendship and a sense of belongingness In other words, they attempt to develop social relationships with other people inside the community

5.1 Social Cognitive Theory and knowledge sharing

The Social Cognitive Theory argues that a person's behavior is partially shaped and controlled by the influences of social network (i.e., social systems) and the person's cognition (e.g., expectations, beliefs) Bandura advances two types of expectation beliefs as the major cognitive forces guiding behavior: outcome expectations and self-efficacy. During the past decade, studies in the information systems (IS) literature have demonstrated the importance of self-efficacy and outcome expectations for predicting and improving computer training performance, computer usage, and Internet behaviors. According to Bandura. if individuals were not confident in their ability to share knowledge, then they would be unlikely to perform the behavior, especially when knowledge sharing is voluntary. Consequently, self-efficacy is not considered in this study. Researchers interested in understanding the motivations prompting people to share knowledge or participate in virtual communities have shown the importance of social influences. They have focused on impersonal configuration of linkages between people or units (e.g., community ties or social interaction) and assets that are rooted in the network of relationships (e.g., trust, norms, and identification). For example, strong community ties could provide important environmental conditions for knowledge exchange. (Langerak, 2004)concluded that satisfaction with member–member interactions and organizer–member interactions have positive effects on member participation. Trust has been identified as a key element in fostering the level of participation or knowledge sharing in virtual communities. They found that group

norms have a strong effect on we-intentions (group intentions) to participate in virtual communities. (al K. e., 2005) found that reciprocity is positively related to the usage of electronic knowledge repositories by knowledge contributors under conditions of weak pro-sharing norms. (al B. e., 2005)found that anticipated reciprocal relationships have a positive effect on attitude toward knowledge sharing and subjective norm has a positive effect on intention to share knowledge. Furthermore, some studies found that a sense of community and social identity can enhance the likelihood of members' contribution and participation in a virtual community.

Prior studies drawing upon the Social Cognitive Theory have ignored the importance of social network influence, while studies in the virtual community literature have paid less attention to the role of personal cognition, such as outcome expectations. According to the Social Cognitive Theory, the question why do individuals spend their valuable time and effort on sharing knowledge with members in virtual communities, should be addressed from the perspectives of both personal cognition and social network. Yet the Social Cognitive Theory is silent concerning what resources are embedded within a social network and how they affect an individual's behavior. Consequently, the Social Capital Theory is introduced to supplement the Social Cognitive Theory to address our research question

The tenet of the Social Capital Theory is that social relationships among people can be productive resources and suggested that social capital facilitates coordination and cooperation for mutual benefit. Social capital has been defined as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Building on , (Ghoshal, 2002) empirically justified how social capital facilitates resource exchange and production innovation within the organization, while examined the effects of social capital on knowledge acquisition and exploitation in young technology-based firms. However, virtual communities differ notably from organizational settings since interaction among community members is through online communication. Consequently, whether the impact of social capital on resource exchange and knowledge management activities found in the organizational settings could be generalized to virtual communities is still unclear

(Ghoshal, 2002) suggested that the Internet decreases social capital, while (man, 2001)indicated that Internet use supplements social capital by extending existing

levels of face-to-face and telephone contacts. They concluded that the Internet neither destroys nor creates social capital. Members in virtual communities differ from general Internet users in that virtual community members are brought together by shared interests, goals, needs, or practices. This begs the key question — whether the social capital developed in virtual communities is strong enough to stimulate members to overcome the barriers of complex knowledge sharing process, and then share valuable knowledge, especially when no extrinsic reward is provided. By following the theory proposed by (Ghoshal, 2002),

5.2 Knowledge communities in matrix like organisations.

(Nesheim, 2011) hypothesize that the actions and interactions among members are influenced by management along two dimensions; first the quality of management as conducted by the community coordinator and, second, the degree of support provided by the line manager with regard to participation in communities. They test how these two management dimensions interact with employee motivation, and influence knowledge application
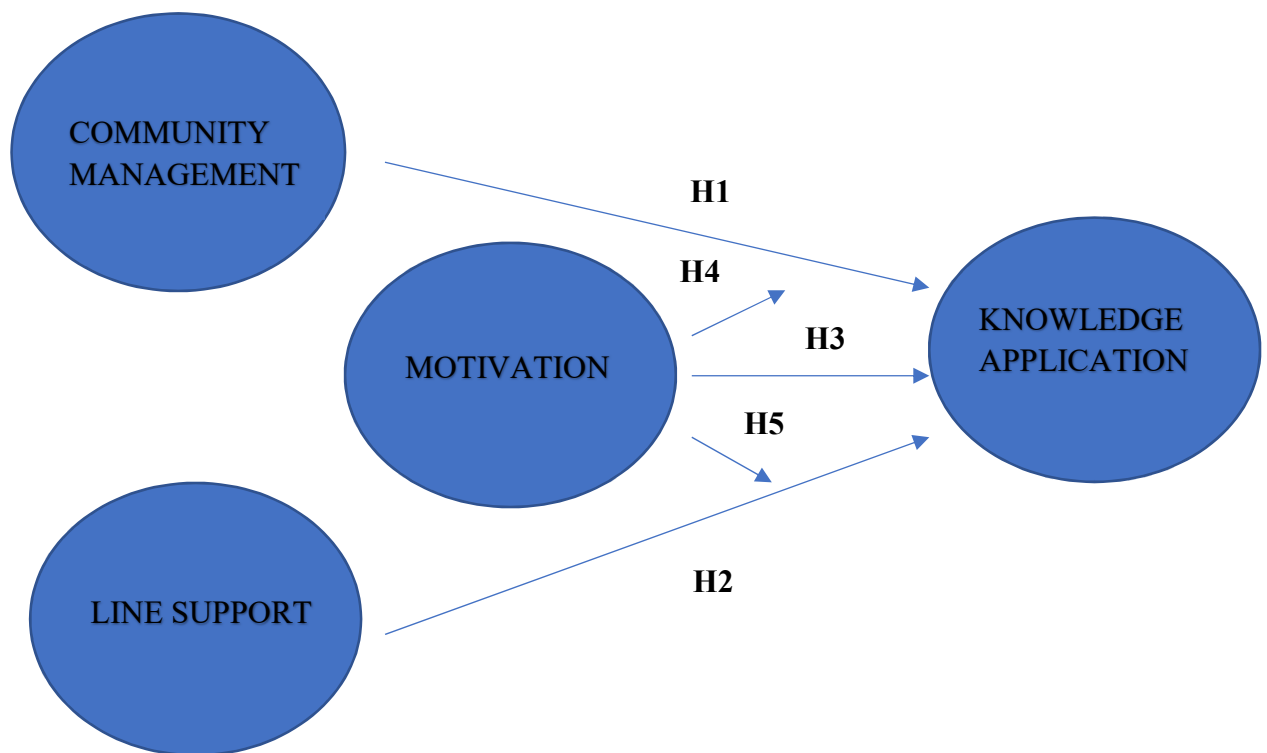

Figure 1:MANAGING KNOWLEDGE TOWARDS APPLICATION

They found that good community management is positively associated with knowledge application, the actions and capabilities of the coordinator should influence knowledge processes in the community. A good coordinator will be able to identify and disseminate relevant information and thereby stimulate knowledge sharing among the members. By influencing the amount of relevant information and informal contacts, as well as focus the potential use of knowledge, coordinators will make a difference towards

5.3 Individual, social and organisational context for active knowledge.

This study attempts to identify the factors and relationships that influence community of practice (CoP) members' knowledge-sharing attitudes, intentions, and behaviors (Jeon, 2011). They imply that managers who intend to introduce CoPs to their firm, a CoP supportive environment must be created, such that the image, reciprocity, enjoyment of helping, and need for affiliation of each CoP member can be satisfied

They identified confirmatory relations by integrating some theoretical models on human behavior designed to clarify the mechanism of knowledge sharing in CoPs. With an understanding of the entire knowledge sharing process (attitude-intention-behavior), companies should establish a spontaneous knowledge sharing culture and adopted three background theories,the Theory of Planned Behavior (TPB) model, Motivation Theory, and the Triandis model. The integration of these three underlying theories to hypothesise the factors affecting knowledge sharing and intention towards knowledge sharing in which they considered anticipated recognition, reciprocal relationship and usefulness as an intrinsic motivator.Affect, social factor and facilitating conditions as an extrinsic motivator.
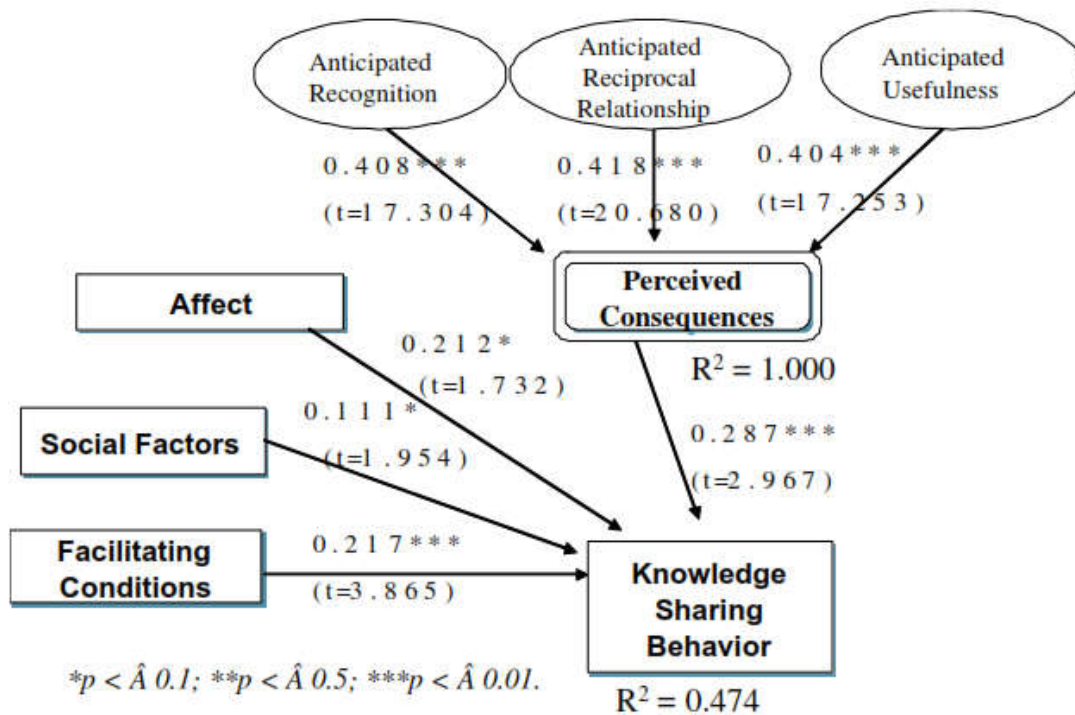
Figure 2:ACTIVE KNOWLEDGE SHARING IN COP

Whereas both extrinsic motivational and intrinsic motivational factors positively influenced attitude toward knowledge-sharing behaviors, intrinsic motivational factors were more influential in this regard. Additionally, some differences in knowledge-sharing mechanisms were noted between formally managed CoPs and informally nurtured CoPs. This study is one of the first pieces of integrative research regarding CoPs to target understanding of the most crucial component of CoP activities, namely knowledge sharing.

5.5 Understanding knowledge sharing in virtual communities.

The study draws on both the Social Cognitive Theory and the Social Capital Theory (Chao-Min Chiu a, 2006) to investigate the influence of outcome expectations and facets of the three dimensions of social capital on the knowledge sharing in virtual communities in terms of quantity and quality, the structural dimension of social capital is manifested as social interaction ties, the relational dimension is manifested as trust, norm of reciprocity and identification, and the cognitive dimension is manifested as shared vision and shared language.
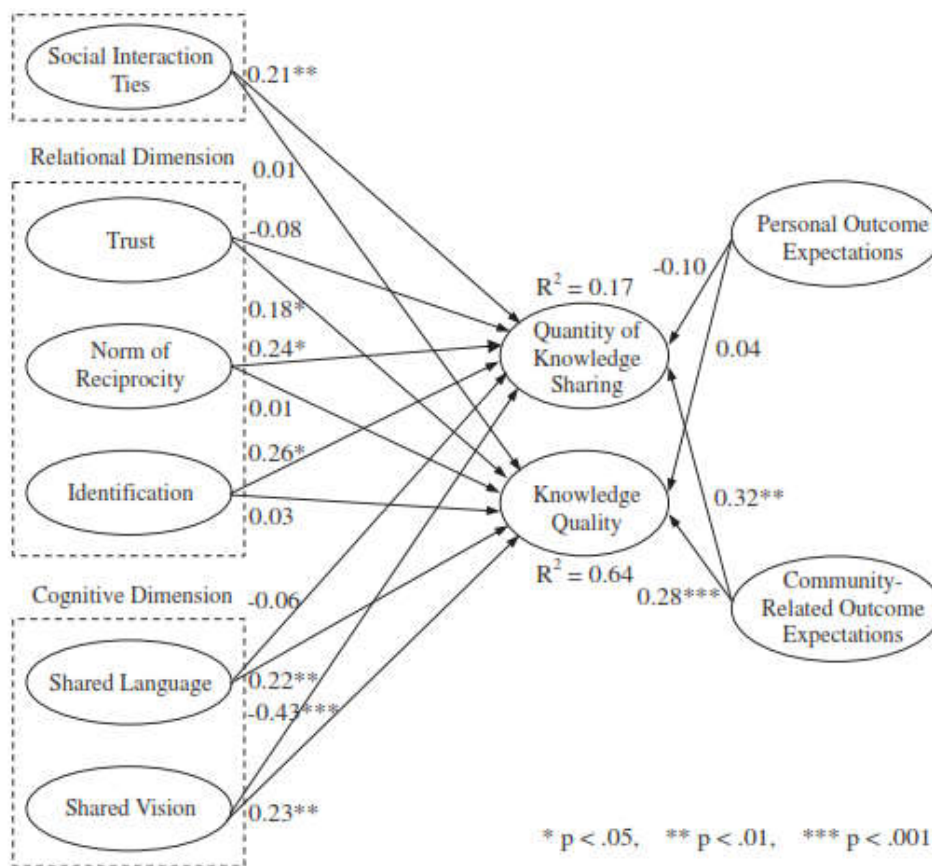
Figure 3:QUALITY OF KNOWLEDGE SHARING

6. PROPOSED MODEL

We hypothesize that value perception has a mediating role between line support and Cop engagement, instead of just considering line support as a simple relation that will benefit cop engagement.

H1: The direct effect of line support on CoP engagement
H2: The mediating effect of Value perception in this relationship.
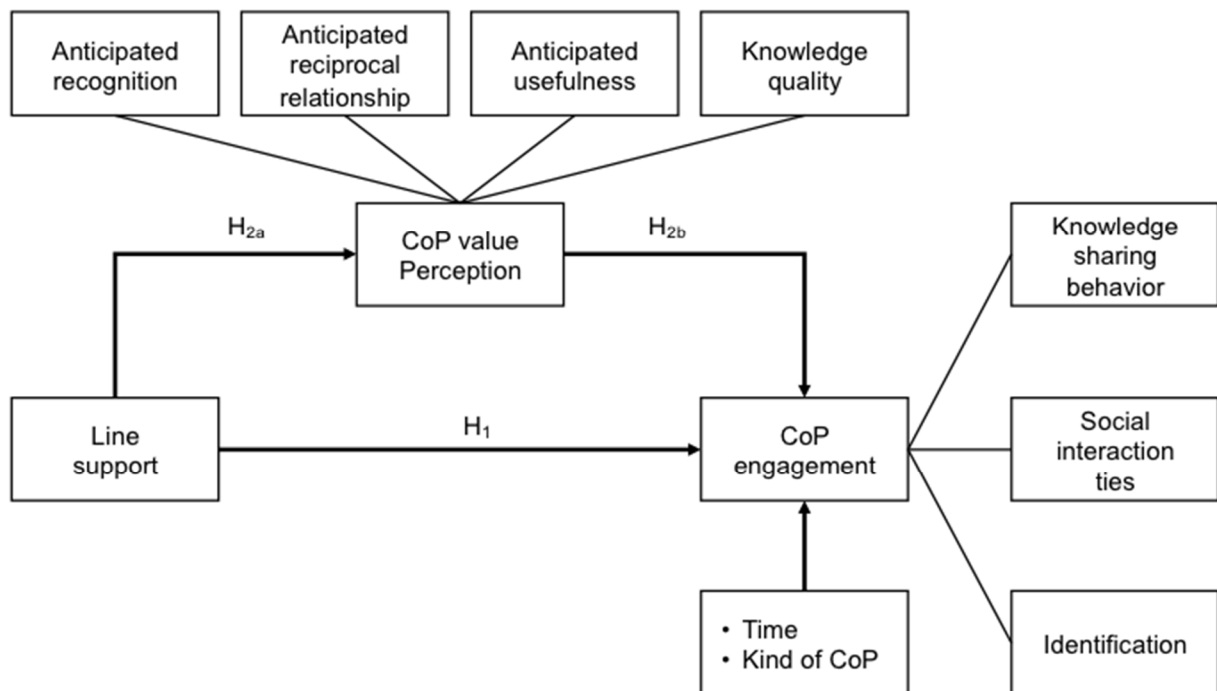
Figure 4:RESEARCH MODEL

7. JUSTIFICATION OF HYPOTHESES

Line support, H1

Line support is positively associated with knowledge application. As community members have a double membership. They report to their manager in a line unit in which most of the operative work tasks are located, as well as participate in knowledge communities. The line manager and coordinator roles reflect the matrix character of an organization in which different internal stakeholders are present. In general, such organizations may have built-in dilemmas and tensions, such as the internalization of conflicts into the organization, stress related to role conflict, and maintenance of the delicate balance of power between managers. A formalized community creates a structural overlay across the hierarchical organization that potentially reduces the power of the line organization. Line managers may worry that they would lose control and that their position would be threatened by the other membership. For instance, line management with limited interest in supporting knowledge ''activists'' was found to hamper the effectiveness of the knowledge community. In summary, the line manager may perceive an employee's participation in other domains as disrupting, competing for scarce resources, as well as a potential challenge to his or her power. Given that supervisors are important in shaping employees' attitudes towards knowledge sharing; they play a crucial role for employees' engagements in knowledge sharing activities (al, 2006)Thus, if line managers provide active support for such participation, it increases the likelihood that best practices, methods, and techniques will be used in the organizational unit

Which implies Line support and intrinsic motivation have a positive impact on knowledge application. Second, the effect of line support is stronger when employees are intrinsically motivated

Perceived consequences, H2

Human behaviors are influenced not only by internal factors but also by external stimuli. Rewards might be a typical example of such external stimuli within the context of knowledge sharing. Social image refers to the expectation that one's reputation can

be enhanced due to knowledge sharing in CoPs. Prior literature has studied some of these aspects. Other studies have argued that value perception is also an important element of the VCoP management (see here especially the paper used for the construct of value perception). So, Perceived behavioral control will have a positive effect on CoP members' intentions toward knowledge sharing.

Anticipated recognition

Image will have a positive effect on CoP members' attitudes toward knowledge sharing. implicit knowledge is shared among members, economic rewards may cause negative perceptions to arise among the members Social image refers to the expectation that one's reputation can be enhanced due to knowledge sharing in CoPs, (Triandis, 1989) has proposed that ego in an individual comprises individual ego, collective ego, and public ego, and that, among collective individuals, public ego is nurtured more prominently than individual ego.

Anticipated reciprocal relationship

Reciprocity is another extrinsic social psychological motivational driver of knowledge sharing in CoPs. Reciprocity functions as a crucial motivation for participants engaging in social exchanges.. Reciprocity entails a social "give and take" relationship. When one member of a CoP shares his knowledge with other CoP members, if reciprocity holds, he would anticipate receiving the required knowledge from other CoP members. A positive relationship has been noted to exist between the knowledge-sharing behaviour of online community members and community members' perceived reciprocity. According to the study of Bock et al.(2005), reciprocity will affect one's knowledge sharing attitudes first, before it ultimately results in more active knowledge-sharing behaviour in CoPs, reciprocity will have a positive effect towards COP's members toward knowledge sharing.

Anticipated usefulness

An anticipated increase in visibility or status within the organization as the result of certain behaviors may serve as an extrinsic social motivation (Frey and Osterloh, 2002). The social rewards can also be understood in terms of the participants' personal benefits involved in social exchange (Blau, 1967). In the context of CoP, social rewards such as reputational or image enhancements, are considered more appropriate, since CoP members create or join their communities as the result of shared enthusiasm for a common cause, rather than as the consequence of anticipating specific economic rewards from the firm.

Knowledge quality

Outcome expectations refer to an individual's belief that task accomplishment leads to a possible outcome. In this study, community-related outcome expectations refer to a knowledge contributor's judgment of likely consequences that his or her knowledge sharing behavior will produce to a virtual community, while personal outcome expectations refer to the knowledge contributor's judgment of likely consequences that his or her knowledge sharing behavior will produce to him or herself. According to the Social Cognitive Theory, individuals are more likely to engage in the behavior that they expect to result in favorable consequences. Several studies in IS research provided support for this contention. One study found that performance-related outcome expectations had a significant effect on computer use. Another study found that outcome expectations were significantly related to computer end- user's organizational commitment.

Some studies suggested that individuals would share knowledge within virtual communities with the expectations of enriching knowledge, seeking support, making friends, etc. Butler et al. suggested that the primary reason for individuals to share knowledge is their expectation of being seen as skilled, knowledge- able or respected. Other studies suggested that individuals share knowledge with the expectation of helping the virtual community to accumulate its knowledge, continue its operation, and grow.

8. ANALYSIS

We surveyed 545 employees at Petrobras oil and gas company in Brazil to understand how the industry is functioning and given a questionnaire to fill with all the useful variables to rate in a scale of 1-7 and 345 employees completed the survey.

Main construct	Subconstruct	Reference	Item scale
Line Support	-	Neisheim et al. (2011)	1. My line manager believes it is important for me to participate in the discipline network.
		New	2. I receive necessary support from line manager to participate in CoP.
		New	3. All line managers participate in activities developed by CoP.
		New	4. At the managerial level, I feel that there are enthusiasm and engajement for the growth of CoP.

Main construct	Subconstruct	Reference	Item scale
CoP perceived value	Anticipated Recognition	Jeon et al. (2011)	1. My knowledge sharing in the CoP would improve senior managers recognition of me.
		Jeon et al. (2011)	2. My knowledge sharing in the CoP would improve other co-workers recognition of me.
		Jeon et al. (2011)	3. My knowledge sharing in the CoP would have a good effect on the job evaluation of me.
		Jeon et al. (2011)	4. My knowledge sharing in the CoP would give me opportunities to get honorable prizes.
	Anticipated Reciprocal relationships	Jeon et al. (2011)	1. My knowledge sharing in the CoP would strengthen the ties between other members and myself.
		Jeon et al. (2011)	2. My knowledge sharing in the CoP would get me well-acquainted with other members.
		Jeon et al. (2011)	3. My knowledge sharing in the CoP would expand the scope of my association with other members.
		Jeon et al. (2011)	4. My knowledge sharing in the CoP would deepen the relationship with other members.
		Jeon et al. (2011)	5. My knowledge sharing in the CoP would create smooth cooperation with other members.
	Anticipated usefulness	Jeon et al. (2011)	1. My knowledge sharing in the CoP would ease learning for my job.
		Jeon et al. (2011)	2. My knowledge sharing in the CoP would decrease the time needed for my important job responsibilities.
		Jeon et al. (2011)	3. My knowledge sharing in the CoP would increase the effectiveness of performing job task.
		Jeon et al. (2011)	4. Considering all tasks, my knowledge sharing in the CoP would assist on job.
	Knowledge quality	Chiu et al. (2006)	1. The knowledge shared by members in the community is relevant to the topics.
		Chiu et al. (2006)	2. The knowledge shared by members in the community is easy to understand.
		Chiu et al. (2006)	3. The knowledge shared by members in the community is accurate.
		Chiu et al. (2006)	4. The knowledge shared by members in the community is complete.
		Chiu et al. (2006)	5. The knowledge shared by members in the community is reliable.
		Chiu et al. (2006)	6. The knowledge shared by members in the community is timely.

Main construct	Subconstruct	Reference	Item scale
Engagement in CoP	Knowlede Sharing Behaviour	Jeon et al. (2011)	1. I frequently share the work reports and official documents obtained from inside the organization with other CoP members
		Jeon et al. (2011)	2. I frequently share the work reports and official documents obtained outside the organization with other CoP members
		Jeon et al. (2011)	3. I frequently share my experience or know-how from work with other CoP members.
		Jeon et al. (2011)	4. I frequently share my expertise from my education or training with CoP members.
	Social interaction ties	Chiu et al. (2006)	1. I maintain close social relationships with some members in the community
		Chiu et al. (2006)	2. I spend a lot of time interacting with some members in the community.
		Chiu et al. (2006)	3. I know some members in the community on a personal level.
		Chiu et al. (2006)	4. I have frequent communication with some members in the community.
	Identification	Chiu et al. (2006)	1. I feel a sense of belonging towards the community.
		Chiu et al. (2006)	2. I have the feeling of togetherness or closeness in the community.
		Chiu et al. (2006)	3. I have a strong positive feeling toward the virtual community.
		Chiu et al. (2006)	4. I am proud to be a member of community

Table 1:QUESTIONAIRE

To test the proposed research model, we adopted the survey method for data collection, and examined our hypotheses by applying CFA analysis

8.1 Measurement and Data Collection

To secure CoPs that are distinguished from the traditional business or task force teams, we looked for an organization where CoP activities were voluntary and informal and the organization was willing to nurture such CoPs without formal control. A major player of the OIL and GAS industry, based in Brazil, fit our target profile and agreed to participate in our study. Their CoPs were initiated to promote internal learning and problem solving.

We developed the items in the questionnaire either by adapting measures that had been validated by other researchers or by converting the definitions of constructs into a questionnaire format. Specially, the items for the three antecedents, Line support , Perceived consequences and COP engagement were developed based on relevant theories and prior studies. Each member received an electronic, web-based questionnaire

8.2 Variables

All variables were measured in Likert-style 7 point scales (1 = strongly disagree, 7 = strongly agree). For anticipated recognition, Gruen et al.'s (2000) recognition variable, Bock and Kim's (2002) anticipated reward variable, and image variable were adapted for the CoP context. Anticipated reciprocal relationship was measured by adapting Bock et al.'s (2005) anticipated reciprocal relationship variable for the CoP con- text. Anticipated usefulness was measured by adapting Thompson et al.'s (1991) job fit variable for the CoP context. Anticipated recognition, anticipated reciprocal relationship, and anticipated usefulness were used for as indicators to create the superordinate perceived consequences construct (Chin & Gopal, 1995). Affect variable measurement was based on Thompson et al. (1991) and Compeau, Higgins, and Huff (1999) studies while social factors were based on Chang and Cheung (2001).

It is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (or factor). As such, the objective of confirmatory factor analysis is to test whether the data fit a hypothesized measurement model.

In confirmatory factor analysis, the researcher first develops a hypothesis about what factors they believe are underlying the measures used (e.g., Depression being the factor underlying the Beck Depression Inventory and the Hamilton Rating Scale for Depression) and may impose constraints on the model based on these a prior hypotheses. By imposing these constraints, the researcher is forcing the model to be consistent with their theory. For example, if it is posited that there are two factors accounting for the covariance in the measures, and that these factors are unrelated to one another, the researcher can create a model where the correlation between factor A and factor B is constrained to zero. Model fit measures could then be obtained to assess how well the proposed model captured the covariance between all the items or measures in the model. If the constraints the researcher has imposed on the model are inconsistent with the sample data, then the results of statistical tests of model fit will indicate a poor fit, and the model will be rejected. If the fit is poor, it may be due to some items measuring multiple factors. It might also be that some items within a factor are more related to each other than others.

Evaluating model fit

Most statistical methods only require one statistical test to determine the significance of the analyses. However, in CFA, several statistical tests are used to determine how well the model fits to the data. Note that a good fit between the model and the data does not mean that the model is "correct", or even that it explains a large proportion of the covariance. A "good model fit" only indicates that the model is plausible. When reporting the results of a confirmatory factor analysis, one is urged to report: a) the proposed models, b) any modifications made, c) which measures identify each latent variable, d) correlations between latent variables, e) any other pertinent information, such as whether constraints are used. With regard to selecting model fit statistics to report, one should not simply report the statistics that estimate the best fit, though this

may be tempting. Though several varying opinions exist, Kline (2010) recommends reporting the Chi-squared test, the Root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardised root mean square residual (SRMR).

Model fit indices	Results	Recommended values
Cronbach's alpha	0.8997	≥ 0.70
p-value	0	0
CFI	0.931	≥ 0.9
RMSEA	0.106	≤ 0.08

Table 2:MODEL FIT INDICES

First, the measures were subjected to Confirmatory Factor Analysis (CFA), where all factors, excluding the controls variables (time and type), were included in one CFA model

CFA all

We used structural equation modelling technique to test the hypothesis, and the constructs were subjected to SPSS(statistical tool) where all the variables are subjected to statistical analysis.

In the Table below we did a CFA analysis of all the variables starting from the constructs

Construct	Subconstruct	sub	Var.	Coef.
Engagement	CoP Identification	IDEN	-	0.8306581
Engagement	Social ties	INTER	-	0.6393938
Engagement	Knowledge Sharing	KS	-	0.8023898
Engagement	CoP Identification	iden1	var36	0.8680305

Engagement	CoP Identification	iden2	var37	0.8698974
Engagement	CoP Identification	iden3	var38	0.7480399
Engagement	CoP Identification	iden4	var39	0.8224825
Engagement	Social ties	inter1	var40	0.8858951
Engagement	Social ties	inter3	var42	0.6266426
Engagement	Social ties	inter4	var43	0.9488595
Engagement	Knowledge Sharing	ks1	var44	0.8578481
Engagement	Knowledge Sharing	ks2	var45	0.6504305
Engagement	Knowledge Sharing	ks3	var46	0.9034048
Engagement	Knowledge Sharing	ks4	var47	0.9029034

Chi^2	1555.755
p-value	0
RMSEA	0.078
CFI	0.888
Cronbach's Alpha	0.9698
VE	0.6497
SRMR	0.05

Table 3:CFA RESULTS

CFA recognition

We used the subconstruct recognition to study the the 6variables sharing knowledge in the CoPs would help me gain more recognition from top management, colleagues, evaluation others make on my work, get important awards, strengthen my ties with other members of the community.,well acquainted with other members and the results from the SPSS analysis are shown in the table below

sem(REC-> var23-var24),cov(e.var23*e.var26) stand

Subconstruct	Sub	Var.	Coef.
Quality	qual1	var17	0.8065864
Quality	qual2	var18	0.8078495
Quality	qual3	var19	0.8541552
Quality	qual4	var20	0.7953475
Quality	qual5	var21	0.7930457
Quality	qual6	var22	0.7717317

Chi^2	13.485
p-value	0.142
RMSEA	0.038
CFI	0.997
Cronbach's Alpha	0.9164
ariance extracted)	0,6483
SRMR	0.013

Table 4:CFA RECOGNITION

CFA QUALITY

We used the subconstruct Quality to study the the 6variables of the knowledge shared by CoP members is relevant to the interests of the group,easy to understand,accurate. Complete,Reliable and current, the results from the SPSS analysis are shown in the table below

sem(QUAL->var17-var22),stand

Subconstruct	Sub	Var.	Coef.
Quality	qual1	var17	0.8065864
Quality	qual2	var18	0.8078495
Quality	qual3	var19	0.8541552
Quality	qual4	var20	0.7953475
Quality	qual5	var21	0.7930457
Quality	qual6	var22	0.7717317

Chi^2	13.485
p-value	0.142
RMSEA	0.038
CFI	0.997
Cronbach's Alpha	0.9164
ariance extracted)	0,6483
SRMR	0.013

Table 5:CFA QUALITY

CFA Relationship

The subconstructs relationship refers to the 4 variables that believe sharing knowledge in the CoPs would help to strengthen ties with other members of the community.,well acquainted with other members,expand scope of association with other members (networking), deepen relationships and have good cooperation with other members. the results from the SPSS analysis are shown in the table below

sem(REL->var27-var31),cov(e.var29*e.var31) stand

Subconstruct	Sub	Var.	Coef.
Relationship	rel1	var27	0.9311976
Relationship	rel2	var28	0.7068181
Relationship	rel3	var29	0.7798346
Relationship	rel4	var30	0.9348144
Relationship	rel5	var31	0.7988986

Chi^2	20.685
p-value	0.000
RMSEA	0.110
CFI	0.989
Cronbach's Alpha	0.9268
VE (variance extracted)	0,6974
SRMR	0.015

Table 6:CFA RELATIONSHIP

CFA Usefulness

The construct Usefulness refers to the 4 variables of sharing knowledge in CoP would allow to learn more easily the tasks of work, reduce the time needed to complete work, improve the effectiveness of tasks and effectively helps to improve my performance. the results from the SPSS analysis are shown in the table below

sem(USE->var32-var35),stand

Construct	Subconstruct	Var.	Coef.
Usefulness	use1	var32	0.8328643
Usefulness	use2	var33	0.752392
Usefulness	use3	var34	0.8006171
Usefulness	use4	var35	0.7841126

Chi^2	12.147
p-value	0.002
RMSEA	0.121
CFI	0.985
Cronbach's Alpha	0.8685
ariance extracted)	0,6289
SRMR	0.020

Table 7:CFA USEFULNESS

CFA cop identification

The construct Identification refers to the 4 variables of having a sense of belonging to one Cop, strong positive feel, togetherness and proud to be a member of Cop of their company, the results from the SPSS analysis are shown in the table below

sem(var36-var39), cov(e.var36*e.var37) stand

Subconstruct	Sub	Var.	Coef.
CoP Identification	iden1	var36	0.7753188
CoP Identification	iden2	var37	0.7899798
CoP Identification	iden3	var38	0.8046558
CoP Identification	iden4	var39	0.8884615

Chi^2	1.321
p-value	0.250
RMSEA	0.031
CFI	1.000
Cronbach's Alpha	0.8985
VE (variance extracted)	0,6655
SRMR	0.004

Table 8:CFA COP IDENTIFICATION

CFA Social ties

The construct Social ties refers to the variables of maintaining close social relationships with some CoP members, spend a lot of time interacting with other CoP members, know some CoP members on a personal level and have frequent communication with some members of the community. the results from the SPSS analysis are shown in the table below

sem(INTER->var40-var43),stand

Subconstruct	sub	Var.	Coef.
Social ties	inter1	var40	0.8858951
Social ties	inter3	var42	0.6266426
Social ties	inter4	var43	0.9488595

Chi^2	0.000
p-value	0.000
RMSEA	0.000
CFI	1,000
Cronbach's Alpha	0.858
VE (variance extracted)	0.6928
SRMR	0.000

Table 9:CFA SOCIAL TIES

Value perception

A second-order confirmatory factor analysis of a model depicting quality, recognition, reciprocal relationships and usefulness was conducted, in order to provide evidence for the plausibility of the thesis that CoP value perception is a multifaceted construct construed from quality, recognition, reciprocal relationships and usefulness. the results from the SPSS analysis are shown in the table below

sem(VPERC->var62-var65),stand

Construct	Subconstruct	sub	Var.	Coef.
Value Perception	Quality	QUAL	var62	0.7477589
Value Perception	Recognition	REC	var63	0.7303693
Value Perception	Relationships	REL	var64	0.8952921
Value Perception	Usefulness	USE	var65	0.871008

Chi^2	3.027
p-value	0.22
RMSEA	0.039
CFI	0.999
Cronbach's Alpha	0.8825
VE	0.6632
SRMR	0.008

Table 10:CFA VALUE PERCEPTION

COP Engagement

Another second-order confirmatory analysis was conducted, now with a model depicting CoP identification, social ties and knowledge sharing, in order to provide evidence for the plausibility of the thesis that CoP Engagement is a multifaceted construct construed from CoP identification, social ties and knowledge sharing.

sem(ENGAG->var66-var68),stand

Construct	Subconstruct	sub	Var.	Coef.
Engagement	CoP Identification	IDEN	var66	0.7973021
Engagement	Social ties	INTER	var67	0.5910872
Engagement	Knowledge Sharing	KS	var68	0.7396991

Chi^2	0
p-value	
RMSEA	0
CFI	1
Cronbach's Alpha	0.7463
VE	0.51074
SRMR	0

Table 11:CFA COP ENGAGEMENT

CFA Model

sem(VPERC->var62-var65)(ENGAG->var66-var68)(LSUP->var1-var4),stand

Construct	Subconstruct	sub	Var.	Coef.
Value Perception	Quality	QUAL	var62	0.7970513
Value Perception	Recognition	REC	var63	0.7259213
Value Perception	Relationships	REL	var64	0.8571577
Value Perception	Usefulness	USE	var65	0.872524
Engagement	CoP Identification	IDEN	var66	0.9211207
Engagement	Social ties	INTER	var67	0.5305475
Engagement	Knowledge Sharing	KS	var68	0.6402588
Line Support	-	sup1	var1	0.8696768
Line Support	-	sup2	var2	0.7892156
Line Support	-	sup3	var3	0.5090848
Line Support	-	sup4	var4	0.8212158

Chi^2	199.024
p-value	0
RMSEA	0.106
CFI	0.931
Cronbach's Alpha	0.8997
VE	0.59190
SRMR	0.057

Table 12:CFA MODEL

8.4 Regression Analysis

In Statistical modelling, regression analysis is a set of statistical processes for estimating the relationships among variables. It includes many techniques for modelling and analysing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors')

Many techniques for carrying out regression analysis have been developed. Familiar methods such as linear regression and ordinary least squares regression are parametric

Regression models involve the following parameters and variables:

- The unknown parameters, denoted as β
- The independent variables, X
- The Dependent variables, Y

Since this study constructed the perceived consequences construct as a second order factor composed from anticipated recognition, anticipated reciprocal relationship, and anticipated usefulness formatively, Regression method, which enables the formation of latent constructs from formative indicators, was adopted.

8.4.1 Mediator

To test for mediation, one should estimate the three following regression equations: first, regressing the mediator on the independent variable; second, regressing the dependent variable on the independent variable; and third, regressing the dependent variable on both the independent variable and on the mediator (Baron and Kenny, 1986).

These three regression equations provide the tests of the linkages of the mediational model. To establish mediation, the following conditions must hold: First, the independent variable must affect the mediator in the first equation; second, the independent variable must be shown to affect the dependent variable in the second equation; and third, the mediator must affect the dependent variable in the third equation. If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the second

8.4.2 Regressing the mediator on the dependent variable

	Quality	Recognition	Relationships	Usefulness	Value Perception - cumulative
	beta	beta	beta	beta	beta
Line Support	0.498***	0.467***	0.396***	0.426***	0.518***
Control_Time	-0.078*	-0.044	-0.104**	-0.031	-0.074
Control_Type1	0.108	0.161**	0.075	-0.026	0.094
Control_Type2	0.16**	0.22**	0.142*	0.127*	0.19**
Control_Type3	0.021	0.113	0.111	0.107	0.104
Control_Type4	0.044	0.139**	0.035	0.042	0.078
F	2.022*	2,351**	1.857	2.111*	2.194*
R²	0.292	0.261	0.182	0.206	0.304
Adj. R²	0.28	0.248	0.168	0.192	0.292
Change in R²	0.021	0.026	0.022	0.025	0.023

*p<0.1 **p<0.05 ***p<0.001

Table 13:REGRESSION DEPENDENT VARIABLE

8.4.3 Regressing the mediator on the independent variable

	CoP Identification	Social ties	Knowledge Sharing	Engagement - cumulative
	beta	beta	beta	beta
Line Support	0.581***	0.39***	0.533***	0.61***
Control_Time	-0.036	0.085*	0.046	0.042
Control_Type1	0.079	0.225**	-0.036	0.113*
Control_Type2	0.129*	0.269***	-0.01	0.166**
Control_Type3	0.021	0.031	-0.072	-0.008
Control_Type4	0.09*	0.036	-0.044	0.033
F	1.441	5.863***	0.735	3.047**
R²	0.367	0.263	0.306	0.442
Adj. R²	0.356	0.25	0.294	0.432
Change in R²	0.13	0.064	0.008	0.025

*p<0.1 **p<0.05 ***p<0.001

Table 14:REGRESSION INDEPENDENT VARIABLE

8.4.4 Regressing the dependent variable on both the independent variable and on the mediator

	CoP Identification	Social ties	Knowledge Sharing	Engagement - cumulative
	beta	beta	beta	beta
Line Support	0.22***	0.266***	0.38***	0.355***
Value Perception (cumulative)	0.695***	0.238***	0.295***	0.492***
Control_Time	0.015	0.103**	0.068	0.078**
Control_Type1	0.014	0.203**	-0.064	0.067
Control_Type2	-0.03	0.224**	-0.058	0.072
Control_Type3	-0.052	0.006	-0.102	-0.059
Control_Type4	0.036	0.018	-0.067	-0.006
F	1.228	5.804***	1.216	3.85**
R^2	0.704	0.302	0.367	0.61
Adj. R^2	0.698	0.288	0.354	0.602
Change in R^2	0.005	0.06	0.011	0.022

*$p < 0.1$ **$p < 0.05$ ***$p < 0.001$

Table 15:REGRESSING DEPENDENT VARIABLE ON BOTH

9. DISCUSSION

This study intends to enhance our understanding of the characteristics of interaction processes in CoPs and their antecedents. Building on prior research on CoPs, teams, and knowledge management we proposed and tested a research framework capturing to what extent members' motivation, the community leader and management support influence CoP interaction quality and knowledge sharing. Further, she we evident interaction frequency mediates the relationship between antecedents and interaction quality. In order to test the proposed hypotheses data from 325 members in PETROBRAS.

First, we found that line support has a positive impact on knowledge application. Because formalized communities create an overlay across the hierarchical organization, and thus may reduce the line organization's power, the authors expected that line support would be essential for knowledge application. Our findings support this when workers perceive having support from their line manager, they tend to be able to retrieve more knowledge from the community. In other words, when the line manager has a positive attitude towards community participation, he or she is more inclined to understand the potential of the knowledge elements shared and disseminated throughout the community.

Second, we found a positive interaction effect of motivation and line support. Intrinsically motivated employees who receive support, from their line manager, for joining the community are able to retrieve more knowledge than those who do not receive support from their line manager. This finding shows that the line managers' attitudes are essential for employees to be able to apply the knowledge they retrieved from the communities. .

Our proposed model demonstrates the relationships among all the constructs that we hypothesised, It shows that the proposed model adequately fits the data. The incremental fit index and comparative fit index are beyond ≥ 0.9, The P-value and Cronbach's alpha are suggesting a reasonable fit. The RMSEA is 0.106

The results of this study have several implications for the management of knowledge in CoPs in corporate practice. As CoPs are fertile organizational forms, managers have to learn to cultivate them without destroying them. While interfering in interactions of community members will be contra-productive, management should have an awareness of networks of knowledge workers. As this research shows, CoPs profit from an active support in terms of providing required resources.

Future research could enhance our understanding of learning and knowledge generation by also considering the type of knowledge handled in the CoP and Time indicators Furthermore, with respect to leadership issues the impact of existing reward schemes on members motivation and their actual participation on knowledge sharing processes could be an interesting research area. Additionally, as this analysis is based on community members' perceptions, further studies could include assessments from community leaders

9.1 Implications and further research

This study has several implications for further research on knowledge management and knowledge processes. First, this study is among only a few studies that have examined the antecedents of knowledge application. This process in the knowledge management cycle is closely connected to exploitation of knowledge. Follow-up studies of knowledge application could contribute to a better understanding of this key aspect of organizational knowledge sharing. Research challenges include understanding what constitutes knowledge application in different settings, and determining whether or not the model the authors outline can explain the application across empirical settings. Challenges also include developing measures for this concept.

We analyzed deliberately created horizontal communities of a more formal nature in which knowledge sharing and dissemination take place, in contrast with ''early'' communities of practice and informal knowledge sharing communities. Although organizations have different rationales for creating such constellations, the authors believe there are reasons to suggest that they often constitute horizontal, structural overlays in matrix-like organizations. Further work should be done on such knowledge

constellations because of their possible empirical significance, and the potential to build theory that accounts for variation in organizational context. Findings, within similar settings should be accumulated and compared. Further questions need to be explored, for example, what is the impact of the degree of formality? Do formal, managerial supported communities have higher degrees of success, and if so, what accounts for the differences between types of communities?

The authors cannot generalize statistically beyond the organization studied here; however, the authors believe that the matrix-like character of knowledge constellations is generic in organizations, at least beyond a certain level of complexity. This is because an employee's primary membership is usually related to day-to-day operations in a line unit, project, or team. Such operations consume most of the employee's time. However, in large distributed organizations, there will be a need to build, develop, and exchange methods, techniques, experiences, and information across these basic units. These overlays might be related to similar knowledge domains, such as in the context studied here, or focus on product development and innovation that is based on a range of different knowledge types. The matrix-like character of knowledge communities is an area for sharing information. Further research should pursue competence development in such organizations. This would be a vital addition to understanding the relationship between organizational structure and knowledge processes in organizations.

We found support for both management dimensions, namely, the quality of community management and support from line managers. The main leadership challenge for incumbents of the community integration role is to exert influence across organizational units and activate members, when they do not have any hierarchical authority. The authors developed the measures of community management on the basis of an in-depth understanding of the communities in the specific context. A vital task for further research should be to develop constructs that capture such horizontal coordination, as well as the constructs' indicators. Further questions need to be explored. What are the mechanisms through which community coordinators exert influence and stimulate interactions among network members? Regarding the influence of the line manager of the community member, the authors found that line

support contributed positively to knowledge application in the line unit. Using this study as a basis, further research could analyze line support in more detail, including the development of indicators of the construct and its impact in matrix-like organizations.

10. CONCLUSION

This study has identified confirmatory relations by integrating some theoretical models on human behavior designed to clarify the mechanism of knowledge sharing in CoPs. With an understanding of the entire knowledge sharing process (attitude-intention-behavior), companies should establish a spontaneous knowledge sharing culture.

One of the major findings of this study was that, to enhance knowledge sharing and knowledge application, commitment from both line managers and community coordinators is vital. In a matrix-like organization, dialogue and communication both extrinsic motivational and intrinsic motivational factors can affect attitudes toward knowledge sharing behaviors. In particular, intrinsic motivational factors were determined to exert more profound effect on these attitudes than extrinsic motivational factors. Additionally, some significant differences in knowledge sharing mechanisms between formally-managed and informally-nurtured CoPs were identified.

The speed and enthusiasm with which oil and gas companies have adopted the tools of KM during these years points to the substantial potential for KM to boost efficiency, facilitate learning, build organizational capabilities and accelerate innovation in among global, technology-intensive firms facing constantly changing business and operating conditions. There is little doubt that KM has constituted substantially to the companies' success in dealing with the massive challenges of the past decade and a half—not only the technical challenges of frontier exploration and performance but also the organizational challenges of immense corporate size, environmental challenges of protecting the natural environment, and competitive challenges of limited access to many of the world's most attractive hydrocarbon deposits.

We found that IT-based knowledge management systems facilitated knowledge storage and sharing, yet the ability of an organization to learn, develop, and share knowledge was largely dependent on how organizational members behaved. Accordingly, successful knowledge management requires linking the technology for knowledge management with an enterprise-knowledge sharing culture. Such sharing required managing the behavior of employees such that knowledge transfer becomes part of the organization's operating norm. This required: first, refining roles and responsibilities including the roles of knowledge owners, individual knowledge users,

support members; second, incentives (including recognition programs) that motivate sharing, collaboration and innovation; and third, allowing those involved in knowledge sharing activities the time and space to capture knowledge and to collaborate with one another. Ultimately, the engagement of employees within a company's knowledge management processes requires the reformulation of perceptions and expectations about job responsibilities and performance such that knowledge-related activities are accepted as a normal part of the job

In aligning knowledge management to a company's business strategy, our study pointed to several key questions: What types of knowledge are necessary for company's viability? What information is used and is useful? To provide such alignment, the knowledge management supervisory group has to prioritize and filter their knowledge depending on how much the knowledge would contribute to realizing their goals. Moreover, knowledge helping users to do their jobs should be updated dynamically. Ultimately, the knowledge and value chains should be incorporated to contribute to enhance profitability. Otherwise, knowledge management systems can easily turn into a garbage pool, which can exacerbate the problems of knowledge overload. While top management leadership and support is essential to the effectiveness of enterprise-wide KM initiatives, it is also important to recognize that knowledge accumulation and sharing occur voluntarily and cannot be conscripted. KM systems are only utilized when knowledge sharing activities are supported by trust and appropriate motivation. The dependence of knowledge management upon the active engagement and participation of rank-and-file organizational managers is revealed most clearly by the central role that communities of practice have played in the KM initiatives

LIST OF REFERENCES

Archibald, M. &. (2010). knowledge management in organisations.

Ardichvilli, A., Page, V., & Wentling, T. (2003). *Motivation and barriers to participation in virtual knowledge sharing in communities of practice". Journal of knowledge management. 7 (1): 64–77. doi:10.1108/13673270310463626.*

Bourdieu, P. (1991). Language and symbolic power.

Brown & Duguid, 1., & Wegner & Synder, 2. (2000). knowledge creation.

Chao-Min Chiu a, *. M.-H. (2006). Understanding knowledge sharing in virtual communities: An integration of social capital and social cognitive theories.

Choi & Lee, 2., Lee & Kim, 2., & Wiig, H. &. (1997).

Davenport, T. H., & Prusak, L. (. (2000). *Working knowledge. How organizations manage what they know, 2nd Edition. Cambridge, MA: Harvard Business School Press. ISBN 1-57851-301-4.*

Davenport, T. H., & Prusak, L. (2000). *Working knowledge. How organizations manage what they know, 2nd Edition. Cambridge, MA: Harvard Business School Press. ISBN 1-57851-301-4.*

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation. Cambridge: Cambridge University Press. ISBN 0-521-42374-0.; first published in 1990 as Institute for Research on Learning report 90-0013.*

Nonaka, I. (1995). The knowledge creating company: how Japanese companies create the dynamics of innovation. .

Prussak, L. a. (2001). Retrieved from https://web.archive.org/web/20110409160937/http://www.providersedge.com/docs/km_articles/CoP_and_Organizational_Performance.pdf

Rockart, J. F. (1979). *Chief executives define their own data needs. Harvard Business.*

Suhwan Jeon, Y.-G. K. (n.d.). An integrative model for knowledge sharing in communities-of-practice. 2011.

Torstein Nesheim, K. M. (2011). Torstein Nesheim, Karen M. Olsen and Anita E. Tobiassen.

Tu, C.-H. (2002). *The measurement of social presence in an online learning environment.*

Wasko, M., & Faraj, S. (2001). Retrieved from http://linkinghub.elsevier.com/retrieve/pii/S0963868700000457

Wenger, E. (1998). Communities of Practice: Learning, Meaning, and Identity.

Wenger, E. (2002). Cultivating Communities of Practice: A Guide to Managing Knowledge.