An Exploratory Study on Knowledge Management Process Barriers in the Oil Industry

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Abstract: This paper identify and discuss barriers affecting knowledge management (KM) processes in the oil industry. Based on reviewing the literature on this topic, we used a conceptual model comprising the most important barriers, grouped in three categories–organizational, knowledge and people related–influencing four critical KM processes–creation, storage, share and application. Using factor analysis, we identified which barriers influence the most each of the KM process and what are the practical implications for companies operating in the oil industry. This study provides useful insights regarding knowledge processes barriers, enabling top executives to better cope with factors hindering successful implementation of KM initiatives.

1. Introduction

Knowledge Management (KM) is beginning to play an increasingly more important role in organizations across various industries [1–6]. The KM process has been divided into two main macro-processes: knowledge management adoption, and knowledge management development [7–11]. KM deals with principles for managing knowledge are introduced into the organization. On the other hand, KM development consists of all the systematic activities that the organization uses to create, store, exchange (transfer and share) and apply knowledge. The latter has in turn been subdivided by various scholars [12–14] into several phases, like creation, storage, sharing, and application. *Knowledge creation* assumes that different types of knowledge are acquired; *knowledge storage*, in which different types of knowledge are retained; *knowledge sharing*, in which two actors exchange and share different types of knowledge; *knowledge application*, in which different types of knowledge are used.

KM has received little attention in the oil industry, with only a handful of papers analyzing this concept [3,15–17]. In terms of barriers impeding the KM process, there are only a few studies on this topic, usually focused on specific knowledge processes like sharing and not on KM as whole [18–20].

Our paper analyzes a set of barriers as these are categorized in the literature to discover those influencing the most common knowledge processes—knowledge creation, storage, share and application—in the oil industry. Our results provide directions for managers to adequately consider respective barriers in their initiatives to implement or make KM more effective.

2. Review of Literature Regarding Knowledge Management Process Development

For KM we used a definition describing it as "an emerging set of organizational design and operational principles, processes, organizational structures, applications and technologies that helps

knowledge workers dramatically leverage their creativity and ability to deliver business value" [21]. As such, it comprises knowledge processes that support other organizational processes such as innovation or collaborative decision-making [22].

Regarding KM processes, there is a diverse literature addressing various phases:

(a) In terms of *Knowledge creation*, there are scholars [23] which studied knowledge creation in the form of intellectual capital and its importance for corporate success. Knowledge requirements for successful partnerships in small and medium enterprises were analyzed [24] along with the relation between different approaches to knowledge transfer [25]. Others [26] dealt with outsourcing activity as a means to achieve complex knowledge and competencies or identification of knowledge types and means for their transfer [27]. Identification of knowledge, this time hidden knowledge, is presented in another study, as well [28]. Another trend in knowledge creation is revealing the connection between KM strategy and the knowledge creation process [29].

Learning seems to be one of the most common process associated with knowledge creation. Various studies analyze it, from factors facilitating learning in relation with performance [30] or in relation with the generation of innovation [31]. Learning about existing knowledge flows was the focus of another study [32] seeking to identify knowledge concentrations across particular functions of companies. The importance of learning for knowledge creation was addressed by various studies: one focused on the importance of commitment in fostering learning [33], another emphasizing the role of technological experience in knowledge development [34].

Other studies focus on memory and knowledge acquisition [35], knowledge discovery [36,37] or the conditions under which effective collaboration and knowledge creation take place [38].

Finally, another string of studies surveyed the process of knowledge creation and accumulation [39] and strategies of accelerating knowledge creation [39].

(b) *Knowledge storage* was analyzed in various studies. One [40] surveyed KM practices in order to examine the applications and technologies adopted in developing a KM system. Others [41,42] emphasized the importance of integrating information and knowledge flows, focusing on the importance of handling distributed knowledge or addressed the problem of knowledge calibration [43].

(c) *Knowledge sharing* is by far the most common phase of KM process development analyzed in the literature. As such, there is a diversity of studies on the subject. Some scholars analyzed knowledge transfer in outsourcing activities, seeking to improve knowledge integration [44]. Others surveyed coordination among multi-agent systems [45]. In terms of the knowledge share, the subject analyzed varies from in multinational corporations [46], teams [47], small and medium sized enterprises [48] or global strategic networks [49].

Other scholars have analyzed knowledge sharing in relation with culture, with divergent conclusions. For example, one study [50] concluded that cross-cultural differences rarely matter, while other found the opposite [51].

Factors influencing knowledge share were subject of various studies: learning [52–54], service exchange for innovation [55] or the role of specific actors like universities and research centers as a key source of technological innovation [56].

Another string of studies focused on the performance of knowledge sharing: one study [57] demonstrated that the knowledge transfer process has a positive impact on outsourcing outcomes; others [58–60] addressed the problem of knowledge sharing effectiveness.

(d) *Knowledge application* comprises a diverse range of studies. Development of a knowledge-driven approach to risk management was performed by Tah and Carr [61]. Other studies analyzed the links between organizational agility and KM [30] while the problem of managing knowledge heterogeneity in the context of interoperability was carried out by others [62].

Performance was analyzed as an outcome of knowledge application in various studies, either as organizational performance [63–65], in terms of knowledge intensive projects success [66] or as successful value creation [67,68].

For our study we considered four major knowledge processes [69,70]:

1. *Knowledge creation* involves generating or discovering new knowledge by various means: research and development, innovation or learning [71,72], while others [73] consider it as complementary to knowledge acquisition.

2. *Knowledge storage* involves selective storage of existing, acquired, and created knowledge in various suitable knowledge repositories [73,74], a result of the knowledge assets accumulation over time [75].

3. *Knowledge sharing* involves distribution of the existing knowledge within the organization, both at organizational and individual level [71,72,76,77].

4. *Knowledge application* involves retrieving and using knowledge to substantiate decisions, initiate actions, solve problems, overall to productively use knowledge [71,73].

3. Review of Literature Regarding Knowledge Management Process Development Barriers

In terms of KM process development barriers, one starting point may be to identify the critical success factors for KM, since they may provide some clues about what areas may be problematic. In the literature, the most common CSF relates to management leadership and support [78–82], culture [78,80,81,83], information technology [78,80,81,84], strategy and purpose [78,80,81,85], organizational infrastructure [80,81,86], processes and activities [78–80], motivational aids [80,81,87], resources [79,88], staff training and education [89–91] and human resource management [90,92].

KM process development barriers are problematic to assess because KM is not usually integrated into business processes of the company, the KM performance is difficult to assess and the resources are often insufficient [93,94]. As such, lack of strategic planning regarding KM adoption [30,46], lack of roles and responsibilities [94], lack of fund for KM system development [93,95], lack of top management commitment [33], lack of clear understanding of KM adoption [96,97] or insufficient integration with business process [93,94].

For some scholars, managerial mindsets and corporate culture are the main problems [96], since organizational hierarchy seems to hinder the upward flow of communication and stops the vertical sharing of knowledge [97,98]. In the literature, other cultural barriers include lack of willingness and sharing spirit [94,96,99], lack of trust and commitment [60,96,100–102] or insufficient empowerment [101], lack of motivation and reward [99] or different values, cultural and linguistic environment [39,94,103].

KM process development is more complex due to cross-cultural differences [39], leading to opportunistic behaviors negatively influencing inter-organizational trust and knowledge sharing [68]. The lack of information provision and empowerment may also be an issue [101]. The organizations seem to be aware of the importance of various best practices, but they still consider KM as a secondary approach to organizational success [95].

Technological infrastructure has both direct and indirect effects on firm performance [103]. Lack of proper organizational structure to create and share knowledge [94,95], restricting communication and knowledge flows [45,96,98], lack of focus on knowledge retention of experienced staff [36], lack of knowledge sharing opportunities for employees [97], lack of adequate knowledge of functioning [94,97] or opportunistic behavior [68] along with a high level of tacitness makes the transfer of knowledge within and outside the borders of the firm very challenging [104,105]. A crucial issue with managing knowledge transfer to partners centrally is that communication barriers and tensions may arise between those responsible for inter-organizational knowledge transfer and other involved departments [99].

Of course, one not forget than individuals may affect KM process phases. As such, fear of embarrassment for sharing incorrect information [50,106], lack of time to share knowledge [97], fear of loss of intellectual property ownership [107], poor verbal/written communication, interpersonal and computer skills [37,99] or lack of education and training [46] are surveyed by various scholars in relation with individual barriers. Other approaches are more integrated and complex, identifying sets or typologies of variables.

One typology [77] groups the barriers into four sets: (a) barriers related to knowledge; (b) barriers related to the source of knowledge; (c) barriers related to the recipient of knowledge; (d) barriers related to the cultural context. Another typology [108] identify three categories: (a) barriers related to technology; (b) barriers related to organization; and (c) barriers related to people. The McLaughlin et al. [109] approach considers four categories of barriers: (a) people; (b) technological; (c) organizational and (d) cross-category barriers. Rego et al. [110] surveyed the barriers of knowledge gathering, creation and dissemination and grouped them into three types: individual, socio-organizational and technology. Ranjbarfard et al. [70] discuss five categories related to: (a) people; (b) technology; (c) processes/organization; (d) environment and (e) characteristics of the knowledge. Patil and Kant [5] identify five types of barriers: (a) strategic; (b) organizational; (c) technological; (d) cultural; (e) individual.

However, none of this studies except one were focused on oil companies. Hence, there is a distinct gap in the literature, which provides the rationale for our study.

4. Conceptual Model

Based on literature review, we considered three types of barriers: (*a*) *related to organization*; (*b*) *related to knowledge*; (*c*) *related to people*. Other types encountered in the literature, like technological ones, are not critical for oil companies since they do not use IT technologies on a regular basis or as a core component of their activities.

In terms of (*a*) *barriers related to organization*, after literature review we considered 10 variables:

(1) *Lack of congruence*. Organizational goals or mission, on one hand, and KM initiative goals, on the other, is important to be congruent [111]. However, many times unclear criteria to assess success or challenges determined by measuring knowledge processes achievements make it difficult to address this barrier [18].

(2) *Unsupportive organizational culture*. Organizational culture may not support knowledge share or reuse [24]. For oil companies, creating a supportive organizational culture is still a major challenge for those seeking to implement effective KM [112–114].

(3) *Bureaucracy*. In rigid, highly bureaucratic organizations, knowledge processes exchanges are formal and hierarchical. As such, rigid regulations may become a barrier for knowledge processes since they can reduce the freedom for those involved [18,115].

(4) *Geographical distance*. Geographical distance may impact various knowledge processes like sharing, since different locations, common in oil industry, may hinder knowledge transfer between people [116]. Since the most efficient mean of transferring knowledge is direct communication [117], the geographic dispersion of oil companies, especially those operating multiple locations may make it difficult [109], creating barriers which affects the success of knowledge transfer, especially when tacit knowledge is involved.

(5) *Poor leadership*. Poor leadership and lack of managerial direction hinder KM processes [118]. Hierarchical leadership styles, common in many oil companies, may lead to poor coordination across functions or project teams, while laissez-faire leadership styles lead to dysfunctional communications, both hindering KM processes, especially sharing [18].

(6) *Centralization*. Linked with the previous, hierarchical structure of many oil companies, raise problems in introducing new ideas [18] and inhibits knowledge flows [119].

(7) *Poor retention rate of highly skilled employees*. High skills staff leaving the organization is a common problem in oil industry due to high competition, poor working conditions, headhunting, inappropriate rewards or other factors. As a consequence, their skills and knowledge are lost, especially for tacit knowledge, well known for difficulties in storage and sharing processes. This ultimately leads to discontinuity and disruption of the organizational memory, impeding knowledge processes like creation or application [18].

(8) *Inconsistent organizational practices*. This barrier exists when the organization fails to align and integrate KM initiative practices with the way in which knowledge is actually created, stored, shared, and applied across various organizational divisions or project teams [109,115].

(9) *Poor organizational absorptive capacity*. Absorptive capacity describes, in this case, organization's ability to identify, assimilate, transform, and apply valuable external or new knowledge [18].

(10) *Lack of incentives*. Incentive plays a major role in the success of KM initiatives [120]. Lack of adequate incentives may impede organizational objectives [121] and reduce willingness to create, share and use knowledge among employees [115,121].

In terms of (*b*) *barriers related to knowledge*, after literature review we considered six variables:

(1) *Loss of proprietary knowledge*. Many oil companies does not want to share their proprietary knowledge with partners because it creates a risk to lose it [109].

(2) *Poor retentive capacity*. For an organization, retentive capacity describes its ability to institutionalize the use of new knowledge [18]. Poor retentive capacity leads to difficulties during knowledge integration and may be a reason to terminate using that knowledge.

(3) *Poor targeting of knowledge*. Information must be accessible and relevant to support knowledge creation and application, hence it must be targeted to provide results [111]. As such, it is important to clearly identify specific domains in the organization where knowledge will be used or generated [109].

(4) *Perceived irrelevance*. If an organization concludes that certain knowledge is irrelevant for organizational present or future goals, it ignores it. Benmoussa [111] argues that many organizations are focused on present requirements and, as a consequence, fail to recognize future challenges in terms of knowledge processes.

(5) *Unprovenness*. Knowledge perceived as having little usefulness, usually based on the previous experience of the knowledge handler, is difficult to exchange or share [109].

(6) *High. causal ambiguity*. This barrier emerges when individuals or organizations does not know what knowledge is supposed to be used for [109]. Higher ambiguity leads to poor knowledge transfer since it cannot be easily coded [18,122,123].

In terms of (*c*) *barriers related to people*, after literature review we considered 10 variables:

(1) *Poor interpersonal skills*. Skills of staff in effectively exchanging information [124] may have significant impact on acceptance of new knowledge by others [18]. For instance, different language is a barrier, which affects communication among people [119].

(2) *Time constraints*. Knowledge processes, like any other organizational process, depends on employees availability [109], since they must have enough time to create and foster relationships with internal and external knowledge sources [119].

(3) *Fear of failure*. Various scholars emphasized people apprehension or fear for sharing their knowledge since it may jeopardize their job security [119] or may affect their status [125,126]. It is natural to avoid being associated with instances of failure, risking of being labelled as incompetent [18].

(4) *Lack of motivation*. Employees may perceive their involvement in various knowledge processes as extra work and may not support it [119]. In Knowledge Management, motivation to create knowledge and to accept and use it is important [109]. Motivation may be enhanced by organization by creating an incentive system for their employees' efforts [121].

(5) *Insufficient top management support*. Managers have an important role in developing appropriate conditions for KM initiatives by establishing technical infrastructure, motivating staff or assigning resources. Providing clear managerial directions and making sense of knowledge processes definitely affects benefits, for instance in terms of knowledge share [119]. However, if top management fails to support the KM initiative, it will be difficult to achieve collective action [18].

(6) *Self-interest*. Since knowledge is a source of power for many, employees and managers alike, exposing their knowledge to others may lead to loss of ownership, both formally and informally [124].

(7) *Divergent aspirations*. Employees may have their own interests, incompatible with knowledge processes they are supposed to implement [18]. This barrier may have multiple causes, like a negative attitude toward changes [18], unwillingness to give up comfort zone [124].

(8) *Lack of trust/reliability*. Scholars correlate individual trust with the knowledge source reliability and efficient utilization [109,124]. Also, the trustworthiness of the source unit influences recipient behavior, facilitating knowledge processes.

(9) *Poor absorptive capacity of individuals*. Absorptive capacity describes, in this case, the ability to identify, assimilate, transform, and apply external or new knowledge by each member of the organization [70,109,124].

(10) *Different individual features*. Employees are reluctant to get involved in various knowledge processes due to their different educational background [115], languages [125], and differences in experience, gender and other personal characteristics [119].

5. Materials and Methods

The sample consisted of 97 respondents from 23 consulting companies involved in providing consulting and advice for oil industry companies. As such, they were involved in various projects dealing with KM systems implementation in the industry (see Table 1).

Table 1. Sample structure.

Characteristics		%
	<5 years old	0.00%
	5–10 years	26.09%
Company age (years)	10–15	39.13%
	15–20	26.09%
	>20	8.70%
	<10	4.35%
Company size (no. of employees)	10–49	47.83%
	>50	47.83%
	Less than 5 years	12.37%
Respondent seniority in the company (years)	5–10 years	45.36%
	10–15 years	26.80%
	>15 years	15.46%
	Top executive or Senior consultant	9.28%
Respondent hierarchical position	Middle manager or Project manager	26.80%
	Junior manager or Team leader	40.21%
	Consultant	23.71%
	ISCED 4 or less	0.00%
Respondent education (ISCED level)	ISCED 5 and 6	11.34%
	ISCED 7 or more	88.66%
	1	38.14%
Respondent number of participations in KM initiatives	2–3	40.21%
	>3	21.65%

For data analysis we used exploratory factor analysis (EFA) based on factor analysis. Considering the number of respondents and variables, we have met the criteria (at least five variables for each factor) [127]. The Cronbach's alpha coefficient value of 0.972 was above the threshold of 0.70 considered acceptable in the literature [127]. In terms of multicollinearity, since there were no variables with a large number of low correlation coefficients, we concluded that the dataset was appropriate. Bartlett's test of sphericity ($\chi^2 = 16073.540$, $p < 0.01$) and Kaiser-Meyer-Olkin measure of sampling adequacy further confirmed that the dataset was suitable for EFA (see Table 2).

Table 2. KMO and Bartlett's test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.862
	Approx. Chi-Square	16,068.322
Bartlett's test of sphericity	df	823
	Sig.	0.000

Regarding factor extraction and rotation, we performed principal axis factoring extraction method and rotation method—Varimax with Kaiser Normalization. In terms of number of extracted factors, we used Kaiser criteria, retaining all the factors with eigenvalues >1 [127], and percentage of variance, extracting successive factors until a cumulative percentage of the total variance was achieved considering the 60% threshold [127]. The final model recovers 64.067% of the common variability of all knowledge process barriers included in our research (see Table 3).

Table 3. Rotated Factor Matrix.

| No. | Barrier | Knowledge Process | | | | Communalities |
		Knowledge Creation	*Knowledge Storage*	*Knowledge Share*	*Knowledge Application*	
1	Poor retention rate of highly skilled employees	0.936	0.586	0.627	0.697	0.826
2	Centralization	0.927	0.661	0.482	0.682	0.782
3	Time constraints	0.919	0.651	0.616	0.370	0.794
4	Poor targeting of knowledge	0.902	0.518	0.316	0.448	0.755
5	Unsupportive organizational culture	0.893	0.685	0.618	0.684	0.724
6	High. causal ambiguity	0.854	0.573	0.392	0.651	0.688
7	Inconsistent organizational practices	0.816	0.792	0.751	0.577	0.647
8	Lack of incentives	0.622	0.984	0.305	0.565	0.765
9	Lack of motivation	0.507	0.919	0.383	0.631	0.741
10	Insufficient top management support	0.689	0.883	0.657	0.722	0.703
11	Bureaucracy	0.638	0.870	0.562	0.672	0.782
12	Poor retentive capacity	0.318	0.865	0.630	0.604	0.775
13	Perceived irrelevance	0.428	0.811	0.574	0.330	0.692
14	Self-interest	0.398	0.412	0.911	0.358	0.782
15	Unprovenness	0.516	0.662	0.902	0.484	0.698
16	Different individual features	0.672	0.563	0.895	0.365	0.605
17	Loss of proprietary knowledge	0.362	0.429	0.862	0.428	0.639
18	Poor interpersonal skills	0.712	0.742	0.855	0.519	0.793
19	Divergent aspirations	0.528	0.425	0.829	0.677	0.765
20	Lack of congruence	0.427	0.370	0.662	0.968	0.762
21	Geographical distance	0.425	0.408	0.637	0.931	0.743
22	Poor organizational absorptive capacity	0.371	0.336	0.489	0.906	0.717
23	Poor absorptive capacity of individuals	0.317	0.342	0.564	0.887	0.698
24	Lack of trust/reliability	0.382	0.313	0.530	0.839	0.702
25	Poor leadership	0.528	0.492	0.484	0.816	0.649
26	Fear of failure	0.619	0.380	0.672	0.803	0.635
	Eigenvalue	9.723	9.708	9.822	9.974	-
	Percent of variance	15.706	15.672	16.075	16.614	-
	Cumulative percent	15.706	31.378	47.453	64.067	-
	Cronbach's Alpha	0.952	0.947	0.967	0.978	0.972

Extraction Method: principal axis factoring. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in eight iterations.

The solution has a good fit since the residuals with absolute values higher than 0.05 are <50%. In terms of Cronbach's alpha for each knowledge process, all of the constructs reported good reliabilities (0.952 for *Knowledge creation*, 0.947 for *Knowledge storage*, 0.967 for *Knowledge share*, and 0.978 for *Knowledge application*), proving internal consistency. We have considered a highly selective threshold of 0.80 [128] and all variables with factor loadings higher than the threshold were considered.

6. Results and Discussion

Regarding the first knowledge process analyzed, *Knowledge creation*, it cumulates 15.706% of the common variability of the 26 variables used and is significantly and positively correlated with seven barriers: *Poor retention rate of highly skilled employees, Centralization, Time constraints, Poor targeting of knowledge, Unsupportive organizational culture, High causal ambiguity* and *Inconsistent organizational practices*. For oil companies, it seems the most important barrier in creating knowledge relates to poor retention rate of highly skilled employees, it is difficult to create continuity within knowledge initiative implementation and hind creation of an effective organizational memory. Even though many oil companies use loosely formalized structures, many operating on a project based structure, at the core of their activities lays a core of individuals—President, CEO, sometimes board members —which effectively make organizational structure highly centralized. In terms of targeting knowledge, this seems important to oil companies since many times information is not accessible and relevant, how it will be used and what information is needed to be targeted to generate what knowledge. Another problem concerns an unsupportive organizational culture, perhaps due to some of the factors mentioned above, like discontinuity and use of part-time employees. This barrier must be analyzed in conjunction with inconsistent organizational practices, oil companies often lacking any form of KM strategy and, as a consequence, neglecting formalized mechanisms to deals with knowledge creation. Many of the factors mentioned above are linked with high level of causal ambiguity. Their employees do not know exactly what the information/knowledge is supposed to be used for. However, this barrier comes as a surprise for us since it is usually related with knowledge sharing and less with knowledge creation.

In terms of *Knowledge storage*, it caccounts for 15.672% of the common variability of all 26 of the barriers and is significantly and positively correlated with six barriers: *Lack of incentives, Lack of motivation, Insufficient top management support, Bureaucracy, Poor retentive capacity* and *Perceived irrelevance*. *Lack of resources* is one of the most common problems in KM initiatives implementation. As such, many oil companies cannot or are unwilling to provide incentives to successfully implement KM initiatives, even though this has a key role according to literature. Staff should be motivated to store knowledge within the organization. This barrier is obviously linked with lack of motivation. Oil companies' staff may perceive knowledge storage as extra work and hence do not support it. Since top management is crucial in providing support, insufficient involvement in knowledge storage usually means failure. Top managers have an important role in developing positive conditions for storage like establishing technical infrastructure and mechanisms to do it. Another barrier is bureaucracy. Usually oil companies have complex structures, hindering them in coping with fast pace changes in the environment. In terms of knowledge storage we have to consider use of repositories for specific tasks, like reporting to their shareholders or public authorities.

In terms of *Retentive capacity*, a poor one may lead to difficulties for oil companies during the integration of knowledge in repositories. This is linked with perceived irrelevance barrier. Many companies are focused on present requirements, not on what must be known to operate in the future and, as a consequence, may fail to store knowledge useful in the future.

Regarding *Knowledge share* process, it cumulates 16.075% of the common variability of all 26 barriers and is significantly and positively correlated with six barriers: *Self-interest, Unprovenness, Different individual features, Loss of proprietary knowledge, Poor interpersonal skills* and *Divergent aspirations*.

Self-interest is one of the most common knowledge share' barrier in the literature and, as such, our study confirmed it once more. Oil companies' staff know that their knowledge is a source of power and

think that if they share it to others, their importance or privileges may diminish. After all, a sense of self-interest exists in most human beings. This barrier is linked with loss of proprietary knowledge, an organizational barriers. While the previous one is about individuals, this one involves organizations. Many companies are reluctant to share their proprietary knowledge with their partners because this leaves it open to the risk that the information will be revealed, making them more vulnerable for competitors. A consequence of poor knowledge storage capabilities, *Unprovenness* describes cases when companies' staff are not able to discern valuable knowledge, making it difficult be shared. Poor retention rates of oil companies' staff or their inability to attract high skilled employees may contribute to this barrier. Poor interpersonal skills of staff, actually lack of skills to effectively express knowledge or champion new knowledge have great impact on knowledge acceptance and, hereby, it may hinder its share. Finally, another barrier is described by divergent aspirations.

In terms of *Knowledge application* process, it represents 16.614% of the common variability of all 26 barriers and is significantly and positively correlated with seven barriers: *Lack of congruence*, *Geographical distance*, *Poor organizational absorptive capacity*, *Poor absorptive capacity of individuals*, *Lack of trust/reliability*, *Poor leadership* and *Fear of failure*. Lack of a measurement system and unclear criteria of success for KM process, the core of lack of congruence between KM and organizational goals/mission barrier, impede learning and, as such, impede knowledge application since people does not have clear criteria for success. Geographical distance, even though usually described in literature in relation with knowledge share, in our study impacts more knowledge application (it still have a high level in relation with share, too). The next two barriers are related to absorptive capacity, both for the company and for individuals involved. Considered an ability to identify, assimilate, transform, and apply valuable external or new knowledge, it is both a capacity of each organization member and an organizational capability. Trust is important in KM application since any employee have to trust the source or recipient of the knowledge to use it correctly. If the company cannot implement effective KM practices and create mechanism to enhance trust, this will hinder knowledge application. In Romania, lack of trust is one important cultural issue since people, as a given, are learned not to trust others. Poor leadership and lack of managerial direction hinder KM processes. Concerning KM initiatives, this is even more important since, for many oil companies' managers, it is a first for them in implementing KM processes. Finally, fear of failure is another barrier in knowledge application. Oil companies' staff and especially managers may be afraid that their knowledge may be inadequate or fear to be associated with instances of failure, being stigmatized as incompetent.

7. Conclusions

Our study may be attractive for scholars and practitioners alike since it presents both theoretical and practical implications. From the theoretical perspective, it is one of the first studies analysing KM process barriers in oil industry, making possible to outline future research directions on this topic. Our study validates the findings of other studies addressing the KM process barriers, like Ranjbarfard et al. [70], Patil et al. [4] or Wong and Aspinwall [9] regarding the typology of barriers they identified, even though a different set of barriers were considered in our own research.

Form the practical perspective, our research allows oil companies' executives implementing or planning to implement KM initiatives to be aware of their specificity and act accordingly. We do not seek, however, to have a ranking of these barriers. Since oil companies may not be able to manage all aspects of KM simultaneously, a list of what knowledge process barriers will provide a check list to top executive, chief knowledge officers and other staff tasked with KM system to prioritize and adjust their KM procedures and actions accordingly.

Concerning research limitations, we consider that a replication of the study is needed to further confirm our results. At the same time, a more comprehensive list of barriers may be considered, since in the literature there are studies comprises a more extensive list of barriers. This must not be done, however, by considering all barriers but their selection must be done according to the oil companies'

characteristics. Another limitation regards number of phases of KM process development. For instance, some scholars includes knowledge transfer, which was not considered in our study.

Another limitation was that our study explored the perceptions of outsiders, consultants involved in various KM initiatives and not employees of oil companies. As such, even though their answer are more objective, they may lack depth. All these limitations will be considered, we hope, in a future study.

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