Information and Knowledge Sharing in Industrial Clusters
Theoretical Background and a Case Study

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Abstract: Information and knowledge sharing represents currently usually not sufficiently utilised source of the competitive advantage. If appropriately managed, this should lead to better performance, higher efficiency and improved cooperation and communication within as well as among organisations. The advantages and disadvantages of information and knowledge sharing are discussed. Based on the semi-structured interviews and subsequent statistical analysis, the researched industrial cluster reveals the real practices and enables the comparison with the theoretical prerequisites. The findings prove the ineffectiveness of the sharing processes. Therefore, particular recommendations and suggestions for the improvements are provided and emphasised.

1 INTRODUCTION

During the past decades knowledge has emerged as the key to economic success and as a focus of thinking about organizational effectiveness, innovation and growth. Nevertheless, the research question how organizations should encourage and facilitate knowledge sharing to improve organizational performance is still very important. Therefore, the extent and potential of information and knowledge sharing (IKS) associated with organisational performance and activities is examined. Firstly, the general background is provided focused on the importance of knowledge, IKS and clusters. The following section describes the research methodology. Afterwards, the results and findings are discussed. The last part concludes the main implications and recommendations as well as summarises the limitations and areas for further research.

2 LITERATURE REVIEW

Bartol and Srivastava (2002) define knowledge sharing as the action in which employees diffuse relevant information to others across the organisation. Knowledge sharing is the voluntary dissemination of acquired skills and experience to the rest of the organization (Davenport, 1997); (Käser and Miles, 2002) and is the most important part of knowledge management (Bock and Kim, 2002). On the contrary, Lee and Al-Hawamdeh (2002) and Appleyard (1996) emphasise the necessary compensation being expected by the participants for their efforts. Information and knowledge have been recently considered as a critical organizational resource that might provide a sustainable competitive advantage (Foss and Pedersen, 2002). The real transformation to a competitive advantage has to be based on selecting employees who have specific skills, abilities, or competencies with respect to IKS (Jackson et al., 2006). Taking into consideration records in the well-established scientific databases, the information sharing in economic or industrial clusters has not attracted researchers' attention yet. On the other hand, few studies on knowledge sharing in clusters have already been published (Connell and Thorpe, 2012); (Li and Feng, 2011); (Wang and Zhou, 2007). These basic processes themselves represent a topic currently studied from multiple perspectives. The variety of approaches and views is associated with many aspects.

2.1 Perspectives on IKS

Firstly, technological changes in the area of

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information and communication technologies IKS and knowledge sharing significantly support the research endeavours. Even from the technological point of view, the research results are quite extensive. These can be further classified according to diverse criteria such as general technology type (information and communication versus knowledge technology), type of supported sharing process (formal versus informal), or particular type of technology applied (e-commerce system, web-based systems, grid systems etc.). For instance, Li et al. (2012) investigate how the effective strategy of Internet of Things (IoT) can help organisations to make use of an opportunity from the IoT and then improve their competitive advantage. The Internet of Things (IoT) is a technological phenomenon originating from innovative developments and concepts in information and communication technology associated with Ubiquitous Communication/Connectivity, and the Ambient Intelligence concept (Mikulecký, 2010). Authors provide a theoretical framework which classifies IoT strategies into four archetypes from two dimensions of managers' strategic intent and industrial driving force. They conclude that external industry information sharing more efficiently contributes to the enhancement of both market-based and technology-based exploratory capabilities. On the contrary, internal industry information sharing more efficiently contributes to the enhancement of both market-based and technology-based exploitative capabilities. Davison et al., (2013) explore the use of interactive information technology applications for informal knowledge sharing and develop theoretical propositions to highlight the key facets of informal knowledge sharing processes. Li et al., (2010) analyse the sharing pattern results of supply chain information under the atmosphere of E-commerce.

Secondly, the application domain influences the principal research questions and used methods in IKS research. Variety of areas can be identified ranging from medicine, or pharmacy to industrial applications, education (Fullwood et al., 2013); (Eid and Nuhu, 2011) or agriculture (Li et al., 2010). Moreover, classification based on supported activity such as leadership, creativity (Carmeli et al., 2013), or relationship development (Biggemann, 2012) might also be distinguished. Kane and Luz (2011) present results of a study of multidisciplinary medical team meetings (MDTMs), with focus on information presentation, collaboration, sharing and decision-making issues. Their study reveals the multi-faceted nature of the event and the fact that new knowledge is generated during the meetings. They analyse the findings in terms of their implications for the information sharing needs of participants according to their roles and discuss requirements for technology support at individual, group and organisational levels. Ali et al., (2012) used a self-administered questionnaire to survey Chief Information Officers at all 21 of New Zealand's District Health Boards regarding the extent to which their organisations use knowledge sharing activities involving ITs. They conclude that knowledge sharing activities emphasising the sharing of explicit knowledge (via exchanging documents in electronic form) are significantly more common than knowledge sharing activities emphasising the sharing of tacit knowledge (via technology-mediated discussions and via using technology to connect employees to experts). Therefore, they suggest that in order to facilitate the wider adoption of technologies, early adopters of both relatively established technologies and of the emerging technologies such as social media should be encouraged to publish accounts of their experiences of success and lessons learned from any failures so that the knowledge gained is disseminated to the wider medical informatics community. Yan and Pei (2012) investigated information sharing of traditional and online retailers. Results show that information sharing is not always beneficial for each retailer all the time; both the online and the traditional retailer can be better off under certain conditions; and the value of information sharing for each retailer increases as products are more compatible with online marketing. Moreover, they analyse the incentives for information distortion in information sharing and find that both the online and the traditional retailer have an incentive to overstate their forecasts while sharing information.

Thirdly, particular market arrangements influence forms and patterns of IKS. Differences can be identified in particular developing or developed economies (Toh and Srinivas, 2012), diverse cultures (Brunet-Thornton and Bureš, 2012), or market settings such monopolistic competition (Cho and Jun, 2013). From this paper perspective, the supply chains play an important role since they are structurally similar to economic cluster which represent the subject of this study. For instance, Schloetzer (2012) examines whether the potential for hold-up in supply chains influences the extent of process integration and information sharing between partners. Eventually, he comes with the conclusion that the potential for hold-up can restrict the performance benefits available to partners from

developing more extensive supply chain integration practices. Prajogo and Olhager (2012) investigate the integrations of both information and material flows between supply chain partners and their effect on operational performance. They conclude that information technology capabilities and information sharing both have significant effects on logistics integration. Furthermore, long-term supplier relationships have both direct and indirect significant effects on performance; the indirect effect via the effect on information integration and logistics integration.

The ultimate goal of sharing employees' knowledge is its transfer to organisational assets and resources (Dawson, 2001). Employees may fear a loss of superiority and knowledge ownership after sharing their own personal knowledge (Szulanski, 1996).

Moreover, the implementation of knowledge management principles and rules might support the knowledge sharing processes (Bureš and Brunet-Thornton, 2009). Many authors have pointed out that sharing knowledge among employees would lead to faster responses to customer requirements at a lower cost in operations (Sher and Lee, 2004). Obviously, there are a lot of areas of knowledge and experience sharing from which the companies can gain and retain the competitive advantage, as well as the continuous development and improvement.

2.2 Introduction to Clusters

Clusters usually comprise "firms and other actors co-locating within a concentrated geographical area, cooperating around a certain functional niche, and establishing close linkages and working alliances to improve their collective competitiveness" (Anderson et al., 2004). Clusters depend primarily on the communication and collaboration among their member companies and also with external subjects. The members exploit the same resources to gain and develop knowledge (Işik, 2012) and share best practices and procedures. Other advantages include the cooperation and communication improvements leading to better flow of information and knowledge (Kolerová and Otčenášková, 2012).

Companies within cluster mostly operate close to each other which assures the immediate access to knowledge sharing through formal business networks together with spillover opportunities (Connel, 2009). The problem with the determination of partners for, extent of and conditions for knowledge sharing remains.

3 RESEARCH METHODOLOGY

The discussed research is focused on the initial case study and provides the basic introduction to the whole project intention. Therefore, the results and recommendations should be revised and verified by the experts of particular organisations. The project team aim to explore different companies and unions to broaden the perspectives of the discussed topics.

3.1 Methods

Various methods were utilised to ensure relevant results as well as practical implications of the research task. The appropriate amendments based on the research methodology development were continuously done during the research to ensure the complexity as well as accuracy.

Firstly, brainstorming of the project team was employed to generate basic concepts and areas potentially shared within organisation. These were also confronted with the primary as well as secondary resources which were also analysed. Furthermore, to exclude irrelevant, unnecessary and worthless indicators, the selection and visualisation tools were employed (Bureš, 2012); (Kolerová, 2012); (Otčenášková, 2013). On the basis of the final selection of research areas, the questionnaire was prepared and afterwards reduced after the semi-structured interviews which were conducted with representatives of cluster in pursuit to get the feedback and avoid useless indicators and get. The whole questionnaire encompasses firstly the identification of respondent, secondly the examination of individual companies and their performance and thirdly the functioning of the cluster as a whole. The questionnaire was sent via email to managing directors and chief executives of all eighteen examined companies within the cluster. Considering the extent and the purpose of this study, only the related questions are discussed and investigated. To reveal as many connections and findings, these include both the closed and open questions. The relevant data are also analysed using the statistical analysis encompassing the correlation analyses and the frequency rate determination.

3.2 Research Sample

The initial research was focused on the examination of a cluster called Hradecký IT KLASTR, Joint Association of Corporate Bodies (HIT Klastr). This cluster associating companies focused on information technologies belongs to one of the most

successful clusters in the Czech Republic. Sixteen private organisations and two educational institutions representing the public sector are involved. 39% of organizations have 1-10 employees, 17% have 11-15 employees and 44% have 51-250 employees.

Activities of the cluster are supported by the European Regional Development Fund within programme Investment in Your Future. The involved organisations work generally with information technologies. The cluster aims to benefit from the cooperation of members and to provide the services for them. The main objectives include the improvement of quality management, increase of innovation potential, costs savings and development of business opportunities. Especially the following areas are emphasised in pursuit to promote sharing: development of human resources; marketing; sharing of capacities; and development and innovations (HIT Klastr, 2013). This proves the presence of the idea of sharing and organising some activities together, even though the member companies are usually competitors to a certain extent. On the contrary, just the declaration of shared plan of activities and areas of cooperation is not enough if these are not realised either at all or not effectively.

4 FINDINGS AND RESULTS

The survey focused on one specific cluster and distributed to all members had 100% response rate which means that representatives of all eighteen member organisations provided the answers. This rate is so high because of the personal contact with the representatives of cluster member organisations. This section comprises the close question analysis of the acquired results. Questions related to the sharing issues are described in more details.

Firstly, the rate of sharing of various items is briefly described. Secondly, the analysis is focused on IKS, specifically on its significance, and on the efficiency of various activities for the sharing of knowledge and information in the cluster. Moreover, the correlation analysis is performed underlining the most interesting results.

4.1 Rate of Sharing of Various Items

Beside other things, respondents were asked about the rate of sharing of various items from many areas of business, particularly from the finance (financial sources and credit liability), logistics, export, marketing (promotion, contacts and electronic marketplace), human resources (experiences, best practices, know-how and employees) and production (technology). The seven-point scale was used with categories classified from “not realized” to “very often”. This question was formulated because of the identification of the main aspects and possibilities of sharing in organizations.

Experiences, best practices, know-how and contacts were the four most crucial items being shared. The rate of sharing of these items is “often” or “very often” as mentioned by most respondents. On the contrary, credit liability and export were labelled as “not realized” or “not shared”. Some respondents stated that technology, promotion, employees, export, credit liability and financial sources are shared “rarely”.

4.2 The Significance of IKS for the Cluster Performance

Respondents were also asked about the significance of IKS. Mentioned items were chosen on the basis of the brainstorming of the research team and the literature review. The five-point scale was used with categories classified from “not shared” to “shared frequently” (see Table 1).

Table 1: The significance of information and knowledge sharing about the mentioned items for the cluster performance.

Frequency (n)	0	1	2	3	4	Mean
Customers, Public	6	4	3	2	2	1,41
Market	6	2	2	4	3	1,76
Products, Services	2	3	7	4	2	2,06
Procedures, Processes	2	4	6	3	2	1,94
Competition	8	3	1	3	1	1,13
Suppliers	4	6	4	2	0	1,25
Employees	3	5	9	0	0	1,35
Intellectual Assets	5	3	5	3	0	1,38
Cluster	5	1	3	5	0	1,57
Purchases	10	3	2	2	1	0,94
Institutions, Collaboration	5	2	7	2	0	1,38
Other Clusters	8	4	2	1	0	0,73
Moral Values, Principles	5	5	3	4	0	1,35

Information and knowledge about other clusters, joint purchases and their competition are shared at least (their mean is 0,73, 0,94 and 1,13). The most shared information and knowledge within the cluster are about products and services, procedures and processes, all aspects of the related market and about

the cluster itself. Companies share also some significant information and knowledge about customers and public, employees, suppliers, intellectual assets, government institutions and moral values (as precisely described in Table 1).

4.3 The Efficiency of Various Activities for the IKS in the Cluster

In addition to the significance, the efficiency of various activities for IKS was investigated as well. Period for the determination of this efficiency were the last twelve months to ensure the up-to-datedness and avoid irrelevant former practices of the organisations. The six-point scale was used with the range from "no efficiency" to "high efficiency".

Impersonal forms of contact, namely internal magazines and newspapers, and the own cluster information centre are the least efficient for the IKS (the arithmetic mean is 0,28 and 0,39). Personal contact of members of cluster seems to be the most efficient way for the information and knowledge sharing. Personal meetings, workshops, informal meetings were stated as the most efficient. Modern communication technologies such as e-mail, mobile phones, cluster web pages and intranet are stated as very effective and worthy to be used (see Table 2).

Table 2: The efficiency of various activities for the information and knowledge sharing in the cluster.

Frequency (n)	0	1	2	3	4	5	Mean
Personal Meetings	1	1	1	5	1	9	3,72
Phone Calls	1	2	5	4	4	2	2,78
E-mail	1	2	5	3	4	3	2,89
Workshops	1	1	1	6	7	2	3,28
Conferences	4	4	4	4	2	0	1,78
Intranet	2	4	9	3	0	0	1,72
Cluster Web Pages	1	5	7	3	2	0	2,00
Internal Magazines, Newspapers	14	3	1	0	0	0	0,28
Information Centre	13	3	2	0	0	0	0,39
Shareholders' Meetings	2	2	6	5	1	2	2,39
Informal Meetings	2	1	2	3	7	3	3,17

4.4 Correlation Analysis

Three correlation analyses were performed on the base of the research data. Firstly the area of the frequency of sharing various items is examined in pursuit to reveal potential relations and dependencies. The significant positive correlation occurred among almost all of the examined areas - technology, promotion, experiences, best practices, employees, know-how and contacts (indexes vary from 0,83 to 0,99). Only the correlation among financial sources and other items is a little bit lower (indexes vary from 0,71 to 0,95). No or weak correlation is not revealed at all.

Secondly, the correlation in the area of significance of various items sharing in organizations was researched. The significant positive correlation occured among a lot of examined areas - a market, products and services, procedures and processes, competition, employees, intellectual assets, purchasers, moral values and principles (indexes mostly vary from 0,69 to 0,99). Only the correlation among suppliers and cluster and other items is a little significantly lower (indexes vary from 0,00 to 0,50). In addition, the negative correlation arose among cluster and products and services (the rate of -0,19 and -0,28).

Moreover, the correlation in the area of efficiency of various items sharing in organizations was examined. The significant positive correlation arose among many examined areas - informal meetings, workshops, e-mail communication, phone calls and personal meetings (indexes vary from 0,65 to 0,99). This shows the interconnectedness of the mentioned items which signifies the necessity to pay attention to these simultaneously and to support the efficient utilisation. Only the correlation among conferences, shareholders' meetings and other items is lower (indexes vary from 0,00 to 0,76). The negative correlation is not observed at all.

5 DISCUSSION, LIMITATIONS AND FURTHER RESEARCH

The significance of IKS is obviously crucial for all organisations regardless their size, type, cultural background or any other characteristics. Several recommendations linked directly with sharing or indirectly with influential factors on these processes based on case study and literature review are discussed below.

Doubtlessly, the research revealed specific areas requiring attention leading in better performance. The use of best practices more effectively, the support of learning and the knowledge creation are strongly sustained through IKS. Nevertheless, also the sharing does have particular limitations. Issues linked with security, data protection, copyright, intellectual property and legal issues relating to the privacy should be considered and treated more

properly. From the practical perspective, the danger of know-how loss or the insufficient motivational schemes belong to factors negatively influencing sharing within clusters as well as among individuals. These issues should be addressed more precisely to avoid undesirable effects. Except from the technological and other support also the appropriate conditions should be given. The cooperative instead of competitive culture should be established as well as promoted. The motivational and reward schemes within the organisation and among them if in cluster or any other union should be developed to enhance the notion of sharing culture. The competitive culture usually leads to the information and knowledge retention. Moreover, the utilisation of these does not occur at all or is very limited due to the employees' attitude. If appropriately changed to cooperative and communicative approach, the pursuit to reach the common goal and to fulfil the shared vision would be emphasised naturally. As proved by the results, these issues should be addressed more strictly, because such approach would ensure more efficiency and higher significance of the sharing processes.

Nevertheless, there are particular limitations of the mentioned outcomes which might have impact on the results to a certain extent. The fact that only one cluster was analysed should be considered. In further research, the research sample should be extended. More organisations from various sectors, areas of business and cultural background should be incorporated. This should increase the relevancy and applicability of the recommendations, because the current results cannot be generalised to the appropriate extent.

Notwithstanding, the discussed issues provide utilisable ideas for both theorists and responsible people from organisations or unions of organisations. Especially knowledge management specialists or employees dealing with information and knowledge are addressed and motivated to consider the findings in pursuit to improve the efficiency of the organisational processes and the competitive advantage.

6 CONCLUSIONS

Information and knowledge sharing represents an important source of the competitive advantage. Nevertheless, the utilisation of its potential is not sufficient and efficient even within member organisations of one particular cluster. Therefore, these issues require attention and should be supported especially on the individual and organisational level. For these purposes, particular recommendations as well as concepts are introduced to be employed within companies and among themselves.

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