Research Article

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Knowledge Transfer through Computer-based Systems in Manufacturing Networks: A Study on Albanian Plants

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Abstract

This study shows a general view about knowledge transfer between manufacturing plants in developing countries like Albania, which are part of multinational companies' network (MCN). Part of this goal is the study of computer-based systems from conference calls and intranets to more advanced ones like data warehouses, management information systems (MIS) and executive information systems (EIS), as enablers of knowledge flow and absorptive capacity. The paper examines four case studies based on semi-structured interviews, where the data collected highlight a good coverage of computer-based systems in function of knowledge sharing. In half of the cases, this is done internally in the plant and not over the network of plants. We propose to upgrade where possible the systems used in a distributed way to have data and information connections across the network. In some cases, emerge barriers such as lack of time, lack of tolerance for errors, or the need for assistance. Conclusions show that staff training related to computer-based systems in the optics of knowledge enablers is important for the companies, while the incentives are not considered as a key factor for knowledge transfer.

Keywords: *knowledge transfer, multinational companies' network, computer-based systems, manufacturing plant*

1. Introduction

Nowadays many of the manufacturing companies with headquarters (HQ) located in European Union (EU) countries, are expanding their branches and plants in emerging countries, including the Balkans. This growing trend can be explained by different factors such as payments of lower-wage employees, strategic location, climate, environmental conditions, etc. Previous analysis of researchers has suggested that the process of Knowledge Transfer (KT) becomes a crucial element in organizational competitiveness and those knowledge assets, considered as economic goods are key to learning, especially within a network of plants (Argote & Ingram, 2000). Since KT is a combination of transmission, absorption and use of knowledge, it is closely related to the characteristics of the persons involved in the process and is often transformed and adapted in the receiving unit. So, one of

the main components of KT is not the base knowledge itself, but rather the extent to which the receivers get useful knowledge and utilize it for their proper benefits and operations.

KT can use formal and informal mechanisms for integrating, interpreting, and sharing knowledge between different groups of individuals (Goyette, et al., 2015). Companies that rely on face-to-face exchange of knowledge and experience have difficulties in coordinating this process between sites situated in different countries. The collaboration across international operations can be managed far more effectively by using information technology (IT) to transfer codified knowledge (Adamides & Manolias, 2004). The formal transfer mechanisms can be grouped in four categories: a) personnel movement - the transfer of employees to different departments/divisions to improve their communication abilities and enforce the network within the organization (Galbraith, 1994); b) use of tools - includes the use of IT, procedures, rules, reports and manuals by the company employees (Chai, et al., 2003); c) role assignment - mechanisms used to assign different roles and duties to employees, such as knowledge broker, etc. (Volkoff, et al., 2004); and d) training - deals with the transfer of specific knowledge to different resources (Moreland & Myaskovsky, 2000).

Another form of classifying KT mechanisms is by the way they operate, electronic-based against person-based. The employees use different kinds of tools for electronic-based communication to codify, store, transfer, and access knowledge (Ambos & Ambos, 2009). This type of transfer mechanism includes also written documents and reports, as well as databases and information systems (IS). Whereas the person-based is like the informal transfer mechanism and consists mostly of oral communication, including face-to-face and telephone communication (Pedersen, et al., 2003).

Focusing on the technology part, it is important to mention that KT is one of the knowledge managements pillars along with organization, leadership, and learning (Bixler, 2002). On the other hand, KT is a subcomponent of knowledge management (Sedera & Gable, 2010). In this aspect, Information and Communication Technology (ICT) plays an important role in transferring, as well as in managing, storing, and accessing documents and databases. To have successful knowledge management projects, the ICT professionals should be aware of the various knowledge management processes. For example, there is an important difference between the vertical knowledge transfer from the corporate center to the subsidiaries and vice-versa. Yang et al. (2008) assume that the subsidiaries are the ones that learn from the parent and there is not an important flow in the other direction, although that they declare the strengthening role of subsidiaries in a horizontal way (between subsidiaries) (Adenfeldt & Lagerström, 2008), or in the reverse direction (from subsidiaries to headquarters). The combination between the implementation of standardized electronic-based processes as well as the frequent interpersonal communication (Rabbiosi, 2011; Strube & Berg, 2011), plays a very important role in increasing the extent of Reverse Knowledge Transfer (RKT). Meanwhile, the statement that RKT is getting more and more important in KT processes of multinational companies, is not supported by the findings of Dobrai et al. (2012), which shows that the reverse transfer is more complicated than conventional KT (subsidiary adapts knowledge that comes from the parent company). In their work, they show that most of the surveyed employees from the company center have not shown any interest in the experiences and suggestions that come from the subsidiaries. On the other hand, Ambos et al. (2006) and Yamao et al. (2009) suggest that the traditional role of HQ as a prime source of knowledge and competencies is changing. Increasingly, HQs act as a receiver of knowledge from their internationally dispersed subsidiaries, which also contribute to HQs' knowledge acquisition.

Regarding the positive impact of ISs in transferring and assimilating knowledge, Malhotra et al. (2005) and Schreiber et al. (2011) suggest that IS tools that make knowledge explicit, are good enablers in the transfer process within multinational corporations. The tools used in KT can be categorized in three groups (Malhotra, 2002):

a) data management tools as data warehouses, data search engines, data modeling and visualization;
b) information management tools as automated information search and retrieval agents, decision support technologies, EIS and document management technologies;

c) knowledge management tools as customer relationship systems.

Another aspect to take into consideration is the barriers in KT. Szulanski (1996) lists the lack of absorptive capacity, causal ambiguity, and relationship difficulties. Davenport and Prusak (1998) list other difficulties, such as lack of trust; differences in culture, vocabulary, and theoretical landmarks; lack of time and place for meetings; limited view of productive work; status and reward benefits for knowledge owners; a lack of absorptive capacity on the part of the recipient; belief that knowledge is the exclusive prerogative of certain groups; and lack of tolerance for errors or the need for assistance.

Our study aims to analyze the knowledge acquisition from Albanian plants in an international network, and how the used computer-based system tools, or systems that are more advanced such as MIS/ES, help in KT and knowledge management. It is also interesting to consider how economic barriers (benefits gained by the organization), organizational barriers (the technology fits into organizational processes), or behavioral barriers (new systems functions impacts their daily work) can affect the use of computer-based systems.

2. Material and Methods

The research is based on empirical studies in four manufacturing units, operating in Albania, part of four different MCNs. To fulfill privacy policies with the companies considered in our study, we will refer to them as Alpha, Beta, Gamma, and Delta. The targeted plants in this study are the ones that produce goods and match the sequent criteria:

- To be part of a MNC with the HQ in EU countries or other countries with Gross Domestic Product (GDP) per capita bigger than 21,00 in current US dollars (Schwab & Sala-i-Martín, 2014);
- To have more than three manufacturing plants within the company, at least in two different countries.

The case study interviews were conducted in three different stages. First, a technical visit to each company plant and the delivery of documents with a preliminary explanation of the required information from the interviewees. Second, general analysis on the questionnaire forms submitted back, for finding unclear data or empty fields, which could affect the overall analysis. Third, the conduction of interviews with a mean duration of two hours.

The questionnaire survey was structured with a mixed format (open-ended questions and alternatives). The persons interviewed have leading positions in their companies such as Chief Executive Officer (CEO), Chief Technical Officer (CTO), or Chief Human Resources Officer (CHRO). When possible, more than one interview was conducted, to crosscheck data and get a more accurate result.

The first case study is the Alpha plant, which is one of the largest industrial Greenfield investments made by the company. It was constructed with the highest standards applied in terms of construction and operation in Albania with a total value exceeding 200 million Euros. The plant finished in 2010 and it can produce a total of 1.5 million tons of cement per year. The company's HQ is in Greece. The network has one plant in Greece, one in Albania, one in Brazil, one in Bulgaria, two in Egypt, one in North Macedonia, one in Serbia, one in Turkey, and two in the USA.

The second case study is the Beta plant that produces building materials. The Albanian plant produces about 50 different products, as mortar, plaster, grout, insulation systems and a variety of other materials called dry materials, while the liquid materials and accessories needed for the products are obtained from other plants of the company. The company's HQ is in Austria. The network has eight plants in Austria, one in Albania, two in Bosnia and Herzegovina, two in Bulgaria, three in Croatia, five in the Czech Republic, six in Italy, etc.

The third case study taken into consideration is the Gamma plant that also produces cement. The first phase of this Greenfield plant was concluded in 2009, with the construction of the grinding plant. The company's HQ is in Italy. The network has eight plants in Italy, one in Albania, one in Tunisia, one in the Dominican Republic, and one in Canada. The company has branches in other

sectors like tourism and transport, but the focus of the study was on the manufacturing plants producing cement.

The final plant studied is Delta that produces aluminum systems. The company, whose Delta plant is part of, has more than 30 years of experience in the business. Its industrial facilities include 11 aluminum extrusion lines, powder coating lines, interior doors, and security doors lines, construction of elevators, polycarbonate sheets lines, etc. The completion of the industrial complex plant in Albania finished in 2005 with a total cost of 8 million Euros. The company's HQ is in Greece. The network has fourteen plants in Greece, one in Albania, one in Bosnia and Herzegovina, one in Bulgaria, one in Romania, and one in Serbia.

3. Results and Discussion

As stated in Paulin and Suneson's (2012) study, terms such as KT or knowledge sharing sometimes are used synonymously or considered to have overlapping content. There are also uncertainties in what is defined as information sharing versus knowledge sharing. This is kind of a tricky subject because knowledge and information are used interchangeably by so many people and there were difficulties even for the interviewees to distinguish between these concepts. By considering these facts, we tried to extrapolate only the significant data from the interviews. Firstly, we wanted to have a general overview of the knowledge flow about the most important topics in manufacturing plants. Table 1 shows five topics and the answers from each plant to the specific question "What kind of knowledge is exchanged between your plant and the other plants within your network?"

Table 1: Exchanged knowledge between the plants within the MCN.

Company plant	Product	Process	Technology	Services	Management
Alpha	x	x	x	x	
Beta	x	x	x	x	x
Gamma	x	x	x	x	x
Delta	x	x	x	x	

Table 1 data show that there is a flow of knowledge for products, services, and processes as expected. Meanwhile, in management, this flow is limited, probably because of information sensibility for this subject.

To know more about the company strategy related to KT and the usage of computer-based systems as enablers to this knowledge, we asked each plant interviewee to show through a successful project or an unsuccessful one, how the knowledge in the network is used. This project could be a new product, a newly implemented process, an added service, etc. Different answers and examples gave us the real state and the strategy used by each site and the company in general.

The Alpha company plant, shared knowledge in both ways, informal (skills, experience) and formal (standardized documents). This knowledge comes mainly from the HQ to the business units (BUs), but there are cases where it is exchanged directly between the BUs. As the plant manager said, knowledge is shared in yearly meetings where financial achievements are presented and the subsidiaries are faced with their result and progress in respect with the other subsidiaries, as well as from casual meetings between individual subsidiaries in search of information, expertise, and experience. For specific products, a joint team of engineers is created, with the participation of people from all the BUs that are involved in the product. An example of transferring knowledge for a process in the case of the HQ plant, where a new fuel was introduced. The HQ formed a group of experts from all the plants and sent them to assist and transfer knowledge about this process to their respective plants.

Furthermore, the employees of Alpha Company had the chance for mobility to other plants to cover their same position. The company strategy is to make a rotation of employees with different

experiences, where sometimes by changing their work position, they also change their expertise field. Knowledge exchange is part of the job duties of the employees, especially from a supervisor to his team, so they do not get bonuses as incentives. Promotion and bonuses are given only in the case that an innovative idea of an employee is implemented.

The major means used to discover new knowledge, are visits to other branches of the company, informal interactions (lunch meetings), or conducting collaborative projects. An example of such a project was the one involving the introduction and implementation of the Systems, Applications & Products in Data Processing (SAP) system in the Albanian plant in collaboration with Serbian plant experts. There has been considerable use of computer-based systems such as an intranet, conference calls, and more sophisticated MIS and ES, but the latter are implemented in place for each BU, not as a distributed system over the network of the plants.

In the Beta Company, the KT for new employees is based on training with experts. When the training takes place in the form of a videoconference, a standard protocol is held which then is distributed to other employees. Once a year, meetings of different plants employees are organized, where presentations of innovative ideas take place, or even discussions about various problems encountered throughout the year. "When a new plant is activated, frequent visits occur by specialists and controllers coming from the HQ to give their knowledge and to control the products and processes quality" pointed out the Albanian plant manager during the interview.

Information about the product, the market, the management of human resources, and quality management are accessible through a distributed IS, which is managed by the HQ.

In the third plant Gamma, the company is orientated towards advanced ISs, quoting the CTO: "We use SAP for every activity, for everything". The decision-making in the plant is local, but most of the issues are consulted with the person that has the same role and duties in the HQ. Therefore, there is a doubling employee from HQ plant for every employee in leading or managerial role in Albanian plant with whom the employee can communicate on every issue, sharing in this way the knowledge. The information is highly standardized for products, processes, services, etc. Every consult or communication is activated through SAP.

Furthermore, the company has its internal network with a huge number of different manuals for specific problems, such as security in work, product protection, impact on the environment, etc. There are some rare cases when the knowledge is gained in informal ways (for example through e-mails). Regarding incentives for knowledge exchange, there are no examples related, but the company supports them. Bonuses are rewarded on annual basis in terms of attitude towards the community and the progress of the worker.

In Delta plant company strategy, the knowledge is shared both in informal (skills, expertise, experience through meetings) and informal (standardized documents shared through a document management system). There is yearly training for groups of employers for a specified product application or process. Regarding incenting knowledge share, the company does not give bonuses to the high-skilled professional who shares their knowledge. This is considered as part of every job description and as the duty of every employee.

Regarding the barriers in knowledge, all the interviewed persons underline that the level of cooperation between the plants is moderate – the plants are free to communicate with each other in case they need information and are free to discover and make their connections without communicating previously to the HQ. The plants are always collaborative – they never experience competition among them because they own the market of the country in which they operate and their attempts for export are always coordinated from the HQ. The degree of cooperation between the plant examinated and the other plant in the network is collaborative. In addition, the support for knowledge recognition, assimilation, and application is at high levels, but there are some cases where barriers emerged. For example, the Beta plant manager mentioned the lack of time exchanged for a protocol that should be followed through the exchange of emails, and where was necessary to use informal "help" to speed things up (phone call with a supervisor in the HQ plant). Another example, which we can define as a lack of tolerance for errors or the need for assistance, happened at the Gamma plant. The

knowledge and standard protocol used in the other plants within the network, about the tax administration were inefficient in the case of the Albanian plant. The issue continued for several months until the HQ decided to draft a new specific protocol with the help of local experts to resolve it.

Table 2 shows if three well-known advanced systems such as CRM, ERP, and MIS are implemented in the plant or not. The last column shows if these systems are implemented in-place and data shared locally, or in a distributed way meaning that the data is shared within the network. In the "Future implementation" column is pointed out the strategy of the company in the development of newer systems, for example, SAP.

Table 2: Computer-based systems implemented and their usage. Strategy for future investments in these systems.

Company plant	CRM	ERP	MIS	Future implementation	Usage
Alpha	Yes	Yes	Yes	SAP	Internally
Beta	Yes	Yes	Yes	None	Between the plants
Gamma	Yes	Yes	Yes	None	Between the plants
Delta	Yes	Yes	No	None	Internally

By proceeding with further analysis on the collected data, can be pointed out that all four companies provide formal training related to knowledge management practices using IS/ES. Furthermore, in the case of the Beta company, this is accompanied by a movement of employees to be trained in HQ, and a movement of experts toward the Albanian plant. Regarding the specific question "What information would you like to share through ISs?" all the persons interviewed converge. They have specified a long list from financial issues, market issues, products, and business processes, to organizational knowledge, administration issues, HR management, etc.

4. Conclusions

This research attempt to explore KT in manufacturing plants in developing countries as Albania, part of MCNs network through computer-based systems. The study is based on an empirical investigation carried out in a set of four manufacturing companies with HQs in developed countries having a manufacturing branch (plant) in Albania. The case studies analysis shows that in most cases, computer-based systems play a central role in transferring knowledge between different units in the network of plants. The data analysis shows that there are no incentives for knowledge share because companies fulfill this with different strategies such as job rotation, training, expert visiting groups, etc. Regarding the barriers in KT, analysis points out some examples of lack of time, lack of tolerance for errors, or the need for assistance affecting the KT through the systems. Another interesting finding is the intent of companies to invest in more advanced systems to manage their KT and acquirement. This conclusion is in accordance with all the plant managers that have been interviewed.

Based on the above findings, it is possible to outline a recommendation for the companies that use computer-based systems internally, to extend where possible the system in distributed ways. This would result in the non-replication of information, expertise from more experienced people in the network, and collaboration between all the plants. Furthermore, in line with the results of Jasimuddin et al. (2012), we stress the fact that data quality and strategic commitment towards using advanced computer-based systems for transferring knowledge is an important precondition.

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