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Knowledge Management and Logistics: An Empirical Evaluation

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Abstract: In recent years the possibility of applying knowledge management to logistics and to logistics planning has been put forward in literature. Despite of these discussions knowledge management has not been implemented in logistics in large scale. To draw a clear picture of the current state-of-implementation and understand the impact knowledge management activities have on a company's logistics performance a comparative study is run with German and Portuguese logistics companies. The paper explains the theoretical background and practical implementation of this study and discusses a strategy to measure the investments in KM, access the needs of KM, and evaluate the impact of KM investments in the logistics sector. Although the study is still in progress, results are expected to be available for presentation at the conference.

Keywords: Logistics, Knowledge Management, Intellectual Capital, Measurement of Impact
Categories: A, H

1 KM and Logistics: The Situation

As in companies and the society in general, knowledge has been widely recognized and accepted as strategic resource in the area of logistics (defined by [ELA 2004] as the planning, execution and control of the movement and placement of people and/or goods and of the supporting activities within a system organized to achieve specific objectives), too:

- Whether or not a supply chain operates successfully does not only depend on the intensity and quality of materials and information flows in a supplier-customer relation. Generally recognized, this is also heavily affected by the kind and quality of *collaboration between human resources* involved in it on both sides of the partnership based on knowledge, understanding and trust.
- To support logistics planning, there is a permanently increasing number and variety of methods and software tools. Unfortunately, they quite often dominate the planning person and prevent him or her from *creative problem solving* instead of purposefully giving personalized support [Neumann 2003].
- *Team building* to master complex problems in logistics planning and operation can be successful only if the team consists of the right mix of

knowledge, experience and competence stakeholders adequate to the problem to be solved. Within those well-balanced teams a range of individual strengths are combined to overcome a range of individual weaknesses for jointly better performing at a higher level.

- Logistics itself is a quite young and very dynamic field of knowledge and science. Resulting from this contents, methods, tools as well as way and time frame of *modern logistics education and training* oriented towards future needs and requirements is significantly being changed.

The biggest challenge for properly handling this strategic resource by applying knowledge management methods and tools to both spheres, the planning of logistics systems and processes and the operation of logistics services, consists in providing the right knowledge of the right quality and with the right costs at the right place and time. In other words, it is essential not to focus on the introduction of knowledge management technology and integration of software tools for storing and retrieving knowledge and information into a company's setting only [Gudehus 2003], but to put the human resources driving the company's performance back into the centre of gravity and to try to give them that kind and amount of support which is needed in a particular situation.

Despite of this common understanding, knowledge management has not yet been implemented in logistics companies or logistics departments of big companies in large scale. Although [Baumgarten and Thoms 2002] were able to identify even logistics knowledge management champions (with special focus on those companies involved in supply chain networks), they also had to recognize severe challenges in implementing knowledge management and running it in the daily logistics business. Major problems were seen in financial limitations, time restrictions, insufficient structuring and presentation of knowledge, as well as methodical misconceptions. Further reasons for acceptance problems and the slack implementation of knowledge management into logistic services planning, operation and management are existing deficits in measuring the success of knowledge management initiatives.

2 KM and Logistics: The Evaluation

Taking into consideration the current situation of the introduction of knowledge management into the logistics field of business, the paper describes the general approach and first results of a wider ranging joint research project addressed

- to gain a clear picture on what is knowledge management practice in a certain business sector,
- to develop a domain-specific approach for measuring the impact of knowledge management on a company's performance,
- to understand the impact of knowledge management on the logistics performance taking cultural specifics and organizational diversity into consideration and
- to identify existing potential for improving a company's performance by means of knowledge management.

The input data of this analysis are collected in a three stage process: A prototype questionnaire is used to gain first results and general feedback from a limited sample

of logistics companies in Germany and Portugal. It focuses on three important issues: (i) measurement of the investments on KM that are being made in the logistic sector; (ii) assessment of the needs for KM in the logistic sector; (iii) definition of the impact that the investments in KM have on the logistic sector. In a second stage the improved questionnaire is sent to leading logistics companies in both countries, such as the top 100 logistics companies in Germany [Klaus 2003]. The third stage of the project will aim at extending the investigation to further countries across Europe.

2.1 The basic models

In recent years some very well known models have been developed to deal with the question of evaluating KM and Intellectual Capital, the more important being the Skandia Navigator [Edvinsson and Malone 1997], the Intangible Assets Monitor [Sveiby 1997], and the Balanced Scorecard [Kaplan and Norton 1994]. The main ideas behind those models are two: first to define the "intangible" assets; second to measure their implications: Just because knowledge is intangible does not mean that its impact is [APQC 2004a]. Very important practical applications of those methods have been done recently, [North and Hornung 2003, and North, Reinhardt and Schmidt 2004]. Also, and very interesting, some authors have tried to audit knowledge [Reinhardt 2003; Sabater et al. 2003]. All those ideas are well known, and studied. What has to be done now is to apply them to relevant sectors, which in the present case is the logistics sector.

2.2 Structure and relevant questions of the study

To gain a clear picture on the current situation of knowledge management implementation into logistics businesses we decided to run an impact study rather than a case study. In principle this kind of a study requires two similar sets of comparable organizations both attaching themselves to the logistics sector, but one group of companies applying knowledge management whereas the other is not yet applying knowledge management. Due to the fact that there is no general knowledge available on a logistics company's attitude towards knowledge management, these sets cannot be identified beforehand, but they need to result from first analysis during the study. For this, the structured questionnaire the study is based upon contains questions on general company characteristics to help

- to identify the type of logistics business activities the company is running or involved in for avoiding, for example, to relate a transportation service provider to a consultant,
- to describe the companies in terms of number of workers, sales volume, economic sector, productivity, and other economic and social relevant characteristics and
- to group companies according to their general understanding of knowledge and knowledge management.

On this basis further questions are asked to specify selected knowledge management activities by the volume of investments on them and the company-specific level of priority for accessing them as well as to understand changes in the company's performance eventually initiated through the implementation of knowledge management.

2.2.1 Defining knowledge management

To understand how companies define knowledge management they are asked to specify investments. For this, we decided to apply a typology of 17 items which in our opinion characterize knowledge management:

- formal training, informal training, self training,
- hiring of consultants,
- communities of practices,
- meetings with labour psychologists,
- R&D activities, innovation practices, practices related with creativity and imagination,
- meetings with invited experts, meetings with external specialists,
- participation in workshops, conferences and congresses,
- study visits to other companies, laboratories or cultural sights, study of best practices,
- participation in external networks of knowledge transfer, establishment of internal networks of knowledge sharing and knowledge transfer, development of informal social networks.

This grid of analysis follows the definitions of KM used in the studies mentioned in 2.1 and also in some other well considered organizations [APQC, 2004b]. We are deliberately not asking for investments into knowledge management systems and IT infrastructures, but into people and human resources only, because portals, databases and intra- or internet is common standard in logistics companies. Instead, the focus is strongly put on knowledge management activities influencing a company's culture.

Due to the fact that the accurate numerical definition of each type of investment in EURO or in time would be extremely difficult or even impossible, companies are asked to specify the 2004 investments on each item in a more abstract, evaluating way on a scale from zero to five: 0 means none; 1 less frequent; 2 frequent; 3 rather frequent; 4 very frequent; 5 permanent. With this, we expect to obtain an estimation of the investments made on KM by each responding company and organization. Of course we rely on the good faith of the respondents, but that one is a perennial question on social sciences.

2.2.2 Defining needs for investment in knowledge

Based upon [Reinhardt 2003] we consider that the need for investment in knowledge is defined as the subtraction between, on one hand, the way knowledge is defined as a priority and, on the other hand, an indicator of frequency. As an indicator of frequency we use the investments made and that were defined in the previous section. Priorities are defined by asking how frequent the respondent thinks his or her company should have had access to each type of knowledge. The scale we used to define priority is the same, from 0 to 5, as it was used to define frequency. Thus, in consequence, for each of the 17 items we will be able to see if the level of priority is higher than the level of investment (and thus a reduction of investment will be recommended in these cases) or if on the contrary the level of priority is higher than the level of investment (meaning that urgent need for investment exists is these sub-areas).

Crucially, we think it is much more interesting and correct to define "needs" indirectly by asking for "frequencies" and "priorities" than naively asking a manager this question directly: needs are infinite if we look at them directly. This part of the study may help the companies to identify areas in which they shall invest in the near future and may thus have a short run and important consequence.

2.2.3 Defining knowledge impacts

In this section we somehow followed the notion of impact studies as designed in microeconomics [Heckman et al. 1999]. The basic equation that describes the problem is indeed very simple:

$$\mathbf{Y = aX + bKM + e} \quad \mathbf{(1)}$$

Here, Y represents the outcomes, KM the investment variables, and X the controls. The impact of KM is defined by b.

Very complex developments of this formula may be made according to the best experts in the field [Heckman et al. 1999].

In the present case:

- KM is defined by the 17 variables listed in 2.2.1.
- Y is defined by the evolution of 41 variables as included in the questionnaire which were selected according to the theories listed in 2.1 to show the evolution of a company in a moment of time. The variables relate to financial outcomes, operational aspects, costumer satisfaction, and strategic and structural factors that describe the company. Again, we think we are in line with the studies mentioned in 2.1 and with the work of some other considered organizations [APQC 2004b].

  Crucially again, the question on the impact will be asked indirectly: the value of Y to be used will consist on the difference between, in one hand, the data on the situation after the investment and, in the other hand, the data on the situation before the investment.

  In each one of the two moments, the situation of the company is described for each variable in a scale from 0 to 5: 0 means bad, 1 poor, 2 enough, 3 good, 4 very well, 5 excelent.
- X relates to the company characteristics and to the perceived importance of knowledge in each company. The questionnaire contains 12 small questions on this topic.

We hope to be able to draw a set of charts relating the 17 variables representing investment with the evolution of the 41 variables that represent impacts. Those results may be further specified by the type of the company. In the end we will receive a very interesting description of the impact of knowledge on the companies of the logistic sector.

2.3 Implementation of the study

The study is run with companies attaching themselves to the logistics sector. Those companies are either logistics service providers of various kinds or, for example, big companies such as car manufacturers with a specific logistics department. To eventually see cultural influences the study is less focussed on global players but on German and Portuguese companies with a strong orientation towards regional and

national markets instead. For this, the questionnaire is being provided in the respective local languages.

As a first step the questionnaire needed to be evaluated regarding its common understandability and acceptance by chief logisticians of a limited sample of five companies in each country representing different types and logistics businesses. Their responses to the questions were followed by an interview session to validate answers and gain feedback on individual views on and different interpretation of questions. In the course of this process it turned out that there is not a clear idea on knowledge and knowledge management with all logistics companies. Furthermore, it seems to be not so easy to clearly specify investments on knowledge management activities and identify related changes in the company's performance. As a result, the questionnaire had to be slightly modified to take the answering person into consideration. More detailed explanations on what is meant by knowledge and knowledge management in the terms of the questionnaire were added. Apart from requesting for information on the person's position or role in the company question style has been changed from the absolutist "How important is … to your company?" to the more personal "What is your impression about the importance of … to your company?" way of questioning.

The second stage of the project uses the modified questionnaire. It is sent to those companies having been identified as belonging to the top 100 logistics companies in the respective country. With this it is expected to get a comparable sample of responses from both countries not just according to the number but especially with regard to the characteristics as specified in section 2.2.

3 Expected Results and Conclusions

It is widely recognized that the quality of logistics services and the success of logistics activities strongly depend on knowledge, abilities and skills – i.e. the competence – of people designing or operating logistics systems and processes. Therefore knowledge management is expected to provide a tremendous contribution to the improvement of logistics planning and performance. Before this background the study aims at comparing these high expectations with today's reality in business by

- identifying the level and type of knowledge that exists in the logistics sector,
- understanding the kind, objectives and success of activities for knowledge creation and knowledge sharing in the logistics sector,
- defining the need for investment in knowledge in the logistics sector,
- finding some evidence of the relation that might exist between knowledge and outcomes of the logistics sector.

Consequently we try to develop a domain-specific approach for measuring the impact of knowledge management on a company's performance and identifying potential for improving a company's performance by means of knowledge management. In particular, we expect to obtain descriptions of knowledge investments in the logistics sector, of needs for investments in knowledge in the logistics sector, and of impacts related to knowledge. Although general figures are always important, the analysis may be fragmented in some sub-samples such as:

- Germany versus Portugal – to take into account the socio-economic landscapes in which companies evolve;
- logistics planning versus logistics operation – to take into account the difference between operative and planning procedures.

After having analysed feedback by stage 1 companies the second stage of the overall project – the broad band questioning of logistics companies in Germany and Portugal - is being launched. Results of this will be available for being presented at the conference.

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