

CONSIDERATION REGARDING THE EFFECT OF INTEGRATED USE OF TECHNOLOGIES AND TECHNIQUES FOR SMALL AND MEDIUM ROMANIAN ENTERPRISES BASED ON KNOWLEDGE

Ion Dobre

The Academy of Economic Studies of Bucharest
Faculty of Cybernetics, Statistics and Economic Informatics
Dorobanti Calea Street, nr
Bucharest, ROMANIA
e-mail: dobrerio@ase.ro

Mariana Enusi

The Academy of Economic Studies of Bucharest
Faculty of Cybernetics, Statistics and Economic Informatics
Dorobanti Calea Street, nr
Bucharest, ROMANIA
e-mail: marinusa@hotmail.com

Abstract

The last two decades have witnessed a significant increase in discussions about the different dimensions of knowledge and knowledge management (KM). Many factors have contributed to this growing interest including globalization, increased competition, diffusion of new ICTs (information and communication technologies) and new procurement routes, among others. There are a range of techniques and technologies that can be used for KM in construction of Small and Medium Enterprises based on knowledge. The use of techniques for KM is not new, but many technologies for KM are fairly new and still evolving. Knowledge-based economy indicate that most of Small and Medium Enterprises based on knowledge do not adopt a structured approach for selecting KM technologies and techniques. The use of KM techniques is more evident compared to KM technologies. There is also reluctance among Small and Medium Enterprises based on knowledge to invest in highly specialised KM technologies. The high costs of specialist KM technologies are viewed as the barrier to their adoption. In conclusion, the paper advocates integrated use of KM techniques and technologies in Small and Medium Enterprises based on knowledge.

Key words: *Small and Medium Enterprises based on knowledge, KM techniques, KM technologies, performance, competence*

1. Introduction

The whole relationship that a company develops during its existence to realize its activity represents the economical, social, competition and political medium for all organizations, especially for small and medium Romanian enterprises based on knowledge. Stakeholders for small and medium Romanian enterprises based on knowledge keep in touch and relate to the suppliers, buyers, local and general public administration, state organizations, consumer associations, syndicates, employers, etc.

Small and Medium Enterprises based on knowledge interact and there is a consent regarding the existence of a strong and direct proportional relationship between the size of the company and its amplitude and competence (structure) of the medium.

The object of the Small and Medium Enterprises based on knowledge's activity is of economic nature and, in order to develop it, the enterprise contacts many other economic enterprises, initiating buy-sell relations, information-documentation relations, project relations, etc. The involvement of the labor force into the activity of the Small and Medium Enterprises based on knowledge is economical through their appointment contracts, but it brings the social aspect into the field of its medium, that means viewing the existence the employees as human beings. The social aspects becomes amplified through the consequences induced by the way the Small and Medium Enterprises based on knowledge contribute or not to meeting some of the needs of the population through the object of their production, etc.

The general trend is to develop the relationship inside the business medium and increase it to new partners and then passing to new, superior levels until the global level is reached. For various reasons, some of them being earning performance reasons, some small and medium enterprises based on knowledge could

have a business contraction based on their own recession, the country's recession or the recession of the countries in which it operates.

In the Romanian economy, as well as the world economy, there is a general trend of blockage and economical crisis and the financial help for the Small and Medium Enterprises, especially the Small and Medium Enterprises based on knowledge, becomes very important and immediate.

2. Romanian Small and Medium Enterprises based on knowledge

Romanian Small and Medium Enterprises based on knowledge are those enterprises that carry out services in different domains but they have as common denominator the intellectual capital, intangible capital and they revolutionise the knowledge through their number, their impact and the economical, scientific, educational, ecological and cultural performance.

We consider that Romanian Small and Medium Enterprises based on knowledge are the following:

- commercial societies producers of computers and computer components
- commercial societies producers of computers software
- solicitor firms
- law firms
- officer of the court profession
- mediation firms
- audit firms
- accountancy firms
- surveying firms
- liquidation firms
- optical laboratories
- fine mechanics laboratories
- research and projects institutes
- companies specialising in data storage, sites' administrators, bloggs, consulting in information technology and the instruments offered by IT&C.
- companies specializing in consulting and management
- advertising companies
- companies specializing in training

The specialists' opinions regarding the definition of the Small and Medium Enterprises based on knowledge have different characteristics.

Our opinion is that the Small and Medium Enterprises based on knowledge transform knowledge in products and services, in intellectual and competent capital as raw material, capitalizing the services as efficiently as possible through processes of buying and selling, storing, sharing, developing, protecting the knowledge whilst conditioning the obtaining of profit and the sustainability of the company.

The Small and Medium Enterprises based on knowledge need the most advanced information and communication technologies for the development and assurance of their activities, regarding them as essential tools for their sustainability.

Figure 1 presents the interaction of technologies within Small and Medium Enterprises.

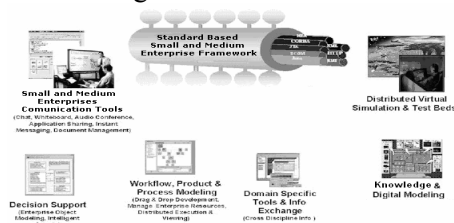


Figure nr.1 The interaction of technologies within the Small and Medium Enterprises

The Small and Medium Enterprises based on knowledge suffer a lack of transparency, where there are few comparable elements, and the emotional and human factors have a large impact on a transaction (buying-selling products, services). On many occasions the evaluation of the performance of the Small and Medium Enterprises based on knowledge is linked more with the value of its assets rather than the company's potential, the difference between the two being the intellectual capital.

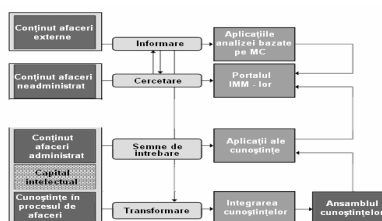


Figure nr.2 The management of knowledge in a Small and Medium Enterprises based on knowledge

3. Information and communication technologies in the Small and Medium Enterprises based on knowledge

Information and communication technologies inside the knowledge management (KM) in Small and Medium Enterprises based on knowledge consist of a combination between hardware and software technologies. Hardware technologies and their components are important for the knowledge management system in the Small and Medium Enterprises based on knowledge because they have the role of platform for the software and for the storage and transfer of knowledge. Some of the hardware requirements of a Knowledge Management system (KM) include personal computers or work stations to facilitate the access to knowledge, servers for high traffic for the organization to be in the network, open architecture for interoperability in distributed media, mass-media rich in applications that need the integrated digital network of services (ISDN) and high speed optic fiber to offer access to the public network (Internet) and private network (Intranet and Extranet) and facilitate the access to and exchange of knowledge (Lucca et al., 2000). In the next figure, we present an open architecture:

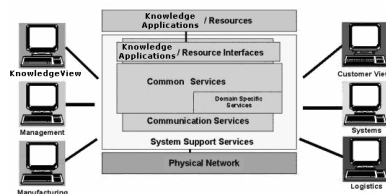


Figure nr.3 Interoperability inside the Small and Medium Enterprises based on knowledge

Software technologies have an important role in facilitating the application of Knowledge Management (KM). The number of software applications has increased considerably in recent years, the suppliers of software offering different solutions for different tasks. The large number of suppliers that offer solutions to Knowledge Management (KM) makes the identification of the best solutions difficult. This led to the adoption of different models in organizations for establishing the Knowledge Management (Tsui, 2002b).

Socializing, as a process, occurs through team work of compatible individuals, with similar cultural profiles. The first software socializing instruments could be considerate distance collaborating software. This class of instruments sustains not only socializing, but also the other processes of knowledge conversion. In socializing, the accent is on sharing the knowledge and building the trust inside the team. Virtual media of communication opened to the public are: discussion groups, forums, intra-net, blogs, chat and wiki pages.

- Discussion groups and forums facilitate the conversation of persons having common interests.
- The level of the professionalism varies and the orientation is practical in general.
- The Intra-net communication software are generally reserved to companies, due to high prices
- Blogs are a new communicating system that promises to become a new method of marketing and public opinion survey
- Chat maintains an active informal network inside and outside a company
- The editing system of Wiki pages is an efficient alternative to an asynchronous communication in text format between the members of the same team or outside of it.

The Internet technologies are supplemented by the software dedicated to the virtual collaboration inside an organization (groupware), with the help of which, members of a team can share experiences, such as conferences, presentations, discussions, or could even work together using visual instruments or modeling in real time. The classic example of this type of software is Lotus Notes application, which facilities simultaneous work on documents but offering only the possibility of asynchronous discussions. A superior form is the videoconference, a solution for the real time communication. (Lotus Sametime and Microsoft

NetMeeting). The present form of this software for cooperating at a distance combines the videoconference with simultaneous work on applications and documents (IBM –Boeing Team Space project). Although the main activity is that of combining explicit knowledge, the participation to these kinds of activities is a form of tacit learning. The major deficiency is establishing a reduced degree of trust compared to meetings face-to-face.

Due to the complexity and speed at which the knowledge market is changing, there are also necessary methods of search and retrieval of expertise; these are search engines of persons by their capacities (by type and value of the tacit/implicit knowledge). Such products are Lotus Discovery Server, which determines the profile of the persons from the online application form and from the documents whose authors these individuals are and Tacit Knowledge Systems Knowledge Mail, which use text mining on emails written by employers in order to determine their expertise.

Externalization is a difficult process, which has to be practiced and methodized. Detailed interviewing of the experts or requesting the description of certain process could lead to the exploitation. Externalization supposes the creation of a mental model shared by the dialog members followed by the articulation of the new knowledge. These methods lead the positive results when the answers have to be expressed into a predefined ontology of the domain, increasing the clarity and concision of the obtained knowledge. This is the design approach of the expert systems that requires procedural knowledge from key members of the organization.

The knowledge management takes the majority of the discoveries of the expert systems and continues with a deepening of the research in the methodology and the creation of instruments of ontology.

The theoretical results of this research will be approached in the section dedicated to the methodology of knowledge management, which has as nucleus the activities regarding the life cycle of ontologies.

Alongside the software dedicated to the work with the ontology, the externalization instruments include the software dedicated to brainstorming and those of search and organization of the archives of discussion groups.

Internalization. The new acquired knowledge has to be understood thoroughly (through their function) and connected to the already existent knowledge system, in order to be used efficiently.

The problem of knowledge abundance makes necessary the existence of a standardization of quality and filtration of knowledge, in order to guide the study to the most relevant knowledge. The filtration could be seen as a phase of document classification from the point of view of their utilities. Alongside filtration, the assistance systems of internalization could offer metadata, the context within the taxonomy specified in the language of the domain ontology, the definitions of the terms, visualizations (e.g. Themescape). Furthermore, they could consist of instruments of exploitation of knowledge and the relationship between different pieces of knowledge, such as the project Lexical Navigation. To all these instruments dedicated to the internalization of the knowledge, the “classical” instruments can be added.

4. The financing of the medium of the Small and Medium Enterprises based on knowledge

The productive logics of the Small and Medium Enterprises based on knowledge subordinates to financial logics, but the movement of capital is no longer inspired by the solid bases of the real economy. Until now the objectives of the real economy had priority and the financial-monetary domain had to adapt to them: the level of the price was derived from the ratio of demand and supply of the goods and services, and the interest rate represented the ratio between available economies and the need for investments. The situation has changed; direct foreign investments are the oxygen of the real economy, the monetary stability is a priority and, because of this, there are some restrictions on the real economy. The rate of interest derives from the anticipation of the monetary market and from the imperatives of stability of the central banks.

If until now the strategies were concentrated to finance the developing firms, attracting of strategic investors was the policy of the Small and Medium Enterprises based on knowledge. From 2009 these would concentrate on “buy-side” because a part of the clients of the firm have turned from direct investors, into investors involved in transactions with distressed assets.

The restructuring of the activity has been imminent because the economic crisis involves a financial blockage of all participants to the real economy. There are running projects for which the financing is essential, and economic entities being in financial blockage search financing from the capital market, because banks have stopped credits or give them very rarely to Small and Medium Enterprises.

For 2009 we can expect to an increase of these types of projects without funds and crash of the Small and Medium Enterprises without financial sustaining. The volume of the investors has increased as soon as

the expectancies about evaluation of the Small and Medium Enterprises have become more realistic and more transparent.

The majority of the investors are strategic but we prefer the associations between strategic investors and investment funds. This formula assures the growth and development of all organizations, especially the Small and Medium Enterprises based on knowledge, through reducing the inefficiency and know-how transfer (acquisition of new communication and information technology). The performance of the Small and Medium Enterprises based on knowledge are increasing.

5. Techniques in Knowledge Management in the Small and Medium Enterprises based on knowledge

Statistical methods of analyses of quality necessary for the services of the Small and Medium Enterprises based on knowledge are seldom used by some firms. The necessary attributes of quality gives the clients satisfaction in proportion to the performance of the products/service and, implicitly, to the performance of the enterprise. The increase of the level of satisfaction is obtained by developing those attributes. Because the clients freely express their wishes above these attributes, the necessary quality is often called "the client's voice".

To obtain some tactic and strategic solutions, to build competitive advantages on long or short term, Small and Medium Enterprises based on knowledge have to determine their clients and other persons they address, the zone/aria they come from, their social status, the price they are prepared to pay. Therefore they have to accomplish a segmentation of the market. For a particular solution of segmentation of the market to be efficient and lead to profit entrepreneurial strategies, there are 6 criteria that have to be performed:

- Identificability: the segments have to be well separated and to have clear differences between them
- Consistency: the identified segments have to contain enough units in order to assure marketing strategies specified for each segment.
- Accessibility: the units of the segments have to be accessible through publicity or direct sales.
- Stability: there must be no major changes between the units of the identified segments.
- Sensibility: the units of the identified segments have to respond uniquely to the marketing efforts specified for each segment.
- Actionability: the identified segments have to foresee the directions of the marketing efforts.

The obtained solutions regarding the segmentation of the market depend on the variable used and on the methods and procedures used for obtaining the classification.

The nature and quality of the segment depend on the variables used. Four classes of segmenting variables can be used:

- General observable variables: demographic variables, social-economic variables etc.
- Observable variables specific to the product: the frequency of utilization, the consumers' loyalty.
- Unobservable general variables: variables referring to the life style etc.
- Unobservable general variables specific to the product: benefits, utilities, preferences, intentions, etc.

After the identification of the amount of potential variables for segmentation, a method of stratification is used in order to identify the segments. M. Wedel and W. A Kamakura classify these methods in four categories:

- A priori descriptive methods: frequency tables
- A priori predictive methods: discriminant analysis
- Post hoc descriptive methods: classification methods, mixed methods
- Post hoc predictive methods: logistic regression methods, CRAID, CART, mixed regression methods, or with latent classes.

The descriptive methods are methods that analyze a set of variables, without any separation between dependent and independent variables. They are used to determine some market segments with properties defined by the segmentation variables.

The predictive methods are methods that analyze a set of variables with the purpose of explaining a dependent variable using a set of independent variables.

6. Conclusions and recommendations

The constitution of the Small and Medium Enterprises based on knowledge and the actions of other Romanian economic actors follow complex aims and effects, but it is very clear that in the Romanian,

European, or international economic medium, all of them very volatile due to globalization, the stability or certainty in movement becomes fundamental, because the turbulence seems to have emerged everywhere. Of course, in the case of the Small and Medium Enterprises based on knowledge, the firms have learnt long time ago, and are still learning, how to work towards success, but the present economic media that overlap more and more, this reaction is no longer sufficient because the competition become global and the means of its development have become complicated.

In the EU the national character of economy is blotting out more and more and the European economy combines more and more in its home as well as on other meridians with the economies from other countries or integrationist regional groups in various degrees. The Small and Medium Enterprises based on knowledge are the engine of this economy and are the most developed link, but in a such context, Romanian enterprises confront with 3 important problems: the information, the influence and the financing that they have to manage as well as they could. These problems are not new, but now they have become explosive.

The performance of the Small and Medium Enterprises based on knowledge have to be optimal and, implicitly, the competence of their employees, through the acquisition the new information and communication technology (TIC), which are strictly necessary for developing their activity and assuring their sustainability.

The access to financing, as an essential ingredient of accelerating the innovative process inside the Small and Medium Enterprises based on knowledge, has to be sustained constantly for a sustainable development of these firms.

One of the important points of “Cartel of Bologna” refers to the access to financing as an essential ingredient of accelerating the innovative process inside the Small and Medium Enterprises based on knowledge. The uncertainty and the asymmetry of information that feature in the Small and Medium Enterprises based on knowledge are amplified in the case of the innovative Small and Medium Enterprises, which makes their access to a financing more difficult. Firstly, the economic effects resulting from innovative activities have a higher degree of uncertainty. Secondly, the enterprises/contractors have more information about the nature and the characteristic of the products and the technological processes than the potential investors. Thirdly, the innovative activities are usually intangible, so their evaluation *ex ante* is difficult, using monetary terms, before they have commercial success. Therefore, financing the innovative Small and Medium Enterprises is very risky and has a high degree of uncertainty, creating reserve from investors and enforcing the government’s involving through specific programs, for supplying the private sources to financing the innovative Small and Medium Enterprises based on knowledge.

The economic structure of the Small and Medium Enterprises differs from the economic structure of a great company that operates on a market. Any company combines the own financial resources with the attracted ones. Lack of real guaranties from the Small and Medium Enterprises makes the access to the resources to be different. The financial structure for the innovative and Small and Medium Enterprises based on knowledge and the modality they finance their development depend on:

- institutional efficiency of the capital market
- regulation of the domain regarding the supervision of the involved institutions in financing businesses with high risk.

7. An example. Example of market segmentation-descriptive approach

At the launch of a new software product on the market, the producer firm carried out a test of the buyers of own products. The survey was carried out in Bucharest, having chosen 10 shops that sell the products of the firm. From these shops, 180 clients consumers were randomly selected. They were asked to complete a questionnaire with 17 questions.

The survey was carried out in order to find out the segmentation of the market depending on how the ratio price-quality was considered, how the advertisement and the package influence the buying decision and what the consumers appreciate most in the products of the firm: newness, originality, the ratio price-quality, the quality, or the fact that the product is an advanced and rapid software.

The variables used for segmentation are:

- What do you appreciate best in our firm’s products?
 - newness
 - originality
 - the ratio price-quality
 - quality
 - it is an advanced, rapid software

- How does the ratio price-quality seem to you at the level of these products?
 - satisfying
 - unsatisfying
- Do you think that presentation of these products influenced your choice?
 - ✚ yes
 - ✚ a little
 - ✚ no
- Did it happen that, after you saw an advertisement for the products of the firm, you went and bought at least one of them?
 - yes
 - no

Following the application of an analysis of multiple correspondences, 8 new cardinal independent variables were obtained, referred from here onwards with d_i .

The new variables are linear combinations of the firsts.

The modalities of the questions are correlated with the new variables, as follows:

1. *What do you appreciate best in our firm's products?*
 - newness: positively strongly correlates with d_1 and negatively strongly correlates with d_8
 - originality: positively strongly correlates with d_7 and negatively strongly correlates with d_2 ;
 - the ratio price-quality: positively correlates with d_2 , d_6 and negatively strongly correlates with d_4 ;
 - quality: positively strongly correlates with d_3 ;
 - it is a soft rapidly advanced: positively strongly correlates with d_5 ;
2. *How does the ratio price-quality seem to you at the level of these products?*
 - satisfying: positively strongly correlates with d_6 negatively correlates with d_1 and d_8 ;
 - unsatisfying: negatively strongly correlates with d_6 , positively correlates with d_1 and d_8
3. *Do you think that presentation mode of these products influenced your choice?*
 - ✚ yes: positively strongly correlates with d_4 and negatively strongly correlates with d_3 ;
 - ✚ a little: positively strongly correlates with d_3 and negatively correlates with d_1 , d_2 , d_4 , d_6 and d_7 ;
 - ✚ no: positively correlates with d_1 , d_3 and d_7 and negatively strongly correlates with d_4 ;
4. *Did it happen that, after you saw an advertisement with the products of the firm, you went and bought at least one of them?*
 - yes: positively correlates with d_2 , and d_7 and negatively correlates with d_6 , d_1 , d_8 ;
 - no: positively correlates with d_6 , d_1 and d_3 and negatively correlates with d_2 , d_7 ;

For choosing the number of layers, there is a possibility to arrange a hierarchical clasification and identification at the level at what the graphs should be cut to obtain a better aggregation.

After aplication of the Ward algorithm, the hierarchical clasification in figure nr.4 was obtained. Variations initial had a few answers, we made a stratification into 3 groups using mobile centers

Tree Diagram for 90 Cases

Ward's method

Euclidean distances

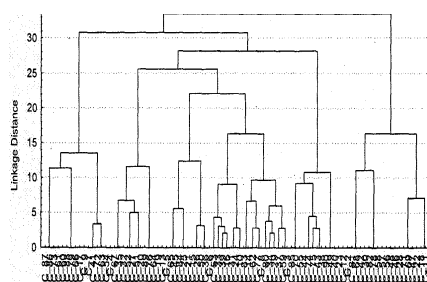


Figure nr.4 Classification tree obtained through Ward method

Source: Cristina Boboc, *Multidimensional Statistics Analyze, Application inside the study" Products and Services*

Therefore, a stratification into 3 groups will be used, with an iterative unhierarchical method of partition-the method of mobile centers.

Centers from three groups of variables and the variations between the centers of the 3 segments are:

Cluster	1	2	3
Dimension 1 (d_1)	0,12	0,10	-0,18
Dimension 2 (d_2)	-0,71	-0,13	0,35
Dimension 3 (d_3)	0,44	-0,27	0,28
Dimension 4 (d_4)	0,29	0,41	0,64
Dimension 5 (d_5)	-0,21	0,26	-0,31
Dimension 6 (d_6)	-1,21	-0,13	0,48
Dimension 7 (d_7)	-0,65	-0,08	0,27
Dimension 8 (d_8)	1,29	-0,55	0,47

Taking into account the existing correlations between the initial variables and the centers of the three groups, the three segments of the market can be characterized as follows:

Segment 1, that represents 9% of the market, consists of the persons that appreciate mostly the quality of the products of the firm, but they consider the ratio price-quality not satisfactory, and they are not influenced by the presentation mode and the advertisement in their buying decision.

Segment 2, that represents 53% of the market, consists of the persons that appreciate mostly the newness and the product is a new rapid software. They also consider the ratio price-quality being satisfactory and they are also influenced by the product presentation and advertisement in their buying decision.

Segment 3 that represents 38% of the market, consists of the persons that appreciate mostly the ratio price-quality and they are also influenced by the advertisement but not the presentation in their buying decision.

Starting from these three segments, the persons' characteristics in each of the three categories have to be studies and the degree to which they are devoted clients-consumers of the products.

The study can be continued to determine the characteristics of people who are part of the 3 categories and to the extent to which they are loyal customers of company products.

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