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ACHIEVING KNOWLEDGE MANAGEMENT AND COMPETENCY MANAGEMENT IN TRANSITION ENVIRONMENT

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Abstract

This research explores the satisfaction and deployment of Knowledge Management (KM) and Competency Management (CM) methods in 106 firms that are the part of the transition environment (in Serbia). Questionnaires containing 14 KM methods and 12 characteristic competences were mailed to top managers of the investigated firms. Results obtained during this survey were analyzed using factor analysis to define models describing Level of satisfaction and Frequency of use of the KM and CM methods. Investigations were conducted separately on the population comprising privatized firms and on the firms not yet privatized. Two groups of firms resulted with completely different models describing their organizational behavior concerning investigated KM and CM methods.

The findings show that the level of organizational culture, technical knowledge and overall organizational discipline, which is much higher in multinational companies involved in privatization process of the large number of Serbian firms, is the main source of organizational capacity for development of homogenous and coherent composite of the KM and CM methods in the process of Knowledge Creation. Results revealed that the process of knowledge transfer from multinational companies to transition economy companies in Serbia is very complex and mostly dependent on the capacity to absorb knowledge that is to be transferred.

Keywords: Factor analysis, Knowledge creation, Management competency, Knowledge management

1. INTRODUCTION

Under the modern hyper communication conditions of global market, great importance for the companies lies in

managing not only their perceptible but imperceptible resources as well. Result of those activities lead to development of new scientific discipline - Knowledge Management (Alavi, 2001), which is

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nowadays subject of academic and scientific interest (Stankosky, 2005).

Concerning that human knowledge in the company is its unique unlimited resource, which is inexhaustible and the only one that can be multiplied, knowledge management has a key role in development of the company and has direct impact on its concurrent position in global market.

Present level of accomplished knowledge in individual areas and number of contracts among companies concerning business-technical cooperation is decreasing, while number of contracts concerning research and development (R&D) is increasing. This trend is specially noticeable among companies connecting: EU-USA, EU-Japan, while stagnating of EU-EU contracts which proves that EU companies besides exchange of knowledge in the frame of EU have necessity for new knowledge from most developed world regions such are USA and Japan (Narula, 2004). Knowledge management was first developed in the companies as the necessity for knowledge exchange aiming to its increase and after that it become focus of academic interest (Desoulza, 2002; Desoulza, 2003; Hogel, 2005).

When talking about knowledge management as the knowledge that should be affirmed and used in different companies or in the parts of the same company, it should be noted that knowledge management itself is less considered compared to the parameters of this knowledge (Ermbrecht, 2001). It becomes obvious that organizations have to manage integration of incompatible knowledge sources in the frame of corporate borders, to retain concurrent vantage. Problem concerning incompatible knowledge integration is of great importance in global context (Nonaka, 1994).

In the transition environment, (which

some of the ex socialist countries have already past thro and some are still in, among which is Serbia regardless to its competative geo-strategic position in Europe), free market didn't exist for years, technologies are very outdated which leads to the fact that companies have low concurrent position in world market. Companies in the transition process are faced with privatization which avoidable leads to the restructuring and reducing the number of employees (downsizing). If some multinational company is to become strategic partner in the process of privatization, apart from the funds, it brings new technologies and new knowledge that would place privatized company in much better concurrent position. Changes appearing in those conditions are accompanied with difficulties, primarily because of inertial behavior of the systems (Hannan, 2004). Influence of mentality (Beliga, 2006), corruption and divergent effect of the state (government or political parties) on those companies, as the result of different interests in the conditions of large entropy make it difficult to accomplish marketing orientation of those firms. To survive in such conditions, companies have to think global and act local (Parnell, 2006). Necessary innovation for maintaining market position must be on global level (Hunter, 2006) which leads to economic perspective at micro level, as already happened in some Asian countries (Jinton, 2006).

On the other hand, in the transition economy, small private companies are being formed starting their own small business, yet at the beginning they are faced with insurmountable problems: large companies' competence is problem that is difficult to transcend. Moreover, large problem is lack of knowledge and experience which in most cases leads to bankruptcy of those firms.

Third group of companies and agencies are those which are still owned by the government (public firms). With the conditions of great entropy present in the transition environment, they are trying to obtain their market position. Unfortunately, mentality and education received under socialist regime with "agreement economy", are often insurmountable problems, especially in Serbia where Balkanian mentality (Zikovic, 2006) still complicate their transformation toward new demands of modern age. Because of that, knowledge management, as the scientific discipline, is of great importance in those companies that practice their businesses in transition environment (Banjanin, 2006).

This paper, presents the results of the investigation carried out during 2006., in 106 Serbian companies (large, medium and small) to diagnose the facts about using knowledge management methods in new products development (NPD) projects (Nonaka, 1995).

2. EVOLUTION OF KNOWLEDGE

Many successful companies (Shell, Volkswagen, IBM, Siemens, HP and other) have introduced specific methods of knowledge management to support NPD and data analyzing, with the purpose of determining which methods are helping and promoting the process of new knowledge creation during NPD process (Wagner, 2002).

In the recent literature, knowledge management is related with capturing, locating, transferring and sharing of primary existing knowledge, which is presented in Figure 1 (Hogel, 2005).

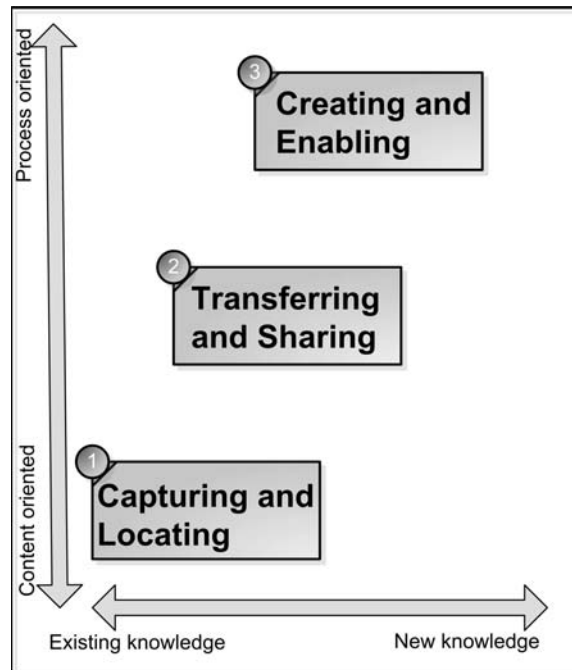


Figure 1. Evolution of knowledge management initiatives (Hogel, 2005)

First and second steps in Figure 1 point the exploitation of existing knowledge or the dissemination of new knowledge. Most beneficial for innovation and NPD is the creation of new knowledge which represents the key factor of growing and developing company.

Under modern environment of knowledge globalization, managers face the challenge of identifying and selecting right KM which contribute the organization becoming profitable and creative and to reach the third stage of the evolution of knowledge management initiatives, i.e., creating and enabling (Von Krogh, 2000).

3. METHODS OF KNOWLEDGE MANAGEMENT

The concept of accepting knowledge as

one of the main factors of productivity is growing nowadays. The problem arises from the fact that the knowledge is human and not technical function. It appears and remains in the human being. Knowledge can not be managed, but environment in which it develops and the means of its use can. The most important thing is to make knowledge visible and to enable people in the organization to realize who knows what. This is the reason why "return to knowledge" not to technology is the main value of some organizations. To achieve success in this process companies must change behavior of their employees. During this process, it must redirect them in the course of knowledge sheering. Knowledge sheering can bring many benefits to the company in the course of its operation and exchange of experience among employees, which leads to practical use of various work improvements.

The importance of knowledge management lies in unveiling hidden knowledge which improves and promotes work, e.g. finding the knowledge of the employees obtained at their work positions and its application for further development of the company and increase of its productivity. Knowledge management in successful companies helps employees to understand what they really know. Using the knowledge mapping techniques they can locate where in the company the knowledge is stored, to capture, accommodate and use that knowledge in various improvements of work organization.

The greatest problem in many companies is that they do not know what their employees really know, what potential they have and how to recognize and use it in their work improvement in the process of new product development.

For the purpose of more efficient location

of knowledge and knowledge management Hoegl and Shulze (2005) have proposed 14 methods of knowledge management in the process of NPD:

1. Informal events
2. Experience workshops
3. Experience reports
4. Data bases
5. Research services
6. Project briefings
7. Expert interviews
8. Communities of practice
9. Best practice cases
10. Electronic discussion forums
11. Index services
12. Knowledge broker
13. Story telling
14. Knowledge maps

Nonaka et al, (Nonaka, 1994; Nonaka, 1995; Nonaka, 2000) in the time period 1994-2000., conducted investigations in number of companies and concluded that companies that used using knowledge management methods had benefits during NPD process. Above all if using the four approaches of knowledge creation as the part of the process of interaction among explicit and tacit knowledge during creation of cumulative company. Four approaches discussed are: tacit to tacit, tacit to explicit, explicit to explicit and explicit to implicit.

For the aspect of knowledge management in organizations', human resources are the key factor, e.g. human resources management (HRM). Respecting the fact that under globalization environment the nature of work is changed (Burke, 2006), the motivation factors which are the main driving force of creativeness and effort are changed in general (Latham, 2006), same as the satisfaction of employees under conditions of technology operations

standardization as the part of TQM (Total Quality Management) process (Jun, 2006).

Most of the knowledge management methods could be the base of the knowledge creation process. Under the high level of technology development and concurrency in the globalization environment, those methods should be the only way leading to creation of concurrent advantage (Borner, 2000).

Using of any of the knowledge management methods demands understanding of the methodology and all the processes during its use. Only this way, improvement of existing and creating of new knowledge can be realized in the process of NPD.

4. USING THE METHODS OF KNOWLEDGE MANAGEMENT

Subject of investigation with results presented in this paper, was to determine the scope of information and use of knowledge management methods in Serbian companies (economy under transition conditions) and to compare those results with the results corresponding to companies in countries with already developed economy systems, which are involved in privatization process in Serbia. This would provide insight on influence of transition processes on this modern aspect of NPD.

Most of the companies in Serbia were privatized according to the plan of Serbian Privatization Agency (SPA). Those companies were privatized by multinational companies (US Steel - ironworks, Telenor - mobile phone network, Michelin - tire industry, British American Tobacco - tobacco industry). Large companies from nonferrous metallurgy, oil industry (refinery), electro

energetic systems and other are still owned by the government having great financial and other problems. Indicative problems that follow privatization process in transition economy are: inertia, distrust, different interests (Balaga, 2006).

4.1. Sample and data collection

A mailed questionnaire was used to collect data for this investigation. Questionnaires contained the questions based on the frequency of use and the satisfaction with all or some of the methods discussed above (1-14). A Likert-type scale (Martinsuo, 2007) of 1 ... 5 were used for each question. We identified and pre-notified 150 potential respondents and then sent each the questionnaire. Non-respondents were called after 2 weeks to ask if they had received the questionnaire and to remind them of the importance of their cooperation. The same procedure was recommended by E. Veldhuizen et al. (2006). This step showed that our research instrument was not applicable for 17 respondents. After 3 weeks a reminder postcard was mailed to non-respondents. In total, 106 completed questionnaires were returned for an effective response rate of 70.66%, which is unexpectedly high. As an incentive, respondents could indicate whether they wanted to receive summary of the research findings. Over 81% did, indicating the relevance of the study to the respondents.

To assess early/late - response bias we compared early respondents (27.4% of the sample) with late respondents (21.8% of the sample) as recommended by Armstrong and Overton (1977). The two groups did not have any significant differences in averages for our constructs.

Results presented in the following text, are obtained using 106 completed questionnaires. The population of 106 companies including:

- Large companies employing more than 1000 people (21)
- Medium companies employing 100-1000 people (39)
- Small companies employing less than 100 people (46).

Among the large companies 11 were privatized by multinational companies (US Steel, Michelin, ...) and 10 are in the privatization process or preparing for the privatization process (nonferrous metallurgy, oil industry, ...).

Eight of the companies from the group (b) were privatized (East Point, British American Tobacco, etc.) and 31 of them

were public companies and institutes (Faculties, hospitals, etc.).

In the group (c) investigations were conducted on 17 privatized companies, some of them owned by world famous firms like (Hanivel, Globex, Volkswagen, etc) and 29 public (institution, agencies and firms) and small private businesses.

Since our empirical study is based on a questionnaire survey, in the first set of questions the respondents had to answer if they were familiar with the particular knowledge management methods and if so to evaluate the frequency of use of those methods. Offered answers were:

- known and deployed
- known but not deployed
- not known

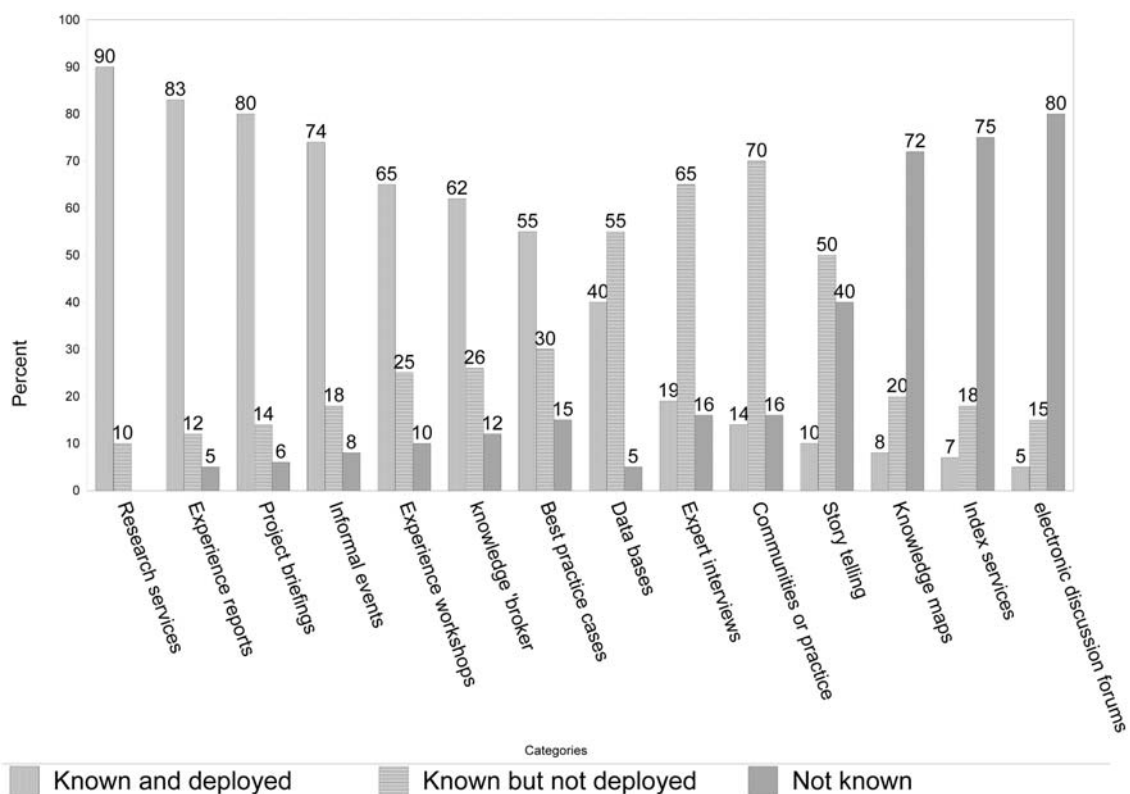


Figure 2. Familiarity and Deployment of Knowledge Management Methods in investigated Serbian companies

4.2. Data analysis

Results obtained after this first test are presented in Figure 2. Observing the results presented in Figure 2 it can be concluded that only 7 of 14 knowledge management methods are deployed in about 66% companies from the population of 106 (which presents the number of 70 companies). All 14 knowledge management methods (including remaining 7) are deployed in 34% of the Serbian companies (36 companies privatized by multinational firms).

According to those results, presented in Figure 2, knowledge management methods 8-14 are deployed in 34% of the investigated companies in Serbia. In the second testing stage employees (managers of the investigated companies) were asked to evaluate the level of their satisfaction and level of deployment for each of the 14 knowledge management methods in their company. We used five-point rating scales to evaluate their answers as presented below.

Rates for satisfaction were:

- Very satisfied (rate 5)
- Satisfied (rate 4)
- Averagely satisfied (rate 3)
- Not satisfied (rate 2)
- Very unsatisfied (rate 1)

Rates for frequency of use were:

- Very frequently (rate 5)
- Moderate frequency (rate 4)
- Frequently used (rate 3)
- Used from time to time (rate 2)
- Not used at all (rate 1)

Results relating level of satisfaction and level of deployment (frequency of use) for the first 66% of investigated - typically Serbian companies, (in further text first

group of companies) where test included only the questions regarding methods numerated 1-7 in Figure 2, are presented in the form of radar chart in Figure 3.

To assess the fit of the obtained data to undergo correlation coefficient calculation, with high enough level of confidence, confirmatory factor analysis was performed first. The goodness-of-fit measures for the confirmatory factor analysis of the level of satisfaction and the frequency of use, of investigated Knowledge Management (KM) methods in the first group of companies are reported in Table I. Chi-square test on contingency table was used for these investigations (L.J.Harrison-Walker, 2001). In this test, the null hypothesis was H_0 : the outcome is independent of the choice of treatment (starting data is given in the form of matrix (M), where the rows of M correspond to the investigated companies, while the columns of M correspond to the outcomes of the level of satisfaction on the investigated KM methods. In our case $M=(70 \times 7)$ matrix.), i.e. the data in the rows of M are each sample from the same distribution. The alternative hypothesis is H_1 : H_0 is false. Yates's (F.Yates, 1937) continuity correction is applied to the data in M. Yates continuity correction compensates for the error which arises when we represent a continuous normal distribution by discrete distribution (typically binomial). The correction consists of adding 0.5 to counts less than the expected value and subtracting 0.5 greater than the expected value.

According to the results presented in Table I, those 70 responses on 7 KM methods could be used to establish our measurement scales using factor analysis. Although the chi-square values are significant, the ratios of chi-square to degrees of freedom are 1.79 and 1.93 for the

Table I. Goodness-of-fit measures for the confirmatory factor analysis of the level of satisfaction and the frequency of use, of the Knowledge Management methods in the first group of companies (the population of 70 not privatized, typically Serbian companies for the first 7 methods)

<p>Level of satisfaction (7 items)</p> <p>Chi-square distributed with 41 degrees of freedom (The sample X^2 value) = 73.302</p> <p>GFI = Probability $P(X^2 > 73.302) = 1.00$</p> <p>Cramer's measure of dependency $V = 0.08898$</p> <p>Contingency coefficient $g = 0.213$</p>
<p>Frequency of use (7 items)</p> <p>Chi-square distributed with 41 degrees of freedom (The sample X^2 value) = 79.013</p> <p>GFI = Probability $P(X^2 > 79.013) = 1.00$</p> <p>Cramer's measure of dependency $V = 0.09737$</p> <p>Contingency coefficient $g = 0.232$</p>

level of satisfaction and the frequency of use, respectively. As suggested by several researchers (Brooke, Russell, & Price, 1988; Carmines & McIver, 1981; Hoetler, 1983; Harrison-Walker, 2001), a ratio less than 2.0 indicates an excellent model fit. The $GFI=1.00$ indicate that the fit is perfect. Factor analysis was performed separately for the level of satisfaction and for the frequency of use. Tables II and III contain means, standard deviation and correlation coefficients among the variables.

For the second group of companies (36 of them) which were privatized by well known multinational firms (US Steel, Michelin, Globex, etc.) testing the level of satisfaction and deployment was conducted on all 14 KM methods as the consequence of the previously concluded fact that they use them all, Figure 2. Results obtained are presented in the form of radar chart in Figure 4.

Same as for the results of the first group

of companies, the goodness-of-fit measures for the confirmatory factor analysis, was performed for the results obtained in the second group, Table IV.

The ratios of chi-square to degrees of freedom are 1.745 and 1.30 for the level of satisfaction and the frequency of use, respectively. Again those values are less than 2.00, indicating an excellent model fit.

Tables V and VI contain means, standard deviation and correlation coefficients among the variables obtained as the result of analyzing questionnaires received from those companies.

4.3. Discussion of results

Having in mind that different knowledge management methods have different impact on process of knowledge creation, it is obvious that most of the methods used in transition companies (group one) leads to

Table 2. Correlation matrix of the level of satisfaction with the Knowledge Management methods in the first group of companies

	Mean	s.d.	1	2	3	4	5	6	7
1	3.82857143	0.701373984	1.00						
2	3.94285714	0.814465492	-0.02	1.00					
3	2.91428571	0.60774845	-0.10	0.02	1.00				
4	4.01428571	0.691414369	-0.11	-0.13	0.00	1.00			
5	2.15714286	1.09855919	-0.17	-0.04	-0.07	0.09	1.00		
6	1.87142857	0.946717113	-0.12	0.05	0.03	-0.06	0.08	1.00	
7	3.31428571	1.46991922	-0.03	0.02	0.03	-0.02	0.09	-0.05	1.00

Table 3. Correlation matrix for the frequency of use of the Knowledge Management methods in the first group of companies

	Mean	s.d.	1	2	3	4	5	6	7
1	2	0.722315119	1.00						
2	4.28571429	1.34210366	0.07	1.00					
3	3.81428571	0.803846859	-0.25	0.20	1.00				
4	3.75714286	1.12205446	-0.14	-0.04	0.03	1.00			
5	1.14285714	0.546018906	0.15	-0.19	-0.27	-0.08	1.00		
6	2.18571429	0.687209378	-0.03	0.05	0.12	-0.07	-0.07	1.00	
7	2.65714286	0.991057323	0.02	-0.30	-0.19	-0.09	0.04	0.07	1.00

creation of knowledge from tacit to tacit and tacit to explicit using primarily own knowledge accumulated as the result of experience in practical working conditions and informal meetings.

Obtained results, presented in Figure 3, expose that level of satisfaction with the ratio of almost 4 is related to the practical methods or the external knowledge offered as the project solutions, briefings, etc., or limited exchange of obtained practical knowledge during the informal meetings. Methods

where knowledge exchange happens during the formal meetings in formal groups doesn't bring satisfaction and are rarely used, above all because of uncertainty of the participators of knowledge exchange process concerning quality of the available knowledge.

If observe results presented in tables II and III, two behavior models could be created according to those correlation coefficients. The models are projected according the following. Obviously negative correlation or very low level of positive

Table 4. Goodness-of-fit measures for the confirmatory factor analysis of the level of satisfaction and the frequency of use, on the Knowledge Management methods in the second group of companies

Level of satisfaction (14 items)

Chi-square distributed with 45 degrees of freedom (The sample χ^2 value) = 78.523

GFI = Probability $P(\chi^2 > 78.523) = 1.00$

Cramer's measure of dependency $V = 0.059391$

Contingency coefficient $g = 0.20939$

Frequency of use (14 items)

Chi-square distributed with 45 degrees of freedom (The sample χ^2 value) = 58.62

GFI = Probability $P(\chi^2 > 58.62) = 1.00$

Cramer's measure of dependency $V = 0.1064$

Contingency coefficient $g = 0.35828$

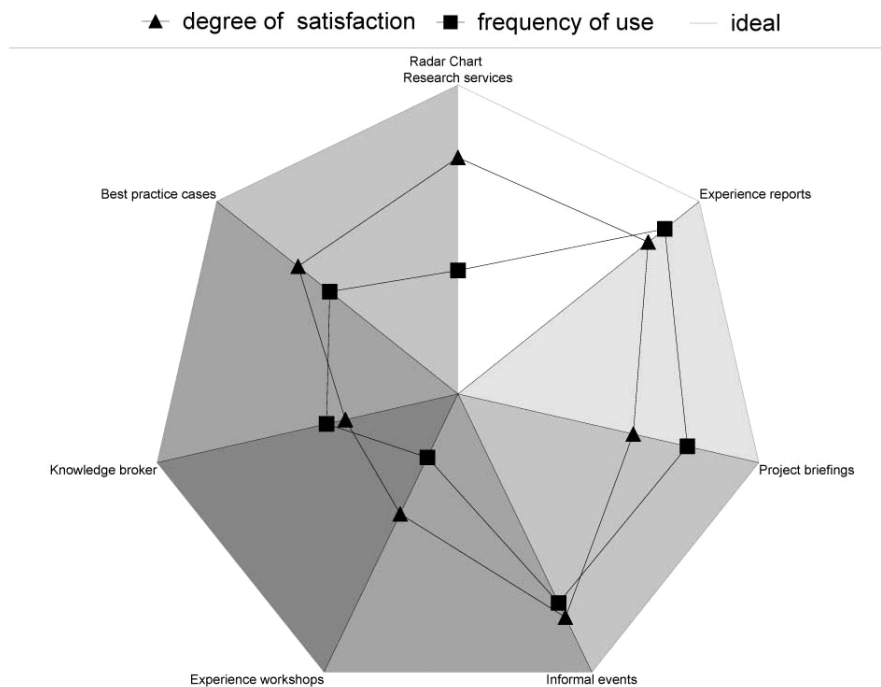


Figure 3. Radar chart for the level of satisfaction and the deployment of Knowledge Management methods in Serbian companies (the population of 70 not privatized, typically Serbian companies for the methods denoted as 1-7)

correlation values are calculated both for the level of satisfaction, Table II, and the frequency of use, Table III. Still, interdependency of frequency of use of KM methods has to some extent higher value of positive correlations.

For all the paired relations concerning satisfaction on KM methods and frequency of use, regardless the values of correlation coefficient, further numerical analyses were performed. Those analyses contained Chi-square test on two data sets. Those tests confirmed the ability to compare starting data sets with high probability.

As the results of all the numerical analysis described above, some hypothesis could be proposed for the level of satisfaction on KM methods in the first group of companies, Table VII, which resulted with the model presented in Figure 5. Results of the analysis concerning frequency of use are presented in Table VIII, with resulting model presented in Figure 6. Since the correlation coefficients are too low to create significant paths for the

final model in this case, only the numbers of the positive values linking the investigated KM methods were important in creating those graphs. On this way, hierarchy of the KM methods was created, presenting logical sequence presented in those figures.

Observing the results presented in Figures 3 and 6, it is obvious that most frequently used KM method in the first group of companies is Experience reports. This KM method is mostly linked with Project briefings and Experience workshops (Hypothesis: H5 and H6). Regarding level of satisfaction, most satisfying KM method is Informal events, still model presented in Figure 5., state that link among Research activities, Project briefings and Expert workshops leads to overall satisfaction of group one company managers.

The reason for such behavior, presented in Tables VII and VIII and in Figures 5 and 6, lie mostly in the fact that in the environment of socialistic predetermined economy it was believed that certain position in the company

Table 5. Correlation matrix for the level of satisfaction of the Knowledge Management methods in the second group of companies (the population of 36 firms privatized by well known multinational companies)

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	3.86	0.76	1.00													
2	2.14	0.54	0.19	1.00												
3	2.97	0.56	-0.14	0.01	1.00											
4	1.33	0.86	-0.19	-0.10	-0.34	1.00										
5	3.72	0.81	0.12	0.15	0.42	-0.76	1.00									
6	4.47	1.16	0.34	0.12	0.11	-0.28	0.23	1.00								
7	4.64	0.93	0.01	-0.24	-0.02	0.15	-0.06	-0.18	1.00							
8	2.83	0.56	0.14	0.17	-0.20	-0.12	0.21	0.08	-0.17	1.00						
9	2.94	1.07	-0.08	-0.04	0.28	-0.17	0.11	0.14	-0.19	-0.02	1.00					
10	3.53	1.13	-0.14	-0.03	0.25	-0.01	-0.05	0.04	0.00	0.10	0.05	1.00				
11	4.25	1.44	0.06	-0.16	0.19	-0.07	-0.04	0.06	-0.04	-0.05	0.08	-0.12	1.00			
12	3.64	0.96	0.09	-0.01	-0.23	0.22	-0.06	-0.18	-0.15	0.10	-0.24	0.23	-0.16	1.00		
13	3.17	0.84	-0.01	-0.36	-0.23	0.16	-0.06	0.06	0.08	0.06	-0.18	-0.06	-0.55	0.08	1.00	
14	4.06	1.49	0.06	0.06	0.24	0.07	-0.10	0.18	-0.19	-0.02	-0.03	-0.03	-0.10	-0.20	0.06	1.00

Table 6. Correlation matrix for the frequency of use of the Knowledge Management methods in the second group of companies

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2.11	0.85	1.00													
2	1.36	0.96	0.33	1.00												
3	0.97	1.40	0.10	-0.14	1.00											
4	0.63	0.59	-0.60	-0.32	-0.08	1.00										
5	0.77	1.24	-0.08	-0.27	0.36	0.12	1.00									
6	3.97	1.52	0.18	0.05	0.17	-0.07	0.24	1.00								
7	2.66	1.62	-0.03	-0.23	0.41	0.23	0.47	0.27	1.00							
8	1.33	1.04	-0.07	-0.07	0.49	0.25	0.46	0.33	0.51	1.00						
9	2.16	1.13	0.01	0.07	-0.12	-0.04	0.25	0.04	-0.03	0.10	1.00					
10	2.05	1.12	-0.19	-0.07	0.31	0.20	0.58	0.32	0.44	0.40	0.31	1.00				
11	2.91	1.52	-0.12	-0.17	0.11	0.25	0.31	0.12	0.43	0.27	0.27	0.27	1.00			
12	1.77	1.12	-0.15	-0.06	0.21	0.13	0.47	0.13	0.27	0.09	0.19	0.58	0.22	1.00		
13	3.44	1.05	0.01	-0.22	-0.03	-0.15	0.06	-0.17	-0.26	-0.24	-0.14	-0.24	-0.30	-0.01	1.00	
14	3.72	1.54	0.24	-0.07	0.22	0.07	-0.06	0.18	0.18	-0.01	-0.28	0.09	0.03	-0.02	-0.01	1.00

▲ Degree of satisfaction ■ frequency of use — ideal

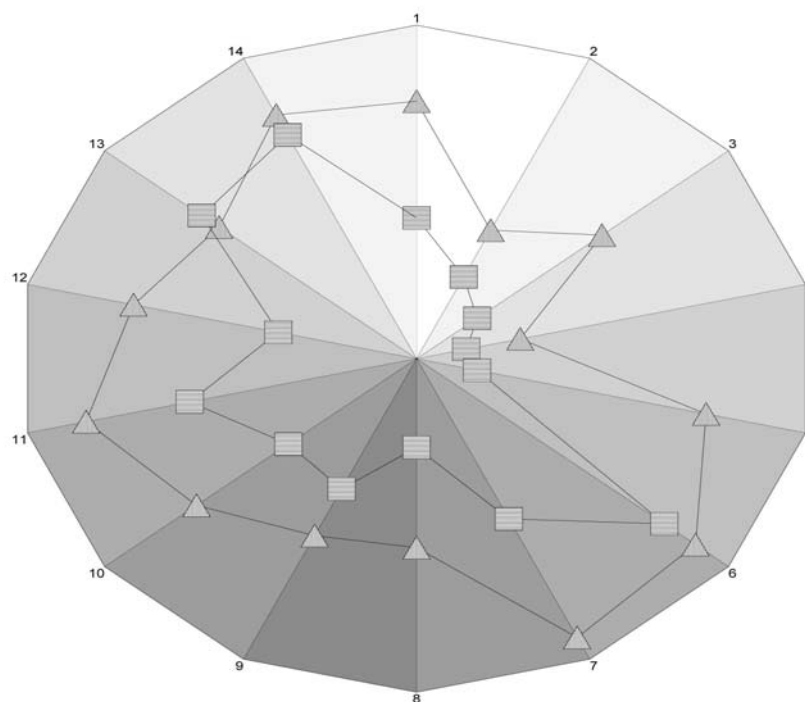


Figure 4. Radar chart for the level of satisfaction and the deployment of Knowledge Management methods in Serbian companies (on the population of 36 companies privatized by well-known multinational companies for all the methods included in this research: 1-14)

Table 7. Statistical parameters calculated for the level of satisfaction on the KM methods having highest correlation coefficients in the first group of companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (chi-square)	Probability P(X2>sample value)	X2/df
H1:	Experience workshops → Project briefings	0.05 ⁺	68	89.76	0.999985	1.32
H2:	Data bases → Research services	0.09 ⁺	68	87.21	0.999997	1.28
H3:	Research services → Project briefings	0.08 ⁺	68	69.31	0.999999	1.02
H4:	Research services → Expert interviews	0.09 ⁺	68	81.46	0.999999	1.20

Table 8. Statistical parameters calculated for the frequency of use of the KM methods having highest correlation coefficients in the first group of the companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (Chi-square)	Probability P(X2>sample value)	X2/df
H5:	Experience workshops → Experience reports	0.20**	68	76.83	1.00	1.29
H6:	Experience reports → Project briefings	0.12 ⁺	68	74.15	1.00	1.09

implied adequate level of knowledge. In many cases adequate knowledge lacked and executive functions were in many cases performed under the principle "cogito ergo sum", without any consequences. In the transition environment, new mix of

management style in Serbian companies happened, where membership of adequate political party is the main advantage in obtaining managers position and the principle "cogito ergo sum" is still functional. In those conditions where people



Figure 5. Logical string of the level of satisfaction on KM methods in the first group of companies

was not educated through adequate school system and through practical work in the companies including team work, public debates and discussions on some professional topics are very rare. Attempts to apply brainstorming in the process of problem solving did not give any result mostly because of the fear to present inadequate knowledge related to profession and company related topics. At the same time, in those companies, one can hear very noisy discussion regarding political parties, sports (in Serbia everyone think that only he/she should be the selector of Soccer of Basketball national team!!). The fear of ignorance results in the fear of team work in which exchange of any knowledge which could enhance its increase happen. In such environment only events which are meant to encourage conversation, open communication and informal knowledge sharing could bring satisfaction (Informal Events).

From the Figure 4 it could be concluded that successful world known companies which participated in transition economy in Serbia (companies of the group two) are using formal work methodology (methods of Knowledge management 8-14) in almost the same extent as the informal KM methods (methods 1-7) and in this way realize so-called combined knowledge creation



Figure 6. Logical string of the frequency of use of the KM methods in the first group of companies

process (explicit to explicit). Explicit knowledge brought from their central companies is rapidly applied in the Serbian companies, sometimes producing difficulties mostly because of the demandingly changed way of thinking and increase of tacit knowledge, which in most cases was not satisfactory in the company before privatization.

From the results presented in Table V and VI, some new hypotheses could be proposed (Tables IX and X), resulting with the graphs presented in the Figures 7 and 8. Those graphs, having in mind strong positive correlations among the KM methods, could be defined as the significant paths in the final models for the level of satisfaction and the frequency of use of investigated KM methods in the second group of companies.

Methods including formal meetings (especially Electronic discussion forums) are widely used in the second group of companies. This clearly signifies high technological culture of those companies, which is to equal extent brought to Serbia. Knowledge exchange and increase of knowledge in those firms is not used in the frame of local companies, in this process cumulative company knowledge is included and coordinated by the parent company.

If comparing to the results obtained in the group one, although twice higher number of

Table 9. Statistical parameters calculated for the level of satisfaction on the KM methods having highest correlation coefficients in the second group of the companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (Chi-square)	Probability P(X2>sample value)	X2/df
H7	Experience reports → Research services	0.42*	34	59.02	1.000	1.74
H8	Informal events → Project briefings	0.34***	34	53.12	1.000	1.56
H9	Experience reports → Best practice cases	0.28***	34	60.10	0.994	1.76
H10	Experience reports → Electronic discussion forums	0.25***	34	58.09	1.000	1.71
H11	Experience reports → Knowledge maps	0.24***	34	55.23	1.000	1.62
H12	Research services → Projects briefings	0.23***	34	61.22	0.999	1.79
H13	Electronic discussion forums → Knowledge broker	0.23***	34	63.21	0.999	1.85
H14	Data bases → Knowledge broker	0.22***	34	52.09	1.000	1.53
H15	Research services → communities of practice	0.21 ⁺	34	57.22	1.000	1.68

* p<0.01; ** p<0.05; *** p<0.1

+statistically not significant

KM methods was tested on the group two, correlation coefficients are mostly positive and with much higher values. Such behavior is observed both on the issue of level of satisfaction and on the frequency of use of those KM methods. This means, compared to group one, all 14 KM methods are used in methodical and systematical way.

5. COMPETENCY OF MANAGEMENT

For the best effects of knowledge management in the companies, the level of available knowledge (meaning level of available competences that could be defined as obtaining, development and sharing of the knowledge and experience) is important. The objective is to possess adequate, available

Table 10. Statistical parameters calculated for the frequency of use of the KM methods having highest correlation coefficients in the second group of companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (Chi-square)	Probability P(X2>sample value)	X2/df
H16	Research services → electronic discussion forums	0.58*	34	53.45	0.999	1.57
H17	Electronic discussion forms → Knowledge broker	0.58*	34	63.12	0.999	1.86
H18	Expert interviews → Community of practice	0.51*	34	66.09	0.988	1.94
H19	Research services → Knowledge broker	0.47*	34	64.87	0.999	1.91
H20	Research services → Expert interview	0.47*	34	62.46	0.999	1.84
H21	Expert interviews → Index services	0.43*	34	65.12	0.999	1.92
H22	Research services → Experience reports	0.36**	34	64.89	0.910	1.91
H23	Community of practice → Project briefings	0.33**	34	51.34	0.999	1.51
H24	Informal events → Experience workshops	0.33**	34	63.03	0.999	1.85
H25	Electronic discussion forms → Best practice cases	0.31**	34	62.56	0.999	1.84
H26	Index services → Data bases	0.25***	34	51.18	1.000	1.50
H27	Knowledge maps → Informal events	0.24***	34	63.32	0.999	1.86
H28	Experience reports → Knowledge maps	0.22***	34	62.12	0.997	1.83

* p<0.01; ** p<0.05; *** p<0.1

+statistically not significant

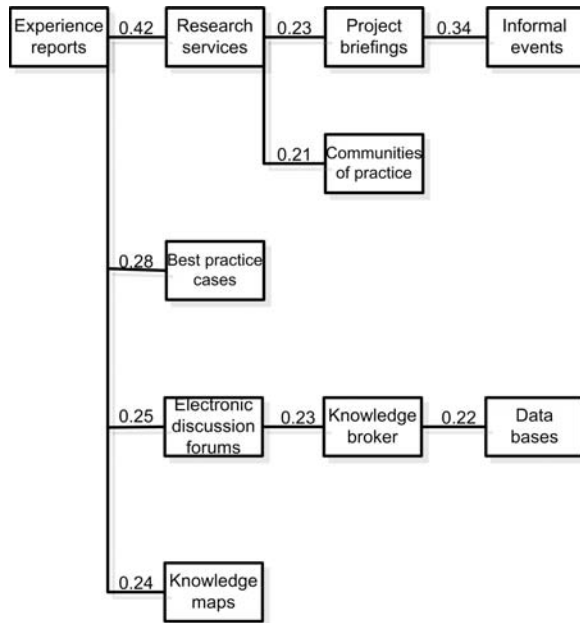


Figure 7. Significant paths in final model for the level of satisfaction on KM methods in the second group of companies

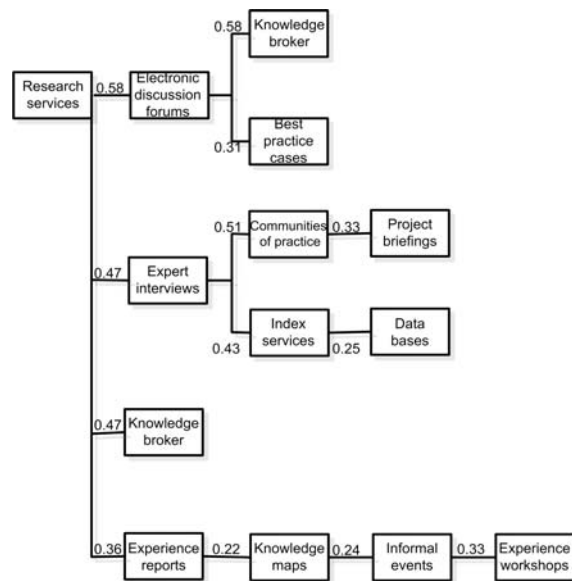


Figure 8. Significant paths in final model for the frequency of use of the KM methods in the second group of companies

competences in the right time, in the company which demand it, producing acceptable costs (Latham, 2006).

Individual competences could be separated in three main categories (Jun, 2006):

1. Human competences
2. Techno-professional competences
3. Business competences

5.1. Sample and data collection

In the third testing stage a questionnaire for evaluation of the competences already present in all the investigated companies for all three main categories of competences was used:

A. Human competences

1. Culture sense
2. Team work
3. Acceptance of change
4. Communication

B. Techno-professional competences

5. Knowledge of the systems
6. Marketing and the sales
7. Knowledge on telecommunication
8. Knowledge of the products
9. Project management

C. Business competences

10. Knowledge concerning the company
11. Customer orientation
12. English language

For rating level of satisfaction in the investigated companies, regarding level of competences, five point ratings scale was offered (satisfaction range from "not satisfied" to "very satisfied").

5.2. Data analysis

Results obtained by surveying of management in investigated companies or

Table 11. Goodness-of-fit measures for the confirmatory factor analysis of the level of satisfaction with the competences in the first and the second group of companies

I group of companies (12 items)	
Chi-square distributed with 75 degrees of freedom (The sample X2 value) = 118.0601	
GFI = Probability P(X2>118.0601) = 1.00	
Cramer's measure of dependency V= 0.069798	
Contingency coefficient g = 0.2255	
II group of companies (12 items)	
Chi-square distributed with 38 degrees of freedom (The sample X2 value) = 55.9503	
GFI = Probability P(X2>55.9503) = 1.00	
Cramer's measure of dependency V= 0.055012	
Contingency coefficient g = 0.18233	

Table 12. Correlation matrix for the level of satisfaction with the competences in the first group of companies

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1	1.96	0.92	1.00											
2	1.57	0.96	-0.02	1.00										
3	1.51	0.86	0.16	0.08	1.00									
4	2.10	0.90	-0.19	0.27	-0.10	1.00								
5	2.08	0.47	0.07	0.59	0.03	0.52	1.00							
6	2.97	0.96	-0.08	0.10	0.28	0.00	-0.06	1.00						
7	3.61	0.97	-0.03	0.12	0.00	0.06	0.07	0.10	1.00					
8	2.00	0.87	-0.09	0.49	-0.04	0.41	0.56	0.02	-0.14	1.00				
9	3.54	1.10	0.05	0.13	-0.02	-0.03	0.08	-0.01	0.81	-0.23	1.00			
10	3.53	0.99	-0.09	0.15	-0.02	0.05	0.09	0.20	0.88	-0.10	0.72	1.00		
11	3.51	0.93	-0.14	-0.01	-0.03	0.06	0.06	0.15	0.85	-0.13	0.69	0.77	1.00	
12	3.07	1.07	-0.09	0.07	-0.07	0.02	0.02	0.06	0.15	0.02	0.11	-0.01	0.18	1.00

owners of the small private businesses are presented in the radar chart, Figure 9. External circle where all 12 competences are rated with mark 5 is representing an ideal state (curve 1). Results obtained in firms privatized by well known foreign companies (36 of them, earlier denoted as the second

group) are presented as curve 2. Remaining of the investigated companies, which are now in the process of privatization or owned by the government (70 of them, earlier denoted as the first group) are presented as the curve 3.

Same as described before the goodness-

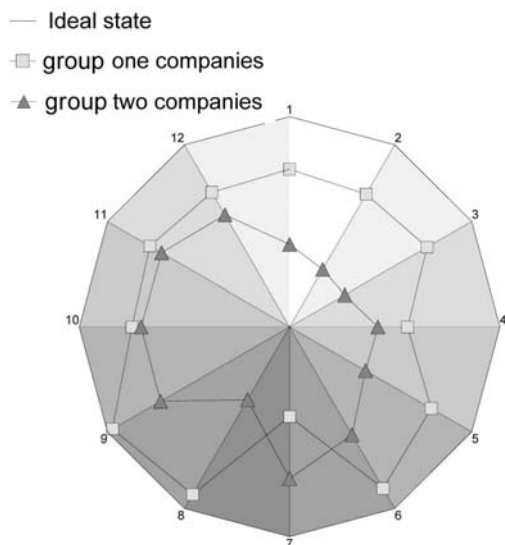


Figure 9. Radar chart for the competence rating in the both groups of investigated companies

of-fit measures for the confirmatory factor analysis is performed on the results obtained in the both groups of companies, Table XI.

The ratios of chi-square to degrees of freedom are 1.57 and 1.47 for the first and the second group of companies, respectively. Again those values are less than 2.00, indicating an excellent model fit.

Tables XII and XIII contain means, standard deviation and correlation coefficients among the variables obtained as the result of analyzing questionnaires received from those companies respecting all twelve categories of competences.

5.3. Discussion of results

Using the same procedure as discussed in the section 4.3., positive correlations of level

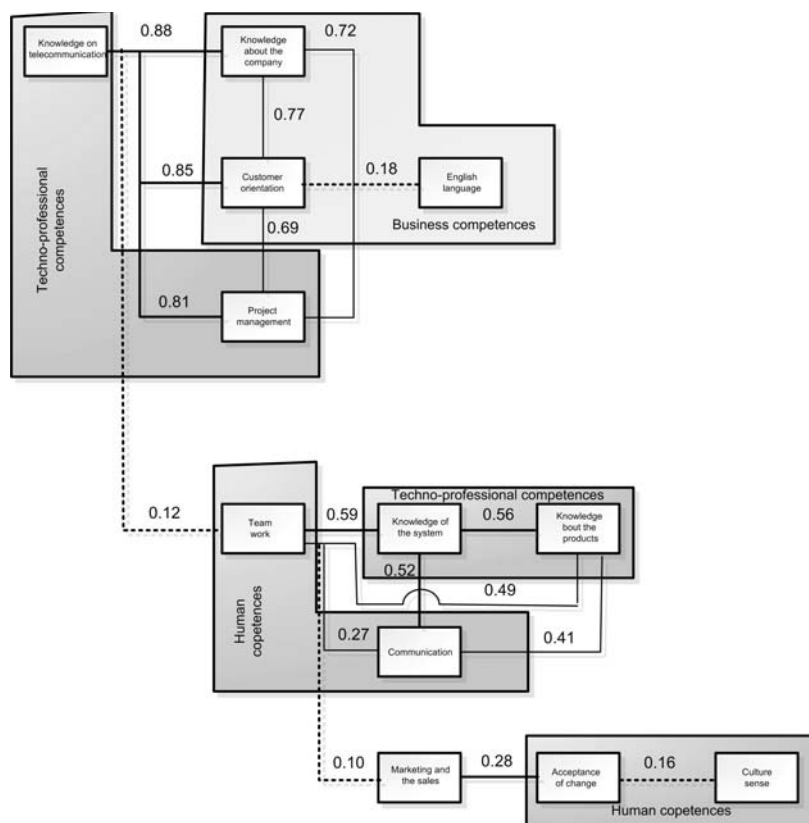


Figure 10. Significant paths in final model for the level of satisfaction with the competences in the first group of companies (dotted lines are non-hypothesized paths)

Table 13. Correlation matrix for the level of satisfaction with the competences in the second group of companies

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1	3.75	0.91	1.00											
2	3.64	1.25	0.09	1.00										
3	3.78	1.10	0.06	0.19	1.00									
4	2.81	0.67	-0.32	-0.16	-0.14	1.00								
5	3.89	0.92	-0.10	-0.06	0.06	-0.13	1.00							
6	4.44	1.38	-0.07	-0.14	-0.01	-0.15	-0.07	1.00						
7	2.14	0.68	-0.36	-0.38	-0.26	0.06	0.03	0.21	1.00					
8	4.61	0.77	0.10	0.12	0.23	-0.15	-0.14	0.36	-0.22	1.00				
9	4.86	0.54	-0.07	0.09	0.38	-0.08	-0.09	0.31	0.05	0.62	1.00			
10	3.75	0.87	0.03	-0.09	-0.03	-0.04	0.82	-0.07	0.01	0.02	0.05	1.00		
11	3.83	0.85	-0.13	-0.09	-0.16	-0.01	0.90	-0.13	0.04	-0.15	-0.11	0.87	1.00	
12	3.69	0.92	-0.03	-0.12	-0.10	-0.10	0.77	-0.20	0.07	-0.09	0.03	0.75	0.81	1.00

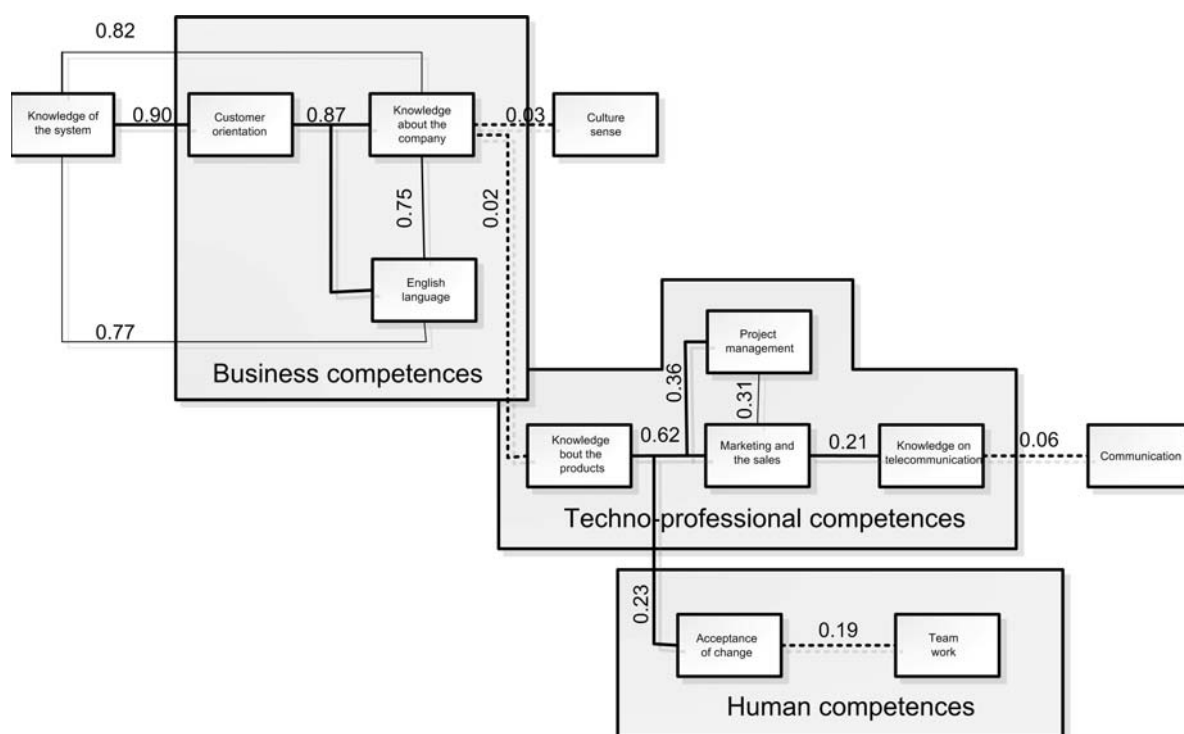


Figure 11. Significant paths in final model for the level of satisfaction with the competences in the second group of companies

Table 14. Statistical parameters calculated for the level of satisfaction with the competences in the first group of companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (Chi-square)	Probability P(X2>sample value)	X2/df
H29	Knowledge on telecommunication → Knowledge about the company	0.88 [#]	68	75.21	1.000	1.11
H30	Knowledge on telecommunication → Customer orientation	0.85 [#]	68	68.32	1.000	1.004
H31	Knowledge on telecommunication → Project management	0.81 [#]	68	79.23	1.000	1.17
H33	Knowledge about the company → Customer orientation	0.77 [#]	68	83.45	1.000	1.23
H32	Knowledge about the company → Project management	0.72 [#]	68	87.45	1.000	1.29
H33	Project management → Customer orientation	0.69 [#]	68	98.12	1.000	1.44
H34	Team work → Knowledge of the system	0.59 [#]	68	81.40	1.000	1.19
H35	Knowledge of the system → Knowledge about the products	0.56 [#]	68	83.56	1.000	1.23
H36	Communication → Knowledge of the system	0.52 [#]	68	83.23	1.000	1.21
H37	Team work → Knowledge about the products	0.49 [#]	68	85.67	1.000	1.26
H38	Communication → Knowledge about the products	0.41 [*]	68	91.23	1.000	1.34
H39	Acceptance of change → Marketing and the sales	0.28 [*]	68	84.23	1.000	1.24
H40	Customer orientation → English language	0.18 ^{***}	68	81.23	1.000	1.19

#p<0.00001; * p<0.01; ** p<0.05; *** p<0.1; +statistically not significant

Table 15. Statistical parameters calculated for the level of satisfaction with the competences in the second group of companies

Starting data			Chi-square test on two data sets			
Hypothesis	KM Relationship	Correlation coefficient	Degrees of freedom (df)	The sample X2 value (Chi-square)	Probability P(X2>sample value)	X2/df
H42	Knowledge of the system → Customer orientation	0.90 [#]	34	37.23	1.000	1.09
H43	Knowledge of the system → Knowledge about the company	0.82 [#]	34	36.45	1.000	1.07
H44	Knowledge of the system → English language	0.77 [#]	34	38.98	1.000	1.47
H45	Knowledge about the company → Customer orientation	0.87 [#]	34	37.23	1.000	1.09
H46	Customer orientation → English language	0.81 [#]	34	43.23	1.000	1.27
H47	Knowledge about the products → Project management	0.62*	34	36.34	1.000	1.07
H48	Acceptance of change → Knowledge about the products	0.23***	34	58.23	1.000	1.71
H49	Marketing and sales → Knowledge on telecommunication	0.21 ⁺	34	62.34	0.999	1.84
H50	Team work → Acceptance of change	0.19 ⁺	34	64.45	0.999	1.89

p<0.00001; * p<0.01; ** p<0.05; *** p<0.1; +statistically not significant

of satisfaction for the both groups of investigated companies are organized in the Tables XIV and XV, respectively. Using the data from those tables, models presented in Figures 10 and 11 were constructed.

If observing Figure 9, competence gap can be noticed as the surface between total competence and real competence level in the first and the second group of investigated companies. It is obvious that there is larger

competence gap among "privatized" and "not yet privatized" companies on the field of human and business competences and smaller one on the technical competences with exception of the project management knowledge.

If observing models presented in Figures 10 and 11, situation similar to one exhibited in section 4.3., repeats. Much better clustering of the competence categories is

obtained in the model presenting second group of companies. Again, this is the result of better understanding of the competences and their development in systematic and coherent pattern, as the result of long process in world known companies which entered the privatization in Serbia.

Competences in Serbian (not yet privatized) companies are not organized resulting in disconnected model presented in Figure 10. The reason for such behavior is that education in management sciences in transition countries, including Serbia, is on the initial stage (in many cases quality of the programs, at the faculties which teach management, is at low level). The lack of this knowledge cannot be exceeded using the knowledge exchange and only possible solution is new education of the employees.

Education of the people in companies under transition environment with purpose to increase their knowledge is a necessity in the following scientific disciplines: HRM (Human Resources Management), Operational management, Marketing management, Project management and Strategic management. This should be necessary phase in the transition process of the company to obtain adequate level of organizational culture followed by knowledge exchange.

In transition countries multinational companies, as a rule, are always bringing higher level of tacit and explicit knowledge after privatizing most of the company's assets. By joining capital of the local and foreign companies, increase of total capital is evident (value of the company) which represent positive prerequisite for transfer and exchange of the knowledge among the partner companies. This relations gain importance with rise of globalization and concurrency based on it (Collins, 2006).

Forming corporate capital results in developing confidence, sharing the information and the problems concerning covering production costs (Uzzi, 1997). Transfer of tacit knowledge demands higher level of trust among partners then transfer of explicit knowledge. Under the transition conditions, partner firm is confronted with additional challenge that results from the cultural differences. This is the main reason why developing the trust has crucial significance in promoting exchange of information (Hitt, 2000).

Transfer of knowledge among companies can be very difficult (Kogut and Zander, 1996). Success of transfer is directly dependent on convenience for the partners created by interpretation of permanent knowledge (Hamel, 1989).

Entering of the foreign company in the transition economy after privatizing local firm leads to arising the problems of invisible assets and resources. These invisible items are often the remaining of the previous strategies of the firm (Borni, 1991). Identifying of those invisible resources is of great importance for creating stable partnership relations among the companies and obtaining concurrent position.

Tacit knowledge within the firm is hardly identified and interpreted under the transition environment, especially for the person outside the company. As such, tacit knowledge is substantial source of differences compared to explicit knowledge which is easy to copy and apply elsewhere. Forms of explicit knowledge present in the firm under transition, (including production knowledge, process knowledge, design knowledge and technical knowledge) increase value of the company if they can be effectively enriched with tacit knowledge existing in the firm. Firms that can

effectively increase own level of knowledge and transfer empirical knowledge to their strategic partners, increase the possibility of developing partnership and sustaining concurrent advantage.

In the transition environment, in the cooperation among world enterprises and transition companies, economic and sociological perceptions are important during creation and development of knowledge exchange. Interactions among people are very important for knowledge transfer (Bouty, 2000). Tendencies of the firms to absorb or transform the knowledge (especially tacit one) must apostrophe development of interrelationship among their representatives and the representatives of the partnering firms. Capacity to absorb specific knowledge, which is subject of transferring, is not the same in all the companies, as the consequence, partnering firms must develop common capacities to harmonize their relations.

6. CONCLUSIONS

In this paper reverse hypotheses testing was performed. Since wide range of different companies was included in investigations, we couldn't propose any starting hypothesis with certainty. We defined important KM and CM methods and tested them on two different groups of companies. Results obtained enabled construction of different models for both groups of the companies. Obtained results are as we expected.

Certain methods, being used in successful world class companies and with potential to sustain creation of knowledge during the NPD projects are systematically correlated resulting with homogenous models. On the other hand, in the Serbian companies (not yet

privatized), those methods are unknown and very rarely used. Knowledge creation process in those companies depends on their ability to absorb knowledge from future privatization partners, during the process of knowledge transfer.

This process of knowledge transfer from multinational companies to transition economy companies is very complex; including finding and activating the tacit knowledge in these companies during early stages of partnership forming. For the successful pass-through the transition process and integration with privatizing partner toward outbreak on global market, it is necessary to create confidence and respect, which leads to successful knowledge exchange, incensement and creation of new knowledge.

Not solely based on evidence of their effectiveness in companies, but also on the conceptual arguments provided in this article, we believe that the deliberate and concerted management of knowledge can offer a great leverage for the improvement of concurrent position of the companies investigated. These processes are especially important for the companies in the transition environment.

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