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STRATEGIES FOR KNOWLEDGE MANAGEMENT AND THEIR IMPACT ON THE BUSINESS OF ITALIAN COMPANIES

Vojislav Babic, PhD
University of Belgrade, Institute for Sociological Research
18 Cika Ljubina street, 11000 Belgrade, Serbia
Phone: +38163334067, e-mail: babic.voja@gmail.com

Sinisa Zaric, PhD
University of Belgrade, Faculty of Economics
6 Kamenicka street, 11000 Belgrade, Serbia
Phone: +38163254525, e-mail: sinisha.zaric@gmail.com

Rossana Piccolo, PhD
University of Campania "Luigi Vanvitelli", Caserta, Italy
E-mail: rossana.piccolo@unicampania.it

ABSTRACT

Knowledge Management (KM) is emerging as a primordial need in the time of the Industrial revolution 4.0 when knowledge and information are a key resource for a faster innovation cycle and economic prosperity. It is a complex process including technologies involved in the creation and use of knowledge data. This empirical study analyses indicators and strategies for KM in 70 companies in the Italian region of Campania. The ultimate goal of the research is to determine whether the KM strategy affects the business parameters of companies. KM indicators are classified into five basic categories: academic education, employees 'training, storage, dissemination, and technical support. A closed-ended response questionnaire with an interval and Likert scales were used to collect data. Variables for measuring KM are processed by the factor analysis technique, the maximum likelihood variant. The idea was to get strategies in the form of factor scores as a result and to analyse their essence. The impact of factor scores on company business parameters was measured through multiple regression analysis.

Keywords: *Knowledge management; strategies; business parameters; factor analysis; Italian companies*

1. INTRODUCTION

Knowledge management (KM) is the skill of acquiring and allocating knowledge resources with the aim of achieving greater business efficiency and profitability for companies. In the era of Industrial Revolution 4.0, KM becomes a primal need, because knowledge and information represent a key resource for a faster innovation cycle and economic prosperity (Wisniewska-Salek, 2019). The transition from the industrial to the knowledge economy marked a change in which intellectual resources took precedence over material ones. The global diffusion of knowledge has led to great benefits for companies, but also to certain challenges. Presently, through information technologies and sharing tools, it is much easier to gain access to knowledge bases about materials, technologies and design. On the other hand, it is more difficult for companies to protect their own inventions and specific local competencies against competitors.

Strategies for KM can essentially be divided into: 1. planned and systemic; 2. some companies may have spontaneous or unconscious actions that benefit from a certain organization of knowledge but without a clear and precise strategy; 3. theoretically, there can be a situation in which the company does not have any KM outlines or strategies, nor any intention for its introduction. However, in today's conditions, when we are surrounded on all sides by the achievements of Industrial Revolution 4.0, it is almost impossible. Figure 1 shows the achievement of the planning and system strategy for KM through stages:

Figure 1. KM pyramid

Source: *Boudallaa et al. 2021.*

Aprille Allen (2021) believes that strategy for KM is much broader than even having a knowledge base that is up to date and serving the needs of employees and customers. KM is a complex process that goes beyond the manager in the role of coach and facilitator. The author points out eight pillars on which every KM strategy should be based, which are stated in the original *(ibid.)*:

1. Knowledge auditing – know where your silos and repositories are and what the knowledge flow currently looks like. Who are the experts and where are the risky dependencies? What are the domains of knowledge that are critical to the business and are there gaps? A single organisation may have dozens of locations where knowledge is stored or transferred – look for duplication across systems, and processes where knowledge leaks out because a problem-solving conversation hasn't been captured anywhere.
2. Document management (or content management) – consider the information architecture for your explicit knowledge early on. It is much easier to manage when the located content is centralised in one location and routinely maintained.
3. Learning & Development – Map staff development with business goals and employee's own interests, (possibly by using a framework such as SFIA or a methodology like Intelligent Swarming), to embed a culture of learning throughout your team and improve employee engagement.
4. Knowledge operations – This is the part concerned with that mobilisation of knowledge. What methods will you employ to make sure knowledge gets to where it needs to go? Maybe KCS for those business functions like HR, customer support, finance and legal, that address repetitive issues. Maybe it is a mobile-first intranet with an effective search engine for those teams that are out in the field working on-site.
5. Social network analysis – Know who your hubs and influencers are, so you can more easily enact organisation-wide changes and identify team members who may be great mentors or coaches.
6. Co-creation & facilitation – Uncover tacit knowledge and develop group ownership for problem solving.
7. Coaching & mentoring – Great for transferring niche skills, explaining organisational quirks to new hires, and for building individual confidence and team performance in a strategic capability.
8. Community management – Drive more effective collaboration and elicit group participation to make high-value reusable content more discoverable in large-scale enterprise social and customer support networks (*ibid.*).

Discussing the right KM strategy, Cerchione and Esposito (2017, p. 1551) pointed out that it includes *"relationship of reciprocity between KM-Tools and KM-Practices: one reinforces the other and vice versa".* Discussing modelling strategies for KM, Kolyasnikov and Kelchevskaya (2020) pointed out that when developing a strategic vision, it was important for companies to pick the relevant data out of the information flow about the external and internal environment and convert it into organizational knowledge that needed to be a key resource.

In this research, the main goal is to determine whether there are any KM strategies and to check whether they have an impact on the business performance of Italian companies. Italy is selected as a country that has always been synonymous with modernity and a place for innovation in managerial approaches that stimulate economic growth (Felice & Vecchi, 2015). Campania as a sample territory is chosen because of its business and cultural specificities.

2. LITERATURE REVIEW

In contemporary scientific literature, there is a large number of researches on KM and its impact on the creation of company benefits. According to Boduallaa (2021), KM allows: 1. strengthening of individual and collective knowledge to increase the wealth of an organization, 2. gain of productivity, and 3. foster innovations. According to The International Data Corporation, Fortune 500 companies lose about $31 billion, because they do not have a clear strategy for sharing the knowledge (Kirkham, 2021). In the research conducted in the construction companies of Serbia (Babic & Zarić, 2020) it was proven that wages jump in firms that have an integrated KM concept. On a sample of 520 respondents from Serbian companies, Kavalić et al. (2021) determined that financial performance (profitability, sales growth, asset growth, market share, competitive position in a specific industry, productivity, and salaries) was a reliable indicator of KM success. Razeai et al. (2021) investigated the impact of KM on organizational performances of the Kabul Steel Plant in Afghanistan. Based on the results obtained from a sample of 108 managers in the company, KM influences the organizational performance, both directly and through the mediating variable of human capital. The study concludes that human resources are the most valuable asset for a company that is fighting for market placement.

On a sample of 245 Italian innovative startup companies in 20 regions for three economic sectors at the 2-Dig NAICS classification, Barboza and Capocchi (2020) investigated the impact of knowledge spillover effects on employment levels. Based on the results, regional specialization encourages the creation and transfer of knowledge, which leads to employment growth. However, higher levels of competition and a more diverse regional production base result in lower firm employment levels. The study also proved that there is a lack of technological convergence between regions and that it is not caused by knowledge spillover effects. In a study of 112 leading Italian firms, Giampaoli et al. (2017) analysed the impact of KM on solving problems and increasing the performance of companies. Based on the results, a strong connection between KM practice and intermediate activities of creative problem solving and problem-solving speed was established. Solving the problem had a direct impact on raising the organizational capabilities and financial performance of companies. Elia et al. (2017) showed that business models in technological spin-offs appear to be related to the effective management of the intellectual capital. Through the use of a specific case study, the authors confirmed that technological spin-offs innovate their business models by leveraging their intellectual capital dimensions, that is, knowledge resources. In their study, Festa and colleagues (2020) assumed the role of local and sub-national entrepreneurial collaborations that preserved and enhanced factors such as history, style and talent as the essence of Italian quality - pillar of Italian territorial capitalism. The authors examined small and medium-sized companies that achieve excellent results in Italy and abroad by using a “glocal” approach, adopting the entrepreneurial formula of industrial districts. The study confirmed that “glocalism” is an important driver for achieving success on the international market. Pietrantonio (2007) investigated the effectiveness of knowledge-management systems (KMS) in the public administration of southern Italy. A combination of a structured set of indicators of intellectual capital and a balanced scorecard was used as efficiency indicators. Data were collected through questionnaires and by interviewing the officers in charge of the informa-

tion systems units of each organization. Based on the results, a low level of KMS efficiency was determined. No significant positive effects were found to be generated by such systems to the intellectual capital of the subjects, which should have led them to reach adequate performances (*ibid.*). Bagnoli and Vedovato (2014) tried to analyze the impact of KM and strategy configuration coherence on SMEs innovation and organizational performance in northeast Italy. The sample included 60 SMEs. According to the results, there is significant coherence between KM and strategy configurations. Furthermore, the authors proved that such coherence had a significant impact on the overall performance of firms. In the case study of the small fashion company Mangiameli (Bertola et al., 2003), operating in the *Made in Italy* successful sector, it was shown how by introducing a strategy for KM one could face the global market and opportunities without losing the link with Mangiameli history and crucial local competencies. Using the methodological technique of interviewing six key managers of Italian construction companies, Bigliardi et al. (2010) examined the implementation of KM strategy in the construction sector. Based on the results, it was shown that the information and communication technologies were key to the effectiveness of KM. In the case of 47 Italian SMEs, Corso et al. (2003, p. 46) indicated that in order to survive in the global economy, companies had to improve their products and processes by exploiting their intellectual capital in a dynamic network of knowledge-intensive relations inside and outside their borders. Mercy et al. (2022) state that so far insufficient research has been conducted on the topic of KM strategies. The reason is the lack of concept, knowledge sharing and technological infrastructure.

Strategic KM represents an important company initiative for market positioning. In today's conditions, the creation of a clear KM initiative is required, including a KM initiative for evaluating and measuring performance. An effective instrument in this regard is the balance score card, which will be used to evaluate the generation of competitiveness (Sushil, 2022). Another contribution to KM measurement was made by Vittoria and Lavaddera (2014). The authors aimed to measure the degree of involvement of a regional community of biotechnology actors of Campania in the global knowledge value chain.

3. METHODOLOGY OF EMPIRICAL RESEARCH AND RESULTS

3.1. Sample and KM toll

The sample included 70 companies in the Italian region of Campania. It contained the following economically important cities: Naples, Caserta, Salerno, Avellino and Benevento. When planning the sample, care was taken to ensure a credible ratio of micro, small, medium and large companies in Campania (OECD, 2020). The selection of companies was made from the list of Local business directory of Campania by using the simple random sample method without repetition (Businessfield, 2020). Table 1 shows the structure of the sample by company size and economic sector:

Table 1. The sample structure

		Sector			Total
		Construction	Commerce	Services	
Number of employees	1-10	9	6	3	18
	11-50	20	6	5	31
	51-250	2	8	6	16
	251 and more	2	2	1	5
Total		33	22	15	70

Source: *Authors' calculation*

A questionnaire with interval scales, Likert scales and closed answers were used for data collection. For research purposes, a KM tool was created including 11 variables, classified into five basic categories: academic education, employees' training, storage, dissemination, and technical support. Managers of selected companies were surveyed.

Two business variables of companies were measured: 1. company's annual balance sheet, shown in terms of taxes in 2021 compared to 2020 and 2. the trend of average wages in the company in 2021 compared to 2020. The Likert 4-degree scale was used to measure respondents' time perception. An interview in Campania was conducted from April 15th to June 29th, 2022.

3.2. Factor analysis

In the first phase, all 11 variables included in the KM tool were processed by factor analysis. The following initial factor analysis equation was set up:

$$X_i = a_{i1}F_1 + a_{i2}F_2 + a_{i3}F_3 + a_{i4}F_{4+}e_i \quad (1)$$

Where:

X is the value of the factor score,

i is the ordinal number of the variable,

F represents the factors,

e is the specific factor related only to the given variable.

The maximum likelihood variant was used as the type of factor analysis (Millar, 2011). The extraction algorithm in the maximum likelihood type (Field, 2017) is set so that the maximum likelihood of the options Λ and ψ*2* is obtained by minimizing the equation 2

$$F=tr[(\Lambda\Lambda'+\psi 2)-1R]-log|(\Lambda\Lambda'+\psi 2)-1R|-p \quad (2)$$

and according to Λ and ψ2 respectively, where *p* represents the number of variables, Λ factor loading matrix, and ψ2 diagonal matrix of unique variance. Minimizing *F* is done via a two-step logarithm. In the first step, the conditional minimum for *F* is calculated, for the given *y*. In this way, the function *f(ψ)* is obtained and it is numerically minimized by the Newton-Raphson method (Field, 2017; Ahmad *et al*., 2007). Based on the results, all criteria of Kaizer-Mayer and Bartlett's test were accomplished (Table 2):

Table 2. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.680
Bartlett's Test of Sphericity	Approx. Chi-Square	167.356
	df	55
	Sig.	0.000

Source: *Authors' calculation*

After performing the varimax rotation, the following results were obtained (Table 3, Figure 2):

Table 3. Rotated Factor Matrix[a]

	Factor			
	1	2	3	4
V2. Number of employees with bachelor's degree %	.638	-.088	-.082	.015
V3. Number of MSc/MA %	.818	-.103	-.094	-.028
V4. PhD number	.125	-.725	-.168	.000
V5. Attending seminars and courses outside the company %	.067	.407	.235	-.125
V6. Attending educational seminars and courses in the company %	-.454	.455	.010	-.186
V7. Are there organized procedures for storing necessary knowledge useful for the functioning of the company?	-.446	.061	.204	-.334
V8. Is there a system of protection and registration of innovative solutions and procedures (at the Intellectual Property Office)?	.347	-.486	.073	-.158
V9. Do participants attending knowledge innovation seminars have an obligation to report information to the appropriate departments, sectors or immediate colleagues?	-.211	.202	.948	.119
V10. Upon returning from business trips (after visiting fairs, exhibitions and other business events) are employees obliged to inform co-workers about the results concerning the company's activities?	-.160	.376	.381	.280
V11. Is there access to virtual libraries and knowledge bases?	-.050	.093	.048	.802
V12. Are you connected via intranet?	.104	-0.85	.075	.464

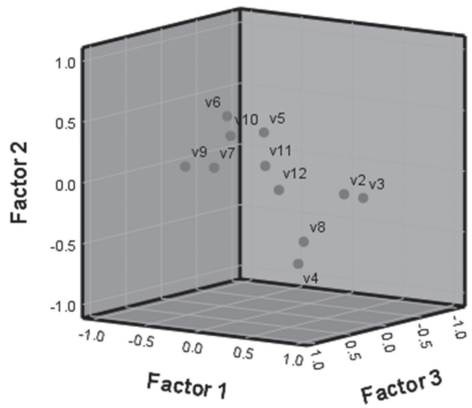
Extraction Method: Maximum Likelihood.

Rotation Method: Varimax with Kaiser Normalization.

[a.] Rotation converged in 5 iterations.

Source: Authors' Calculations

Figure 2. Factor plot in rotated factor space



Source: *Authors' Calculations*

The four obtained factors cumulatively explain 50% of the variance. Joseph Hair (2019, p. 151) criterion was used, according to which minimum acceptable values for factor loadings for interpretation of structure range from ±0.30 to ±0.40. Factor loadings represent the relationship between observed variables (questions) and latent common factors. If the correlation is positive, then it shows to what extent a certain variable contributes to that factor. As for negative factor loading, it gives meaning that the variable is related in the opposite direction with the factor (Vaus, 2002). The negative factor loadings are an indicator that the items are describing the opposite sides of the factor. Negative factor loadings tell us what the given factor does not represent. In the case of Factor 1, which we will henceforth call STRATEGY A, the factor loadings that contribute the most are the share of employees with MSc degrees, bachelor's degrees, and the existence of a system protection and registration of innovative solutions and procedures. It can be seen that companies implementing STRATEGY A rely primarily on the largest possible share of employees with academic education who represent innovative potential, as well as investing in procedures for the protection and registration of innovations in competent institutions.

In the case of Factor 2, which we will henceforth call STRATEGY B, the dominant factor loadings are attending seminars and courses outside/inside the company, and the obligation of employees to inform co-workers about the results concerning the company's activities after returning from business trips. Companies implementing STRATEGY B emphasize the training of employees at professional seminars outside/inside the company, as well as the dissemination of knowledge to co-workers after visiting fairs, exhibitions and other business events. When it comes to Factor 3, which we will henceforth call STRATEGY C, the dominant factor loadings are the obligation for employees after attending innovative knowledge seminars to report the results to appropriate departments, sectors or immediate colleagues, and to spread knowledge to co-workers after visiting fairs, exhibitions and other business events. This strategy emphasizes knowledge sharing within the collective. As for Factor 4, which we will henceforth call STRATEGY D, the dominant factor loadings are the existence of virtual libraries, knowledge databases and also intranet connections.

STRATEGY D emphasizes the transfer of knowledge through information and communication devices.

3.3. Regression analysis

In order to analyse the impact of KM strategies on the business parameters of companies, a regression model was set up:

$$T_i = \beta_0 + \beta_1 f_{i1} + \beta_2 f_{i2} + \beta_3 f_{i3} + \beta_4 f_{i4} + \varepsilon_i \quad (3)$$

Where, for $i = n$ observations:

T_i = dependent variable (company's annual balance sheet shown in terms of taxes in 2021 compared to 2020)

β_0 = T intercept (constant)

β_1 =slope coefficient of predictor f_{i1}

β_2 = slope coefficient of predictor f_{i2}

β_3 = slope coefficient of predictor f_{i3}

β_4 = slope coefficient of predictor f_{i4}

f_{i1}, f_{i2}, f_{i3}, f_{i4} = the independent variables or predictors (regression factor scores 1 – 4 *i. e.* KM strategies)

ε_i = random error

The significance level set is $\alpha = 0.05$. Based on the results (Table 4) for R^2, only 28.8% of the variability of the dependent variable "company's annual balance sheet shown in terms of taxes" is explained by predictors, so it can be concluded that there is no significant influence.

Table 4. Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.537[a]	0.288	0.245	0.717
a. Predictors: (Constant), REGR factor score 4 for analysis 1, REGR factor score 1 for analysis 1, REGR factor score 3 for analysis 1, REGR factor score 2 for analysis 1				

Source: *Authors' calculation*

In order to observe the impact of KM strategies on the second business parameter "trend of average wages in the company", the following model was set:

$$W_i = \beta_0 + \beta_1 f_{i1} + \beta_2 f_{i2} + \beta_3 f_{i3} + \beta_4 f_{i4} + \varepsilon_i \quad (4)$$

Where, for $i = n$ observations:

W_i = dependent variable (the trend of average wages in your company in 2021 compared to 2020)

β_0 = *W* intercept (constant)

β_1 =slope coefficient of predictor f_{i1}

β_2 = slope coefficient of predictor f_{i2}

β_3 = slope coefficient of predictor f_{i3}

β_4 = slope coefficient of predictor f_{i4}

f_{i1}, f_{i2}, f_{i3}, f_{i4} = the independent variables or predictors (regression factor scores 1 – 4 *i. e.* KM strategies)

ε_i = random error

As can be seen in table 5, only 27% of the variability of the dependent variable is explained by the influence of KM strategies, so it can be concluded that the strategies do not have a significant impact on the wages trend.

Table 5. Regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.519[a]	0.270	0.225	0.798
a. Predictors: (Constant), REGR factor score 4 for analysis 1, REGR factor score 1 for analysis 1, REGR factor score 3 for analysis 1, REGR factor score 2 for analysis 1				

Source: *Authors' calculation*

The research isolated four KM strategies applied by companies in Campania. These strategies largely met the criteria defined by Aprille Allen (2021). However, their influence on the two business indicators of the company has not been confirmed. In similar research conducted in Serbia, in medium and large companies, but in the construction sector, two KM strategies were isolated (Babic & Zarić, 2020). The first strategy almost coincided with STRATEGY A, isolated in Italy. The second strategy in Serbian companies was different and was aimed at introducing formal legal protection and registration of innovative solutions and procedures at the Intellectual Property Office, as well as insisting on a greater number of employees with PhDs. However, in the case of Serbian companies, the impact of KM strategies on increasing wages was proven. The greater participation of employees in the distribution of the company's earnings can be linked to the long tradition of self-management in Serbia. On the other hand, it should be noted that the survey for companies in Campania has been completed recently in 2022 including questions on business parameters, which go back two years to the period of the intense pandemic of COVID-19 and the accompanying recession.

4. CONCLUSION

The level of KM in the southern Italian region of Campania was investigated. This region like other lagging European regions suffers from an 'innovation paradox' (Vittoria & Lavadera, 2014), which refers to the need for more investment in innovation, but poor capacity to access public funding. Campania is quite different from the northern Italian regions in terms of wealth, inequalities, business culture and innovation potential. In the companies of this Italian region, there is a certain level of KM, which can be seen in relatively clearly differentiated strategies. However, the question arises as to whether and to what extent these strategies are effectively implemented in practice. Hence, one should look for the reason why there is no significant influence of strategies on the business parameters of companies. The question also arises whether the peripheral EU regions, such as Campania, represent extremes in terms of KM strategies and whether the pattern of this region can be copied to the whole of Italy? One of the limitations of this research is the sample size. In any case, it would be interesting to do a comparative study in some of the northern Italian regions such as Veneto and Lombardy, in order to determine the expected differences in management and business.

STRATEGIJE UPRAVLJANJA ZNANJEM I NJIHOV UTJECAJ NA POSLOVANJE TALIJANSKIH TVRTKI

dr. sc. **Vojislav Babić**
Sveučilište u Beogradu, Institut za sociološka istraživanja
Čika Ljubina 18, 11000 Beograd, Srbija
Tel.: +38163334067, e-mail: babic.voja@gmail.com

dr. sc. **Siniša Zarić**
Sveučilište u Beogradu,Ekonomski fakultet
Kamenička 6, 11000 Beograd, Srbija
Tel.: +38163254525, e-mail: sinisha.zaric@gmail.com

dr. sc. **Rossana Piccolo**
Sveučilište u Kampaniji "Luigi Vanvitelli", Caserta, Italija
E-mail: rossana.piccolo@unicampania.it

SAŽETAK

Upravljanje znanjem pojavljuje se kao iskonska potreba tijekom industrijske revolucije 4.0, kada su znanje i informacije ključni resurs za brži ciklus inovacija i ekonomski prosperitet. To je složen proces koji podrazumeva tehnologije uključene u stvaranje, proširenje i korištenje podataka o znanju. Ova empirijska studija analizira pokazatelje i strategije za upravljanje znanjem u 70 tvrtki u talijanskoj regiji Campania. Krajnji cilj istraživanja je utvrditi utječe li strategija upravljanja znanjem na parametre poslovanja poduzeća. Pokazatelji upravljanja znanjem klasificirani su u pet osnovnih kategorija: akademsko obrazovanje, obuka zaposlenika, skladištenje, diseminacija i tehnička podrška. Za prikupljanje podataka korišten je upitnik sa zatvorenim odgovorima, intervalnim i Likertovim skalama. Varijable za mjerenje upravljanja znanjem obrađuju se tehnikom faktorske analize, varijantom maksimalne vjerojatnosti. Ideja je bila da se kao rezultat dobiju strategije u obliku faktorskih skorova i analizira njihova bit. Utjecaj faktorskih skorova na poslovne parametre tvrtke mjeren je višestrukom regresijskom analizom.

Ključne riječi: *Upravljanje znanjem; strategije; poslovni parametri; faktorska analiza; talijanske tvrtke*

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