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Full Length Research Paper

The impact of knowledge management on SME growth and profitability: A structural equation modelling study

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This paper uses a structural equation modelling technique to verify a theoretically proposed model of knowledge management. The purpose of the study was to clarify the importance of different determinants of knowledge management with the aim to investigate its influence for the firm performance. The empirical analysis estimates the relationships in the structural model of the influence of knowledge management on performance using data collected through questionnaires, filled by 168 firms. The proposed model of the knowledge management consists of six main dimensions; (1) use of knowledge, (2) knowledge acquisition at individual level, (3) knowledge storage, (4) motivation, (5) measuring the efficiency of knowledge management implementation, and (6) knowledge transfer, nevertheless, the firm performance was measured by firm growth and firm profitability. To verify and confirm the relationships between the proposed dimensions, an exploratory and confirmatory factor analysis was performed. The findings indicate that all dimensions are interrelated and important for the firm performance. However, knowledge management represents a strong factor for the firm performance in the proposed model. The paper includes an approach to determine the measures of knowledge management. It is not merely a theoretical reflection, but also outlines the development of empirical model of knowledge management for the firms.

Key words: Knowledge, knowledge management, firm performance, human capital, structural equation modelling.

INTRODUCTION

The business world has accepted the idea that knowledge and the production of ideas represent the most important factor for company success. This is in accordance with the interpretations of the key factors for a long-term economic growth of both companies and economies as a whole (Romer, 1993). This means that contemporary firms are faced with the fact that they should focus their assets management on human capital. The present empirical knowledge about knowledge management of a firm in order to reach highest possible value added appears unsatisfactory.

Small and medium scale enterprises (SMEs) play a major role in economic growth in the organization for economic cooperation and development (OECD) area, providing the source for most new jobs. As larger firms downsize and outsource more functions, the weight of SMEs in the economy is increasing. With sustained economic declination, individuals as well as governments increasingly set up and encourage entrepreneurship to leverage and possibly eradicate the economic depression. As more people fail to get employment in the formal and informal sectors, the need to own a business became more attractive and competitive (Aderemi et al., 2008). In addition, productivity growth – and consequently economic growth – is strongly influenced by the competition inherent in entry and exit of smaller firms. This process involves high job turnover rates – and churning in labour markets – which is an important part of the competitive process and structural change.

The focus of this paper is, hence, the knowledge management model development and the analysis of the significance of knowledge management dimensions for small and medium scale enterprise (SME) performance.

The paper is structured in seven sections. The 2nd section

presents the theoretical framework on which the empirical analysis is based. The main focus is on the literature describing the dimensions of knowledge management. In the 3rd section, the importance of knowledge management dimensions and how they contribute to firms' performance is presented. Afterwards five hypotheses are developed, which are later empirically tested. The 5th section describes the methodology used, including the description of variables and measurement, data collection process, sample description and data analysis. The 6th section is dedicated to present the empirical findings together with a graphic presentation of the structural model. The results are summarized and the main findings discussed in the 7th section, the paper ends with conclusions and implications.

THEORETICAL BACKGROUND ON KNOWLEDGE AND KNOWLEDGE MANAGEMENT

The key theories, which contributed considerably towards the understanding of the importance of knowledge for firms are the theory, based on resources - Resource based view of the firm (also Source–based theory or RBT) and the theory, based on knowledge – Knowledge-based view of the firm (also knowledge-based theory or KBT) . The most important question is: Does the company have appropriate competences in order to reach its targets? The concept of competitiveness based on competences was developed by Penrose (1959) and later used by Wernerfelt (1984), Rumelt (1984) and Barney (1986). These authors can be considered as the creators of modern theory, which is based on resources (Foss, 1997). Proponents of their theory see the firm as a collection of individual unique resources (Nelson and Winter, 1982; Barney, 1991). This collection is increasingly knowledge-based (Roos et al., 2000; Lev, 2001; Sveiby, 2001; Marr and Schiuma, 2001). Knowledge in firms should represent the foundation on which company strategy is built. Similarly, knowledge should become the most important resource for company profitability (Grant, 1991). Companies should therefore, identify and develop their knowledge resources in order to strengthen or retain their competitive advantages and to improve their effectiveness (Peteraf, 1993; Prahalad and Hamel, 1990; Teece et al., 1997; Ruzzier et al., 2006, 2007, Ruzzier and Anton i , 2007). This means that knowledge should be understood as the fundamental resource of revenues (Grant, 1991; Spender and Grant, 1996; Spender, 1994).

Small and medium scale enterprises (SMEs) are particularly subject to the deterministic constraints of the competitive environment, especially the international ones (Ruzzier et al., 2007). By nature, they have neither the resources nor the organization needed to address the constraints that the environment poses to their strategy (Bello, 2009). Competitive advantages rely primarily on knowledge based resources especially if they cannot be easily imitated. Management support is the most important factor of systematic knowledge management. In SMEs one person is usually in charge of knowledge management, combining both ownership and managerial function (Gomezelj and Antoncic, 2008). Thomas et al. (2001) noted that performance differences across firms may be attributed to differences in knowledge and the implementation of knowledge management.

The existing literature is fragmented regarding the indicators of knowledge management. In line with the resource based theory valuable and knowledgeable employees are not sufficient to outperform competitors. They should be managed and controlled in a way that enables the firm to implement its desired strategy (Barney, 1991). The growing importance of knowledge naturally calls for its systematic management. If knowledge management is to give proper results (help creating a firm's competitive advantage and therefore, enhancing firm's performance) its basic goal should be to transform as much of a firm's knowledge to its capital. Conventional approaches to knowledge management are based on the following assumptions on knowledge, that is, knowledge is reified, knowledge is useful when it is objective and certain, there should be distinct between tacit and explicit knowledge, knowledge may be managed through knowledge management, knowledge identification is a search process, knowledge construction is a process of configuration, knowledge management comprises knowledge identification, generation, codification and transfer, knowledge management strategy may be formulated and implemented, and knowledge management strategy must be aligned to the business strategy (Bodhanya, 2008).

Knowledge management dimensions

The people have reached recognition of the need to understand and to measure the knowledge management activities with the objective that organisations can do what they do better so that governments can develop and adapt policies to promote these benefits. Among the various elements of knowledge-related investments (education, training, R&D, etc.), knowledge management is one of the less known. Although, it has become a widely accepted business practice, companies still struggle to measure its dimensions and its impact to the economic benefit. Knowledge management (KM) measures should help us understand where to make changes in the KM implementation. Appropriate measures will help firms to manage the implementation to see where they should adapt, improve, or change. Likewise, all managers and employees like to have a goal in mind when implementing the knowledge management, so the measures should help them understand when and where you have been successful. The form of measurement can differ across organizational contexts. The challenge for manage-ment is to find the right mix for each specific organization or program. When dealing with the importance and

characteristics of knowledge, companies can be defined as institutions, which link knowledge (Grant, 1996). Grant states that the creation of knowledge within companies is less important than efficient and effective use and utilisation of knowledge. Systematic knowledge management in a firm includes efforts to maximise the success of a company through the creation and exchange of knowledge and skills. Lately, new definitions of management and its role in knowledge management have been developed (Drucker, 1959; Sveiby, 1997).

Efficient knowledge management has gained importance because of the very need of the companies who wish to perform successfully in a hyper-competitive global market to maximize the efficient use of all of their resources (Suresh, 2007). The goal of knowledge management is not knowledge itself, but rather the management of human resources who possess such knowledge. Pundziene et al. (2006) emphasized that human resources management was one of the significant challenges throughout all the stages of enterprise life-cycle. One of the relevant elements of knowledge management is undoubtedly the creation of such an environment in a company in which individuals trust one another and the management and are willing to share their knowledge with others with a view to contributing to a successful performance of their company (Kermally, 2007).

Knowledge management forms part of the overall management process in a company. It encompasses systematic analyses, planning, acquisition, creation, development, storage and use of knowledge in companies. Knowledge management focuses on the individual and his/her knowledge as a resource and value. In the existing studies, knowledge management is defined as a set of different dimensions. Table 1a shows the classification of knowledge by different authors.

There are no universal ways of defining or measuring knowledge management in companies. Knowledge management is fast evolving into a special discipline with its own sub-theories, terminology, tools, practices and other characteristics of an independent discipline. In subsequent part of this paper, five elements shall be adopted, namely, the acquisition, storage, transfer and use of knowledge and the measurement of the effects of knowledge management.

Knowledge acquisition

Wernerfelt (1984) was one of the first authors to point out that acquisitions 'provide an opportunity to trade otherwise non-marketable resources and to buy or sell resources in bundles'. Through acquisitions firms can acquire technological capabilities or market relationships. Knowledge management all too often encompasses only dissemination and exploitation of a company's existing stock of knowledge, while insufficient attention is being given to the acquisition of new knowledge, which, however, is essential for the realization of the objectives set (Coulson-Thomas, 2003).

Marquardt (1996) distinguishes between externally acquired knowledge and internally (within an organization) created knowledge. Marquardt further adds that the imitation of successful operation practices of other companies falls within the most important methods of acquiring knowledge from the environment. An organization can acquire knowledge from the environment in several ways, namely, from literature, by participating in various expert meetings, by collecting data on economic, social and technological trends, by cooperating with different economic and non-economic entities, and similar. Especially knowledge acquired from business partners may be of tremendous value as it was found to increase relational benefits and, through that, positively contributes to the loyalty among business partners (ater and ater, 2009). These external economies could help the small firms become efficient and competitive (Phambuka-Nsimbi, 2008). The concept of entrepreneurial networks can play an important role in acquiring knowledge. One way to overcome some of the constraints the entrepreneur may face in acquiring knowledge is by searching into an extended pool, which exists outside the business. This network of knowledge and information may represent a rich source of explicit and implicit knowledge (Anderson and Jack, 20002).

All participants must be actively engaged in the process of creating the knowledge of an organization. The research on Japanese companies carried out by Nonaka and Takeuchi (1995) proves that a company can become successful through organized learning and, thereby, also through the creation of knowledge.

Knowledge transfer

As communication between employees generally contributes to the transfer of knowledge, it is necessary for a company to create a culture which encourages communication. It is very crucial to mention that an entrepreneur cannot succeed without communicating with his or her human elements in the organisation. An entrepreneur needs a communication string that links people together in his or her day-to-day business activities. Without this, he or she cannot succeed (Adejimola, 2008). Sharing knowledge may play a significant role in increasing one's exposure to different ideas and provides different sources of information. Information and knowledge transfer at both the individual and organizational level is as such an important factor that fosters innovation (Dakhli and De Clerco, 2004), and the vital importance of innovation for industrial growth had been recognized in numerous studies. This is because successful innovation is associated with good performance and related to subsequent growth (Abereijo

Table 1a. The classification of knowledge.

Author	Classification
Quintas, Lefrere and Jones (1997)	Knowledge management as a process of continuous management of all types and forms of knowledge with a view to realizing the set goals, fully exploiting existing knowledge and creating new opportunities.
Duffy (2001)	Knowledge management constitutes a formal process which ensures efficient simultaneous use of knowledge by employees, technology and work process and the transfer of knowledge to the right individuals at the right time
Brooking (1998)	Knowledge management as a certain activity which is consistent with the human capital management strategy
Macintosh (1999)	Knowledge management as a process of identification and analysis of available knowledge and. consequently. as a process of planning of different activities with a view to realizing the set objectives and increasing a company's capita
Wiig (1997)	Defines knowledge management as support for knowledge-related managerial activities such as: for instance, creation, storage, reformulation and use.
Lank (1997)	Greatest importance of knowledge management in its ability to maximize the value for customers.
Pirc (2000)	a) the creation of knowledge - the result of the new knowledge or extend an existing. b) capture of knowledge - enables the transformation of tacit knowledge into explicit. c) managing knowledge - it is categorization, storage and maintenance d) access to knowledge - imparting knowledge to all users and e) use of knowledge - in decision-making.
Konrad (2002)	General activities that are related to management skills. as documentation and codification of individual knowledge, knowledge sharing across different channels to motivate the exchange of information between people and measure the effectiveness of knowledge

et al., 2007). Special attention should be given to the ability of the receiving party to absorb the transmitted knowledge (Cohen and Levinthal, 1990). One can imagine knowledge transfer as flows of individual knowledge fragments in the network of employees/co-workers. Social interaction and employees' desire to co-operate play an important role in this sense. Knowledge can be transferred in a single stage, that is, directly from the transmitter to the recipient. Here, the importance of psychological factors becomes evident. However, knowledge transfer can also be multi- stage, which suggests that knowledge passes through several way stations in said network of employees. The transfer of tacit and embedded knowledge is often impossible in the absence of the individual employees who possess it, and of the organizational routines and systems (Teece, 1998). If the employees linked to the key knowledge leave the firm, the knowledge could be altered or even damaged before being transferred (Nelson and Winter, 1982). The transfer of knowledge also depends on the development of an atmosphere of trust and collaboration. Given that the transfer of tacit and embedded knowledge requires the contribution of many individuals; its success depends on the ease of communication and on the intimacy of relationship between the source and the recipient unit.

Knowledge storage

Creation of knowledge is a costly affair that is why it is critical for organisations to store the knowledge and provide access to it, in a professional and efficient manner throughout the organisation for leveraging it for achieving sustainable competitiveness.

The process of storing knowledge allows for the creation of a quality knowledge base of an organization which should contain the entire usable knowledge of an organization. Open access to the knowledge base should be ensured. The most important aspect, however, is the manner in which knowledge is stored: it should allow for a rapid and efficient search for and, in particular, updating of knowledge (Marquardt, 1996). One can realize this by storing knowledge, creating knowledge maps and up-dating knowledge. In order to be able to store knowledge, one usually collets and processes it in electronic form, part of it can be stored in the form of books, handbooks,

documents and plans, while part of it, usually tacit knowledge, remains with employees. Modern information technology and software allow for an almost unlimited storage of knowledge.

Use of knowledge

When we think or do something, we use knowledge. If we want to do something new, we need ideas about what and how to do it. Ideas are building new knowledge, which can be used with in all kind of processes. It is only by using knowledge that one creates its direct utility value within a company. Since one also creates new knowledge when using existing knowledge, one continually returns to the initial stage of knowledge management, that is, the acquisition and creation of knowledge which are repeatedly followed by the transfer and storage of knowledge. Knowledge management phases are ever recurring. One should continuously encourage employees to use knowledge. If an organization succeeds in increasing the use of knowledge among employees, it means that its knowledge management is successful and efficient. Namely, the use of knowledge transforms into concrete results visible in a more efficient adaptation to changes, joint search for solutions and a more rapid completion of certain tasks. This allows for innovation and thereby the use of knowledge for new or upgraded products or services (Probst et al., 1999) . The organization's performance is strongly influenced by the extent to which the appropriate knowledge is available and utilized by those who need it (Badaracco, 1991). Efficient use of knowledge requires different knowledge sources and frequent contacts among employees. As access to information and knowledge becomes easier and less expensive, the selection and efficient use of knowledge become more crucial, and tacit knowledge in the form of the skills needed to handle codified knowledge becomes more important than ever. The knowledge economy increasingly relies on the use of knowledge. Hence, the success of enterprises, and of national economies as a whole, will become more reliant upon their effectiveness in utilizing knowledge, as well as in its creation.

Measuring the efficiency of knowledge management implementation

In a way, the measuring process completes the entire circular process of knowledge management. It measures achievements and determines effectiveness. The measuring process usually provides information on returns from investments in knowledge as well as on the economic impact of such investments in a given period of time. Measurement results expose necessary improvements to be made or other measures to be taken in the overall process of knowledge management. Often failures of knowledge management implementations arise from incorrect evaluation. The problem may not be with the design of such knowledge management system but effective utilization by the members of the organization. Hence, it is inevitably to develop a better understanding system of organizational controls so that they can facilitate the success of knowledge management system implementation (Malhotra, 2001).

The measurement of the efficiency of investments in knowledge contributes to the improvement in the efficiency of an organization's performance. Results serve an organization mainly in its further decisions concerning knowledge management. It is important to measure knowledge management performance. Organizations should employ measures that determine the impact of knowledge management inputs and outputs for being aware of the overall impact of knowledge management assets on the effectiveness of policy implementation.

After presenting the proposed dimensions, it should be emphasized that there exists considerable interdependency among them. Knowledge is, in the first place, always acquired at the individual level by combining existing knowledge, which is comprised partly of knowledge that the individual already possesses, partly of knowledge available to the individual from others in hard copy, electronic format or different other forms of artifacts and partly of knowledge available to the individual from his/her interactions with others. But this is strongly linked to knowledge transfer and knowledge storage. More recently, various authors (Leonard-Barton, 1995; Ranft, 1997; Bresman et al., 1999; Gupta and Roos, 2001) have shown that acquisitions may have as their aim the transfer of knowledge. New knowledge that is acquired needs to be stored for later use as an organizational memory. This can be done with the use of information technology such as, for example, with the development of assessable databases and repositories or maps of an organization's knowledge about its customers, projects, processes, suppliers, competitors, technology and the organization's knowledge itself. Unfortunately, this is still not enough. An organization needs to find a way to eliminate the barriers to knowledge transfer. Without efficient use of knowledge, all the aforementioned processes are of little value. Only through the use of knowledge can an organization ensure that its knowledge amounts to a viable source of sustainable competitive advantage.

KNOWLEDGE MANAGEMENT AND EFFECTS ON COMPANY PERFORMANCE

Penrose (1959) argues that it is the ability to create knowledge that helps to explain the firm's ability to grow. A company is more successful if its employees learn quickly and implement and apply the acquired knowledge faster than the competition's employees. A company must

be capable of improving its existing skills as well as of mastering new ones with a view to gaining or maintaining competitive advantage. Workers at all levels of the firm operations contribute to business efficiency (Ivankovic, 2005). A company's infrastructure should be organized in such a manner that adequate technological equipment, internet and intranet, know-ledge banks, libraries, continuous training, and meetings stimulate efficient team work, creativity, positive attitude, self-confidence, and favourable environment (Rampersad, 2007).

Several studies indicate that the company's business performance depends on the efficiency of knowledge management (Dollinger, 1985; Brush, 1992, Davenport and Prusak, 1998; Nonaka and Takeuchi, 1995). SMEs usually do not have large financial resources that could be spent on investment in working assets and property, so they compete primarily on the basis of their know-how dimensions of knowledge and are therefore, forced to exploit the knowledge for developing their competitive advantage. Research into exploring effects of knowledge management (KM) implementation on firm performance has many weaknesses (Davenport, 1999; DeCarolis and deeds, 1999). Studies have been mainly theoretical and with little empirical evidence. The foundation of a direct relationship between knowledge management and firm performance has a weak background (Alavi and Leidner, 2002; Real et al., 2006). Three problems make this topic particularly difficult. First, it is necessary to design a measurement framework that includes all the essential dimensions needed to analyse the level of knowledge management implementation in the firm. A second question is the justification of the relationship between knowledge management and firm performance. Dyer and McDonough (2001) mentioned four fundamental reasons for introducing knowledge management in organisation, that is;

(1) to capture and share best practices, (2) for training and learning, (3) to manage customer relations and to improve customer satisfaction, and (4) to develop competitive intelligence.

Third, the existence of certain variables that mediate the relationship can be assumed (Davenport, 1999; McEvily and Chakravarthy, 2002). Activities related to Knowledge management could include employees´ capacities, firm innovative competences, information technology (IT) systems, and organizational mechanism to create, store, use and spread information and knowledge between all the members.

TOWARD THE RESEARCH HYPOTHESES

Knowledge or knowledge management is not directly observable or measurable. Therefore, its capacities should be taken into account, which are observable. The study identified five dimensions of knowledge management in the studied literature, knowledge acquisition, knowledge storage, knowledge transfer, use of knowledge, and measuring the efficiency of knowledge implementation. The study measured the above dimensions with 72 variables.

Continuous improvements in firm's knowledge management dimensions are important for increasing a firm's performance. In the study, the particular interest is in how the overall knowledge management, and on each individual dimension and how it affects company performance. Therefore, the study has formulated the following hypothesis:

Hypothesis 1: Knowledge management has a positive effect on company performance.
Hypothesis 1a: The 'knowledge acquisition" dimension has a positive effect on company performance.
Hypothesis 1b: The 'knowledge storage" dimension has a positive effect on company performance.
Hypothesis 1c: The 'knowledge transfer*'* dimension has a positive effect on company performance.
Hypothesis 1d: The 'use of knowledge" dimension has a positive effect on company performance.
Hypothesis 1e: The 'measuring efficiency of knowledge implementation*'* dimension has a positive effect on company performance.

METHODOLOGY

The methodology is discussed in terms of description of variables and measurement, data collection process, sample description and data analysis. Based on the aim of the research and developed hypotheses the conceptual knowledge management model was empirically verified on the sample of Slovenian Small and Medium enterprises.

Variables and measurement

Based on the literature review, interviews with human resource managers, and work with a pilot group, a questionnaire was designed, destined to directors/managers of the firms. Independent and dependent variables were measured through scales previously tested and developed by pilot group. Independent variables are about knowledge management, therefore, about knowledge acquisition, knowledge storage, knowledge transfer, use of knowledge, and measuring the efficiency of knowledge implementation.

Knowledge acquisition was measured with 24 items, knowledge storage was measured with 6 items, knowledge transfer was measured with 21 items, use of knowledge was measured with 15 items and efficiency of knowledge implementation was measured with 6 items. Respondents were asked to indicate (on a 5-point Likert-type scale ranging from "very non truthful" to "very truthful") how truthful were the statements on knowledge management.

Dependent variable – firm performance was measured through firm growth (3 items) and firm profitability (five items). Control variables data were collected about industry of the firm, firm age, firm size and firm disposition. The conceptual framework is visualised in Figure 1. Finally, the study had to define the variables for each determinant in the conceptual knowledge management model.

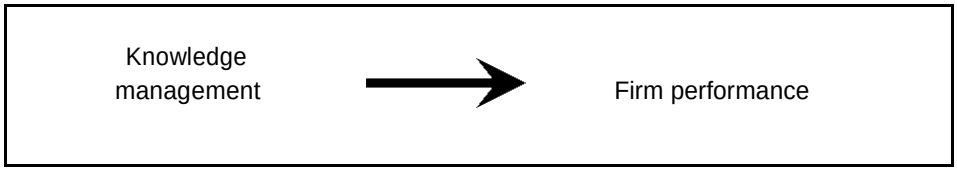

Figure 1. Conceptual framework.

Data collection process and sample description

Small- and medium-sized Slovenian companies were included in the research. First, a list of all small- and medium-sized companies was drawn up, and then a representative sample was chosen using the method of probability sampling (N = 1,300 small and medium-sized Slovenian companies).

The gender structure of respondents shows that there are 124 or 73.4% of men and 45 or 26.6% of women. The majority of respondents is between 40 and 50 years of age (68 or 41.0%), 53 or 31.9% of respondents are more than 50 years old, 33 or 19.9% between 30 and 40 years, 9 or 5.4% between 25 and 30 years, the remaining three or 1.8% respondents are younger than 25 years. 69 respondents or 39.9% represent company founders, 115 or 66.5% are owners or co-owners and 125 or 72.3% are managers or directors.

The majority of companies, 43 or 25.14% operate in production industry. Of these 5 or 2.92% produce consumable goods, whereas 38 or 22.22% of polled companies produce industrial goods. These companies are followed by enterprises, which are active in retailing and wholesale. There are 35 or 20.47% such companies. The next large group of companies is active in civil engineering (30 or 17.54%). 12 or 7.02% of companies are active in consultancy or similar business services, 10 or 5.85% of companies are active in transport and public services, 9 or 5.26% of companies are active in engineering, research and development. All other companies are active in consumer services, banking, investments, insurance or similar services. The majority of companies have between 11 and 50 employees. There are 122 or 69.51% of such companies.

92 or 66.19% of respondents have 10 to 20 years of work experience as company owners or co-owners, 15 or 10.79% of respondents have more than 20 years of work experience, 32 or 23.03% of respondents have less than ten years of work experience. Education level of respondents is rather high. 20 or 11.56% of respondents completed postgraduate studies (M.A. or Ph.D.), 64 or 36.99% of respondents have an advance education diploma higher education or university degree, 29 or 16.76% of respondents have an advanced education diploma. Only 10 or 5.78% of respondents have less than secondary education.

Selected data was analysed with SPSS and EQS programmes. Various statistical methods were used, as well as multivariate analysis methods, namely exploratory and confirmative factorial analysis and structural equation modelling. In order to test the constructs, factor analysis was used (explorative and confirmative), by using SPSS and EQS software. The initial number of factors was chosen with regard to the study expectations based on theory. In the new model specification and the decision about the number of factors eigenvalue was taken into consideration. Principal Axis Factoring was used as the extraction method. Square rotation was selected as the rotation method. EQS Multivariate Software version 6.1 (Bentler and Wu, 1998) was utilized for confirmatory factor analysis and testing of the proposed structural model. Construct and discriminant validity, as well as convergent validity, were assessed using exploratory and confirmatory factor analysis (Floyd and Widaman, 1995). Reliability was assessed using Cronbach's alpha. Since a small amount of non-normality was found in the data, the Elliptical Reweighted Least Square (ERLS) estimation method was used (Sharma et al., 1989). As recommended by Hair et al. (2006), the fit of the model was assessed with multiple indices: NFI (the normed-fit-index), CFI (the comparative fit index), SRMR (the standardized root mean square residual) and RMSEA (the root mean square error of approximation). The chi-square was calculated, but is not given major consideration because it is highly sensitive to sample size and the number of items in the model (Bentler and Bonett, 1980).

FINDINGS

Explorative analysis was carried out on a sample of 168 companies. The initial number of selected dimensions was consistent with the study expectations based in theory. The following basic dimensions were anticipated for the dimension of knowledge management:
(1) Knowledge acquisition, (2) knowledge storage, (3) knowledge transfer, (4) use of knowledge, and (5) measuring the efficiency of knowledge implementation.

The postulated construct of knowledge management has not been empirically backed up, thus, possible uncertainties were expected, which meant that the number of dimensions could be smaller or larger than the number identified on the basis of literature review. When deciding on the number of factors we took into account eigenvalue, the share of explained variance and scree plot. The scree plot shows that the possible number of factors is between 5 and 7, as after the 7th factor an inflection appeared. All the solutions were checked, to ensure the best structure was identified. Combining all these criteria together leads to the conclusion to retain 7 factors for further analysis, with the most suitable solution being the one with seven factors. These five factors explain 53.58% of variance, which is a satisfactory result. The Kaiser-Meyer-Olkin (KMO) measure had the value of 0.855 for all variables, which represents a perfect assessment of suitability of chosen variables. The seven dimensions of knowledge management (52 variables), which were selected through the exploratory factor analysis are shown in Table 1b.

In view of the expectations developed in accordance with the above-mentioned theoretical concepts, the study up to this phase revealed two sub-dimensions more than expected. Instead of the following five sub-dimensions: (1) knowledge acquisition, (2) knowledge storage, (3) knowledge transfer, (4) use of knowledge, and (5) measuring the efficiency of knowledge implementation.,

Table 1b. Factors and weights of individual variables of the 'knowledge management' dimensions.

Variable	F1	F2	F3	F4	F5	F6	F7
A sense of well-being in the company has a positive impact on knowledge transfer.	0.704						
The company successfully applies its own past experiences in addressing new challenges.	0.676						
The company knows how to successfully exploit the potential of its employees.	0.652						
The company successfully applies its knowledge in work processes.	0.639						
Useful proposals are recommended.	0.633						
Useful proposals are applied in practice.	0.633						
Employees are encouraged to apply new knowledge in practice.	0.616						
The company successfully markets its products or services.	0.601						
The company has an efficient system for counselling and mentoring junior co-workers.	0.530						
We discuss with employees their needs for knowledge.	0.519						
We allow mistakes which arise out of the use of new knowledge.	0.455						
Each employee informs his/her co-workers of any newly acquired knowledge.	0.428						
We attend the presentations of innovations by our suppliers and customers.		0.726					
The company supports cooperation with other companies in various projects.		0.698					
We encourage off-the-job training.		0.647					
We follow professional literature.		0.628					
We attend professional fairs at home and abroad.		0.627					
We enable students to pursue practical training and write papers/ diplomas on our company.		0.624					
The company makes regular comparisons with the strongest competitors in the field.		0.601					
We cooperate with external research institutions.		0.598					
The company encourages and supports further education of employees.		0.596					
Our employees participate in various seminars and workshops outside the company.		0.559					
We use the Internet.		0.547					
We implement internal training.		0.383					
The company regularly stores the knowledge (has archives) on the implementation and contents of the research process.			0.715				
The company has an efficient computerised system for accessing and searching in its own knowledge bases.			0.662				
Following the achievement of significant work results. the company conducts interviews with operators on the work process.			0.654				
The company regularly stores the knowledge (has archives) on the implementation and contents of work processes.			0.633				
Variable	F1	F2	F3	F4	F5	F6	F7
The company encourages employees to publish their achievements.			0.602				
The company has a well-organized documentation on the knowledge and achievements of employees.			0.580				
The company supports the publication of successful results.			0.562				

Table 1b. Cont'd

The company regularly organizes different internal educational workshops whereby it encourages the exchange of opinions.	0.511					
The company regularly organizes presentations on employee achievements.	0.502					
The company stores the documentation on its establishment, development and vision.	0.481					
The company has an efficient computerised system for visual communication between employees. e.g. videoconferencing.	0.442					
We reward individuals for successful application of new knowledge – financial incentives.		0.740				
We reward individuals for successful application of new knowledge – non-financial incentives.		0.675				
The best proposals are rewarded.		0.604				
We monitor cost reductions derived from the application of knowledge.			0.739			
We monitor the relationship between investments in knowledge and financial profitability.			0.694			
We monitor the effect of applied knowledge on employee added value.			0.677			
We monitor the effects of applied knowledge by ear.			0.585			
We monitor the effects of applied knowledge with the aid of different indicators (BSC - Balanced Scorecard. and similar).			0.571			
We do not monitor the effects of applied knowledge.			0.348			
Employees fail to understand the importance of knowledge dissemination and exchange within the company.				0.768		
The company does not enable knowledge transfer between departments.				0.736		
Employees hide their knowledge from co-workers because they believe that by doing so they increase their own competitive advantage.				0.707		
Employees have insufficient communication skills required to transfer knowledge.				0.568		
Company culture does not encourage knowledge dissemination.				0.505		
We acquire new knowledge through the purchase or takeover of a company with the required knowledge.					0.755	
We acquire new knowledge through the establishment of a joint undertaking in partnership with a company which already possesses the required knowledge.					0.744	
The company has established strategic affiliations or partnerships.					0.637	

the research brought to light seven factors, which, however, can be logically explained. Factor F1 can justifiably be called use of knowledge, although, several variables which the study initially deemed to fall within the category of transfer were superimposed on it. This is most likely the result of the high level of interconnection of all the factors of knowledge management. A similar situation, although, to a lesser degree, occurred with factor F3, which the paper call knowledge storage. Namely, in addition to the factors of storage which were the subject of the questionnaire, several other factors of knowledge transfer were superimposed on factor F3. This can be easily explained in terms of contents, considering that one could deem an efficiently supported computer system a good means of transfer as well as a means for storing information. The same applies to the publication of achievements. On the one hand, the publication of results represents the transfer of knowledge and, on the other, storage. Factors F2 and F7 are actually both composed of the factors of knowledge acquisition. In literature, authors were encountered who also classify knowledge acquisition into two types, namely, acquisition within the organization and acquisition from the outside, which they most often term knowledge creation and knowledge acquisition; in this case, however, one could say that F2 represents knowledge acquisition at individual level, while F7 represents knowledge acquisition at firm level, considering that the following variables fall within

F7: “We acquire new knowledge through the purchase or takeover of a company with the required knowledge”. “We acquire new knowledge through the establishment of a joint undertaking in partnership with a company which already possesses the required knowledge.”, and “The company has established strategic affiliations or partnerships.” Factor F6 consists of the factors which define knowledge transfer, while factor F5 is undoubtedly the very factor which explains the measurement of the efficiency of knowledge management implementation. Factor F4 should also be mention which actually combines the factors related to employee motivation, namely, it is a question of individual motivation in the event of a successful acquisition of new knowledge. For this reason, it shall be term factor motivation.

The construct of company performance was tested in the same way. The initial number of dimensions was selected in accordance with expectations based on theory. For the dimension company business success the following dimensions were selected: growth and profitability. This theoretical construct of company business success had been tested before (Antoncic, 2000, 2007), thus, it was expected that the selected dimensions would be confirmed. When choosing the number of factors the following was taken into consideration: own value, the share of explained variance and scree plot. All three measures certainly point towards two possible factors, which explain 67.57% variance. All variables have sufficiently high communalities (from 0.610 to 0.737), thus, no variable was eliminated during this stage. Similarly, weights related to individual factors were appropriate; therefore, all variables selected for the explanation of company business success were kept. Bartlett test showed that correlation matrix has significant correlations (sig. = 0.000 for all variables). The KMO measure of sampling adequacy valued 0.795, which points to the suitability of chosen variables. The study kept two dimensions of company business success (with 8 variables), which were obtained by using the explorative factor analysis and are shown in Table 2. Factor F1 can be justifiably called company profitability, because it comprises of five variables, which are related to profit, factor F2 can be called company growth, because it comprises of three variables, namely employee growth, growth of market share and sales growth.

Knowledge management construct

The performance of exploratory factor analysis with SPSS revealed that the knowledge management dimension consists of the following seven sub- dimensions (factors F1 to F7): (1) use of knowledge, (2) knowledge acquisition at individual level, (3) knowledge storage, (4) motivation, (5) measuring the efficiency of knowledge management implementation, (6) knowledge transfer and (7) knowledge acquisition at firm level. For each factor confirmatory factor analysis was performed using the EQS package.

Statistical information on each knowledge management dimension’s internal consistency (Cronbach’s alpha reliability statistics) and convergence (goodness of fit model indices) based on the overall sample is shown in Table 3.
(1)- Use of knowledge. (2) - knowledge acquisition at individual level. (3) - knowledge storage. (4) - motivation.
(5) - measuring the efficiency of knowledge management implementation. (6) - Knowledge transfer and (7) - knowledge acquisition at firm level.

All consistency indices are moderate to high indicating good consistency. The goodness of fit indices for the dimensions indicate moderate model fit (NFI and CFI are high. over the threshold 0.9. whereas SRMR and RMSEA are in many instances too high. over the threshold of 0.05). Also at the overall model which includes all 7 dimensions. Two goodness-of-fit-indices (CFI = 0.95; NFI = 0.88) are very good whereas two badness-of-fit- indices (SRMR = 0.18; RMSEA = 0.06) are less appropriate. No single magic value for the fit indices separates good from poor models. The quality of fit depends heavily on model characteristics including sample size and model complexity.

The correlations among factors are indicated in the Table 4.
(1) - use of knowledge. (2) - knowledge acquisition at individual level. (3) - knowledge storage. (4) - motivation.
(5) - measuring the efficiency of knowledge management implementation. (6) - knowledge transfer and (7) - knowledge acquisition at firm level * $p < 0.05$

Company performance

The construct of company performance was tested in the same way. The initial number of dimensions was selected in accordance with expectations based on theory. For the dimension company business success the following dimensions were selected: growth and profitability. Statistical information on each firm performance dimension’s internal consistency (Cronbach alpha reliability statistics) and convergence (goodness of fit model indices) based on the overall sample is shown in Table 5. The correlations among factors are indicated in the Table 6.
The analysis indicated that the constructs of knowledge management and business performance are multidimensional. The study tried to connect both to the integrated model and have tried to connect knowledge management and firm performance dimensions in four different ways and each time it analyzed the validity indicators of the overall design. The paper will present the only model that has proved to be the best and also adopted it as the integrated model. The better fit indexes were displayed in the final model excluding the 7th factor which was incorporating 3 variables related to the

Table 2. Factors and weights of individual variables for the dimension business success.

Variable	F1	F2
Profitability of your company during the past three years in comparison to known competition	0.844	
Average profitability from total assets during the past three years	0.810	
Profitability of your company during the past three years in comparison to competitors of similar age and developmental level	0.777	
Average profitability from ownership capital during the last three years	0.761	
Average profitability from total sales during the last three years	0.740	
Average annual employee growth during the last three years		0.824
Average annual sales growth during the last three years		0.781
Market share growth during the last three years		0.768

Table 3. The knowledge management dimensions.

	Dimension	(1)	(2)	(3)	(4)	(5)	(6)	(7)	All
	Variables	12	12	11	3	6	5	3	52
	Coefficients	0.518 do 0.849	0.573 do 0.780	0.482 do 0.728	0.557 do 0.889	0.289 do 0.827	0.435 do 0.839	0.577 do 0.866	0.235 do 0.886
Fit indices	NFI	0.91	0.92	0.90	0.95	0.95	0.98	0.93	0.88
	CFI	0.94	0.95	0.93	0.96	0.98	1.00	0.94	0.95
	SRMR	0.19	0.08	0.08	0.12	0.05	0.05	0.19	0.18
	RMSEA	0.10	0.10	0.11	0.18	0.05	0.00	0.13	0.06
Consistency	Cronbach alpha	0.90	0.90	0.89	0.80	0.76	0.74	0.62	0.94
	RHO	0.93	0.91	0.90	0.78	0.77	0.77	0.64	0.97
	Internal consistency	0.93	0.91	0.91	0.85	0.84	0.83	0.78	0.96

Table 4. Correlations among factors.

Dimension	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	1	0.783*	0.761*	0.679*	0.536*	0.633*	0.007*
(2)	0.783*	1	0.767*	0.564*	0.468*	0.460*	0.073*
(3)	0.761*	0.767*	1	0.618*	0.658*	0.431*	0.178*
(4)	0.679*	0.564*	0.618*	1	0.587*	0.351*	–0.087*
(5)	0.536*	0.468*	0.658*	0.587*	1	0.320*	0.096*
(6)	0.633*	0.460*	0.431*	0.351*	0.320*	1	–0.180*
(7)	0.007*	0.073*	0.178*	–0.087*	0.096*	–0.180*	1

acquisition of knowledge at the firm level. The final integrated model is shown in Figure 2.

The structural relationships in the model of the influence of knowledge management on the firm performance were estimated using the Elliptical reweighted least square (ERLS) method in EQS 6.1 (Bentler and Wu, 2006).

EQS reported that parameter estimates appeared in order and that no special problems were encountered during the optimization. The resulting model goodness-of-fit indices indicated a moderately good model fit (NFI = 0.87; CFI = 0.95; SRMR = 0.08; and RMSEA = 0.06). The variance explained for the firm performance was 26%. An examination of the study hypotheses is presented in the following paragraphs.

Hypothesis 1: Knowledge management has a positive effect on company performance.
Hypothesis 1a: The ‘knowledge acquisition” dimension has a positive effect on company performance.
Hypothesis 1b: The ‘knowledge storage” dimension has a

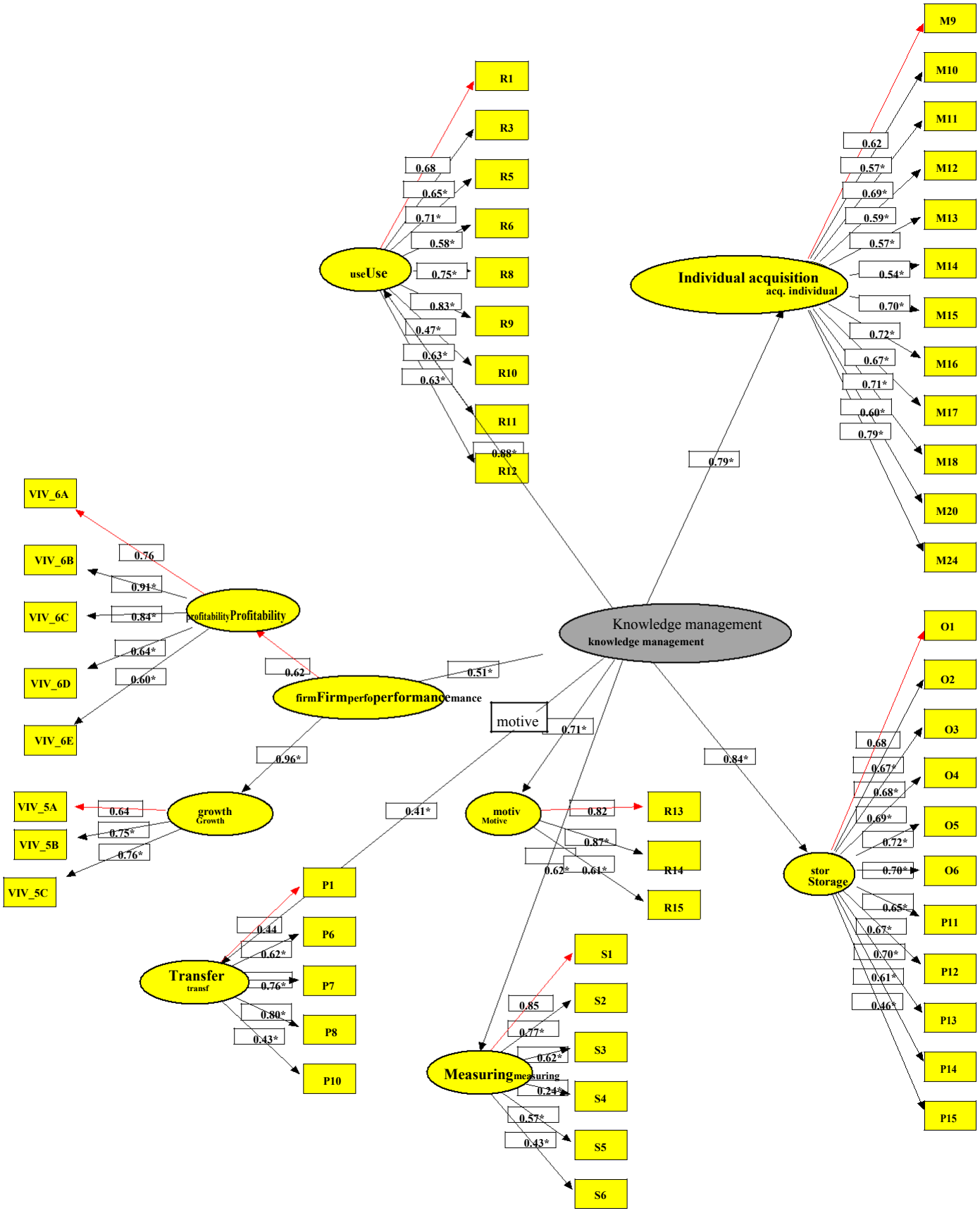

Figure 2. The Integrated modelCFI = 0.95; NFI = 0.87; SRMR = 0. 08; RMSEA=0.06; Cronbach's alpha = 0.94.

positive effect on company performance.
Hypothesis 1c: The 'knowledge transfer' dimension has a positive effect on company performance.
Hypothesis 1d: The 'use of knowledge" dimension has a positive effect on company performance.
Hypothesis 1e: The 'measuring efficiency of knowledge implementation' dimension has a positive effect on company performance.

On the whole, the study confirms that knowledge management is a multidimensional construct which has a positive impact on company performance. In accordance with the reviewed literature the study expected five dimensions that is:

(1) Knowledge acquisition. (2) Knowledge storage. (3) Knowledge transfer. (4) Use of knowledge, and (5) measuring the efficiency of knowledge implementation.

However, using the exploratory factor analysis the study has also identified two additional dimensions a total of seven dimensions therefore, which can be logically explained namely:

(1) use of knowledge. (2) knowledge acquisition at individual level. (3) knowledge storage. (4) motivation. (5) measuring the efficiency of knowledge management implementation. (6) knowledge transfer and (7) knowledge acquisition at firm level.

Using the structural equation modeling and comparing some different models including all the dimensions of knowledge management and firm performance multi-dimensional construct, the study decided to eliminate the "knowledge acquisition at firm level« dimension as the model without this dimension demonstrated best model fit. Anyway, as the proposed dimension (knowledge acquisition) was divided. It can be stated that a sub-hypothesis 1a is just partially confirmed while hypothesis 1, 1b, 1c. 1d and 1e are confirmed in its entirety.

DISCUSSION

A firm is represented by a series of different resources. If knowledge represents one of the resources, it can be agreed that knowledge management is important element for the company performance. Based on the studied literature, it was concluded that the existing theoretical and applied research activities deal with the role of knowledge management. On the other hand, they do not analyze the importance of knowledge management related variables, as well as fail to mention their influence on company performance. The results indicate that knowledge management significantly contributes to the performance of SME.

The knowledge management model that was tested in this study can be seen as relatively robust. The hypothesized relationship was supported. This paper provides that knowledge management does matter in firm growth and profitability. Use of knowledge, knowledge acquisition at individual level, knowledge storage, motivation, measuring the efficiency of knowledge management implementation and knowledge transfer are important elements for firm performance. The results of the study are in accordance with other similar studies. Knowledge, as a part of human capital is considered to be the most important factor for selecting and managing crucial resources to implement the desired strategy to achieve the performance (Baird and Mashoulam, 1988; Lichensein and Brush, 2001). Results of this study can be generalized to some extent because a variety of industries were included in the sample. Future research in diverse countries, preferably including several different countries in a comparative study, is needed to further generalize the model. Further research can be necessary to validate the survey. Slovenia cannot be considered a typical standard economy, but findings from past cross-cultural research based on comparison between Slovenia and other countries (Antoncic and Hisrich, 2001; Bucar et al., 2003; Antoncic, 2007; Antoncic et al., 2007) suggest that some generalizations based on findings on samples of Slovenian firms can be made.

Although, this study has much strength, it also has some limitations that need to be acknowledged. These are (1) the above mentioned sample: the study was limited to Slovenian companies namely Slovenian small and medium sized companies; (2) questionnaire: factors were studied on the biases of data collected with a questionnaire which used perceptual measures which are subjective in nature but capture detailed information about the concept studied; (3) duration of the research: acquired data represent situation in companies on a certain date (cross-sectional study design) which means that the study lacks longitudinal component, which could lead to a better validity and applicability of modeled relationship, and there is confident that a longitudinal study- design could even reinforce the findings of the study; (4) model: probably the study model does not include all elements of knowledge management, but it can be considered satisfactory enough, since it includes a high number of dimensions and elements. Despite the limitations this study makes important contribution and implications.

CONCLUSION AND IMPLICATIONS

The study have thus, developed a knowledge manage-ment model in SME and it was tested empirically on a sample of Slovenian small and medium-size companies and therefore, proved its multidimensional character. The model unites knowledge management dimensions with performance ratios. For the purpose of the model design the study have developed a model of the factors which

Table 5. The firm performance dimensions.

	Dimensions	(1)	(2)	All
	Variables	5	3	8
	Coefficients	0.690 – 0.934	0.732 – 0.770	0.709 – 0.928
Fit indices	NFI	0.81	0.98	0.87
	CFI	0.71	0.98	0.89
	SRMR	0.45	0.12	0.30
	RMSEA	0.27	0.10	0.15
Consistency	Cronbach alpha	0.87	0.76	0.86
	RHO	0.93	0.80	0.93
	Internal consistency	0.94	0.80	0.80

(1) – Profitability. (2) – Growth

Table 6. Correlations among factors.

Factor	F1	F2
F1	1	0.692*
F2	0.692*	1

constitute and measure knowledge management as well as company performance. By using the final model in the research it was proved that almost 26% of the variability in company performance can be accounted for with the knowledge management.

Generalizability of findings in this study is not limited only to SME, but is also relevant for large organizations. The study made a key contribution by developing a model of knowledge management. Finally, knowledge management can be particularly critical for the firm's survival and development in Slovenia and other economies that are being changed after more developed countries and where firms have significantly lower level of performance in comparison to firms in the most developed countries.

This study made a contribution by developing a model of the knowledge management and has important implications for researchers and practitioners. An important issue for researchers is the selection of an appropriate conceptual and measurement model. By modeling knowledge management by using multiple dimensions, first, a more complete and accurate approximation of the actual knowledge management structure can be achieved and empirically tested. Second, the assessment of the relationship between knowledge management and business performance can be characterized by a higher level of accuracy and predictability and thirdly, from the measurement point of view, the relationships between the model elements are better accounted for in a structural equation model than in separate regression models.

In firm practice, dimensions of the knowledge management (use of knowledge, knowledge acquisition at individual level, knowledge storage, motivation, measuring the efficiency of knowledge management implementation and knowledge transfer) can have beneficial effects on the firm's performance. Firms with the efficiently implemented knowledge management are more likely to have higher growth and profitability than organizations which are lacking such characteristics.

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