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THE IMPACT OF KNOWLEDGE MANAGEMENT ON ORGANISATIONAL PERFORMANCE

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ABSTRACT: *Knowledge management is a process that transforms individual knowledge into organisational knowledge. The aim of this paper is to show that through creating, accumulating, organising and utilising knowledge, organisations can enhance organisational performance. The impact of knowledge management practices on performance was empirically tested through structural equation modelling. The sample included 329 companies both in Slovenia and Croatia with more than 50 employees. The results show that knowledge management practices measured through. information technology, organisation and knowledge positively affect organisational performance.*

Keywords: *knowledge management maturity, information technology, organisational performance, structural equation modelling, survey research.*

1. INTRODUCTION

For many companies, the time of rapid technological change is also the time of incessant struggle for maintaining a competitive advantage. It is obvious that knowledge is slowly becoming the most important factor of production, next to labour, land and capital [39]. Even though some forms of intellectual capital are transferable, internal knowledge is not easily copied. This means that the knowledge anchored in employees' minds can get lost if they decide to leave the organisation. Therefore, the key objective of management is to improve the processes of acquisition, integration and usage of knowledge, which is exactly what knowledge management (KM) is all about [21].

KM is a process that through creating, accumulating, organising and utilising knowledge helps achieve objectives and enhance organisational performance. KM also consists

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of strategy, cultural values and workflow [9]. In order to maximise its value a change in strategies, processes, organisational structures and technologies needs to be made [17, 21].

The literature review shows there is a great number of critical success factors for KM. This paper contributes to the knowledge management research field through understanding those factors, their interrelation and the role of information technology in achieving a better business performance.

One of the key benefits of introducing KM practices in organisations is its positive impact on organisational performance. The research conducted in Croatia suggests that KM positively affects organisational outcomes of company innovation, product improvement and employee improvement [19]. According to Fugate et al. [16], results collected in a logistics operations context prove the existence of a strong positive relationship between a KM process and operational and organisational performance. Still, it is not well understood how different KM strategies affect organisational performance. Choi et al. [11] show that combining the tacit-internal-oriented and explicit-external-oriented KM strategies indicates a complementary relationship, which implies synergistic effects of KM strategies on performance. The results of the study conducted by Zheng et al. [45] suggest that KM fully mediates the impact of organisational culture on organisational effectiveness, and partially mediates the impact of organisational structure and strategy on organisational effectiveness. Finally, the results of numerous researches [1, 13, 26, 27, 42] show that KM affects organisational performance in a positive manner, but this relationship is very difficult to prove.

Researchers often imply this positive effect of knowledge management on organisational performance. However, the researches that empirically prove the existing link are very rare. The aim of this paper is to present a different knowledge management maturity model and to explain and test the hypothesis about impact of knowledge management practices on organisational performance. The model was empirically tested through structural equation modelling on a sample of 329 Slovenian and Croatian companies with 50 or more employees.

The paper is divided into five main parts. First, the theoretical background on components and elements of KM and organisational performance is presented. Second, the hypotheses and the conceptual model are shown. Third, the research methodology is described. Fourth, data analysis results are presented. Finally, implications and directions for future research are outlined.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The methodology of measuring knowledge management maturity is complex. By combining a set of critical success factors with a set of measurable knowledge management

factors, an intersection was made to define a new set of measurable key elements of KM. Those elements were united into three categories [36]: (1) information technology (the ability of technology to capture knowledge and usage of information systems), (2) organisation (people, organisational climate and processes) and (3) knowledge (knowledge accumulation, utilisation, sharing practices and knowledge ownership identification).

The understanding of these knowledge management factors, acts as a basis in determining the type of knowledge management strategies and initiatives for an organisation. The review of literature used to develop the questionnaire is stated below:

1. INFORMATION TECHNOLOGY

The value that knowledge management adds, lies in increasing individual, team and organisational efficiency through the use of knowledge management tools (information technology).

- **Capturing knowledge:** the higher the level of capturing knowledge (explicit or tacit) with information technology tools, the better the KM result [24, 11, 25];
- **Usage of IT tools:** the higher the quality of tools, quality of information, user satisfaction, usage and accessibility, the greater the KM effect on organisational performance [2, 5, 39, 24, 29, 23, 40].

2. ORGANISATION

Organizational culture has a great contribution to knowledge management due to the fact that culture determines the basic beliefs, values, and norms regarding the why and how of knowledge generation, sharing, and utilization in an organisation. An organization can achieve a competitive edge by creating and using knowledge about its' processes and by integrating its' knowledge into business processes.

- **People & Organisational climate:** the KM success relies heavily upon the trust, creativity, team work and collaboration among employees [24, 29, 37, 23];
- **Processes:** the integration of the KM activities into organisational processes has a positive effect on KM results [29, 23].

3. KNOWLEDGE

Successful knowledge management applies a set of approaches to organisational knowledge—including its accumulation, utilisation, sharing and ownership.

- **Accumulation**: the higher the effectiveness of knowledge accumulation (internal, external; through internalisation or externalisation) in an organisation, the greater the KM effect [11, 2, 24, 25];
- **Utilisation**: the higher the effectiveness of utilising the (existing) knowledge in an organisation, the better the KM result [23];
- **Sharing:** the improvement of sharing of knowledge (formal or informal) effects the KM positively [25, 23];

- **Ownership:** the better the accessibility of knowledge, the greater the KM success [2, 24].

The items used in the questionnaire are further explained and discussed in Sections 2.1-2.3.

2.1. Information Technology

According to literature and the analysis of critical success factors of KM, information technology (IT) is one of three components of KM [29, 39].

Some authors [29] say that the most dominant KM paradigms are about IT. Results of research [38] show that 70 % of papers on KM stress the importance of IT systems, developed to manage explicit knowledge. Even authors, whose main field of KM research is not about the importance of IT, state that information technology is crucial for successful knowledge management [2, 5, 20, 30, 40].

Based on research [36], two elements form the IT component of KM: the first element is the ability of IT to capture knowledge and the second element is usage of IT tools.

First, the importance of IT systems designed to capture and store tacit or explicit knowledge will be stressed. Formalising knowledge and storing it into applications [23, 25, 34] allows us to start the knowledge transformation cycle and the process of reshaping tacit knowledge into explicit knowledge [32, 33]. Secondly, the usage and quality of IT tools, the quality of information, user satisfaction, rate of usage, efficiency and accessibility, are also very important for managing knowledge [23, 34, 39].

When it comes to judging the influence of those two elements on the KM construct, it is believed that the level of capturing both explicit and tacit knowledge with IT tools affects KM in a positive manner [25]. It is the same with the usage of IT tools. The higher the quality of tools, quality of information, user satisfaction, usage and accessibility, the greater the positive influence on KM [2, 5, 40].

However, the compelling need for KM in organisations is fuelled by a host of social economic and technological factors and only when used in tandem with an appropriate KM strategy, IT is a powerful enabler of organisational success [12].

2.2. Organisation

Organisational elements are considered to be the second component of KM [36] as organisation itself is important for establishing any form of new activities and processes for managing knowledge. Organisation is a multi-dimensional construct that is defined differently throughout literature. For the purpose of this research the construct was defined as a set of several key indicators, focused strictly on organisational climate ele-

ments (such as motivation and collaboration) and on organisational processes. People and the organisational climate, as the first element of organisation, include values, trust, motivation, creativity, teamwork, collaboration, role of employees and managers in decision-making, development of innovative culture, and other important factors [4, 5, 8, 30, 41]. On the other hand, organisational processes, as the second element, with their execution, re-engineering and integration, are also found to be important for successful KM [23, 34].

Organisation, as a combination of those two elements, also affects KM practices in a positive manner. For the first element, people and organisational climate, it is believed that the better and higher the trust, creativity, teamwork and collaboration among employees, the greater the positive influence on KM. Also, the more the KM activities are integrated into processes, the greater the positive influence on KM [23, 37].

2.3. Knowledge

The third key component of KM is knowledge [36]. Defined as a component of four elements it consists of knowledge accumulation, utilisation and knowledge sharing practices, and knowledge ownership identification [2, 20].

Knowledge accumulation can be internal or external, occasional or intended. Knowledge can be accumulated through externalisation or internalisation. The term knowledge utilisation covers individual and group knowledge, learning from experience or innovative solutions. Knowledge sharing can also be both formal and informal. The ownership of knowledge, as the last element of this construct, can be used to describe knowledge as an individual or group identity and to point at specialist or general sources of knowledge in a given organisation.

The research again shows that all four elements have a positive impact on overall knowledge management practices. It is believed for knowledge accumulation that the higher the effectiveness of knowledge accumulation (internal, external, through internalisation or externalisation) in an organisation, the greater the positive impact on KM [2, 25]. Secondly, the higher the effectiveness of utilising knowledge in organisations, the greater the positive impact on KM [23]. Thirdly, the study shows that the higher the effectiveness of sharing of formal or informal knowledge, the greater the positive impact on KM [23]. Lastly, the better the accessibility of knowledge and the practices of defining ownership of knowledge in an organisation, the greater the positive impact on overall KM practices [2].

2.4. Elements of Organisational Performance

When assessing the relationship between knowledge management and organisational performance, it is important to know that the results depend on the used research meth-

odology [40]. Organisational performance alone could be gauged in many different ways, with financial or non-financial indicators.

There are several approaches to organisational performance measurement which include different stakeholders' perspectives. The Balanced Scorecard (BSC) is a performance management tool for measuring whether small-scale operational activities of a company are aligned with its large-scale objectives in terms of vision and strategy [10] and includes four perspectives: financial, customer, internal process and innovation and learning perspective.

The financial perspective examines if company's implementation and execution of its strategy contributes to bottom-line improvement [37]. Some of the commonly used financial measures are economic value added, revenue growth, costs, profit margins, cash flow, net operating income etc. The customer perspective defines the value proposition that an organisation will apply to satisfy customers and generate more sales to the most desired customer groups [10, 37]. The measures should cover both the value that is delivered to the customer which may involve time, quality, performance and service, and the outcomes that arise as a result of this value proposition, such as customer satisfaction and market share. The internal process perspective focuses on all the activities and key processes required in order for the company to excel at providing the value expected by the customers [37]. The clusters for the internal process perspective are operations management (by improving asset utilisation, supply chain management), customer management (by expanding and deepening relations), innovation (by new products and services) and regulatory & social (by establishing good relations with external stakeholders). The innovation and learning perspective focuses on the intangible assets of an organisation, mainly on the internal skills and capabilities that are required to support the value-creating internal processes [37].

In addition to these four perspectives, some researchers [43] include the supplier perspective, which is also important in assessing non-financial performance.

3. RESEARCH HYPOTHESES AND MODEL CONCEPTUALISATION

According to literature and our experience from business practice, we believe that strong relations between organisational elements, information technology and knowledge management can be established. Besides, our intention is to investigate and prove the existence of a positive impact of knowledge management on organisational performance. Therefore the findings from literature and our assumptions are systemised and structured in a form of hypotheses and examined by the empirical research.

Research shows that the better the collaboration and trust among employees, the better the processes of creating knowledge [24] and the better the organisational climate, the better the transfer of knowledge [41]. Moreover, organisational climate directly

affects knowledge management practices [30]. Therefore, we propose the following hypotheses:

H1. Organisational elements (such as culture, climate and collaboration) have a positive impact on elements of knowledge in the context of knowledge management.

The connection between IT and elements of knowledge was also researched in the past and the results show that the better the use of IT tools, the better the knowledge creating processes [24]. Not only that, extensive use of IT tools has a positive relationship with the performance of knowledge transfer and the creation of knowledge assets [41]. Furthermore, technological infrastructure directly affects the knowledge management practices [30]. The survey conducted by Kruger and Johnson [22] shows that information and communication technology and information management are prerequisites to, and enablers of KM.

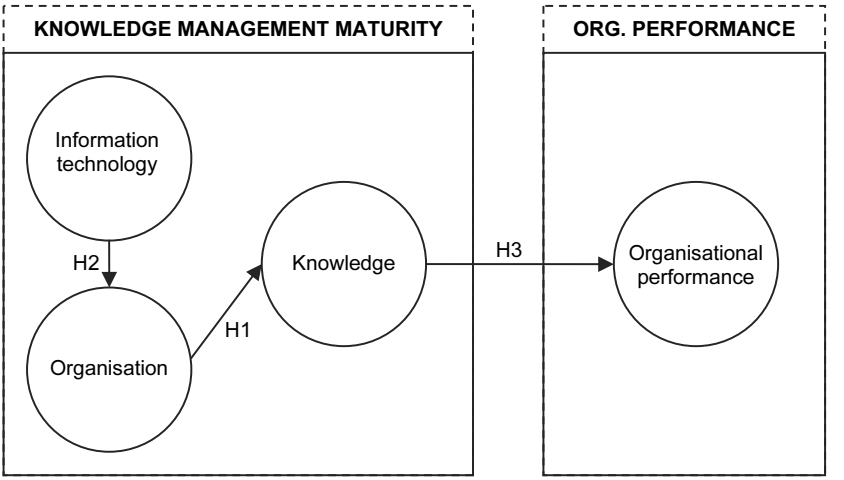
Some researchers cannot find proof of direct impact of IT elements on knowledge. On the other hand, others empirically prove that IT affects organisational elements such as organisational learning and organisational culture [42]. According to Benbya et al. [7] it has become largely agreed that KM activities should be integrated within business processes to ensure continual process improvement and facilitate learning and gradual development of "organisational memory". The results of the research conducted by Chen and Huang [9] show that organisational climate works its beneficial effects on KM through increasing trust and communication between employees. Besides, organisational structure can improve social interaction, and in turn, results in a higher degree of knowledge sharing and application. Consequently, it can be concluded that social interaction plays a mediating role in the relationship between organisational structure and KM. Aligned with the results of literature review, the following research hypothesis is proposed:

H2. There is a positive indirect effect of IT application on knowledge management adoption through organisational elements.

Many authors assessed the influence of KM elements on organisational performance whilst some say that the impact is hard to measure [1]. Some authors [26, 27] suggest that elements of knowledge positively affect organisational performance, while others [13, 15, 42] try to gauge the relationship indirectly, through other measurable indicators such as type of organisational strategy and elements of organisational learning etc. Therefore, we propose the following hypothesis:

H3. Knowledge management has a positive impact on organisational performance.
The conceptual model is presented in Figure 1.

Figure 1: *Conceptual model*



4. RESEARCH METHODOLOGY

4.1. Research Instrument

With the aim of testing the hypotheses formulated above, an empirical research was carried out. The questionnaire (Appendix 1) was based on previous findings reported in literature that is reviewed in section 2. It included 23 questions on knowledge management and 16 questions on organisational performance. Questions about knowledge management are divided into 3 parts – knowledge, information technology and organisation. For example, questions about knowledge are based on [2, 23, 25] and other literature described in section 2.3. A seven-point Likert scale was used in order to specify the respondents' level of agreement to statements.

4.2. Data Collection and Sample Characteristics

The research was conducted among companies with more than 50 employees in Slovenia and Croatia. In Slovenia, the sample included 1339 companies and the response rate was 9.6 %. In Croatia, 200 responses were received from the 1750 questionnaires distributed with an 11.4 % response rate [35].

Slovenian respondents were mainly from the manufacturing industries (39 %), wholesale and retail trade (10 %), other service activities (7 %), construction (7 %) and agriculture, forestry and fishing (5 %). Other activities were represented in less than 5 %. In Croatia, the responses were mainly sent from the manufacturing industry (29 %), construction (13 %), wholesale and retail trade (8 %), accommodation and food service

activities (6 %) and other service activities (6 %). Other activities were represented in 5 % or less [35].

Since a single source of data was used, we tested the data for the Common Method Bias [44] by Harman's single factor test. The test showed that CMB does not exist, because in exploratory factor analysis based on the unrotated solution a single factor did not explain the majority of the variance. It explained only 40% of variance.

4.3. Model Construction

Four constructs were formed in the research: First, information technology (IT), which determines the usage, quality and benefits of IT tools for knowledge management. Second, organisation (OR) that represents a human perspective of organisation and processes. Third, knowledge (KN) that covers accumulation, utilisation, sharing practices, and knowledge ownership identification. Fourth, organisational performance (OP) is defined as a construct composed of financial and non-financial indicators.

The first construct is of exogenous nature, while the last three constructs are endogenous latent variables. Latent variables in the model are measured by manifest variables.

5. DATA ANALYSIS AND RESULTS

The Structural Equation Modelling (SEM) was used to empirically verify the hypotheses. SEM is a statistical technique for testing and estimating causal relationships using a combination of statistical data and qualitative causal assumptions [6]. It has the ability to model constructs as latent variables and allows the researcher to accurately estimate the structural relationships between latent variables [3, 14]. Moreover, the specialised SEM programming tool LISREL 8.51 was used for the analysis.

5.1. Validity of Defined Constructs

The exploratory factor analysis using SPSS 16.0 was conducted to verify the construct validity of the measurement model. The principal axis factoring extraction method with a Varimax rotation was used to determine whether the questionnaire items represent the defined model correctly. The results of factor analysis for the KM construct are presented in Table 1. Only factor loadings higher than 0.50 are presented.

Table 1: *Rotated factor matrix for the knowledge management part of model*

	FACTOR			
	1	2	3	4
KM1				.554
KM2	.581			
KM3	.680			
KM4	.606			
KM5				
KM6	.709			
KM7				.515
KM8	.547			
KM9		.682		
KM10		.673		
KM11		.536		
KM12		.808		
KM13		.854		
KM14		.695		
KM15	.595			
KM16			.556	
KM17	.580		.581	
KM18			.756	
KM19			.678	
KM20			.609	
KM21			.525	.616
KM22			.551	.583
KM23			.586	

Factors 1 and 4 are combined to represent the elements of knowledge (knACCUM, knUTILIS, knSHARE, knOWNER), both formal and informal aspects of accumulating, utilising, sharing knowledge and defining its ownership. Factor 2 represents the elements of information technology (itUSAGE, itQUALITY, itBENEFIT), while Factor 3 stands for elements of organisation (orCOLLAB, orMOTIV, orPROCESS). Several indicators were excluded from further research (KM5, KM17, KM21 and KM22) as they did not meet the required standards, having factor loadings lower than 0.5 or multiplied over several factors, which makes them difficult to identify. Based on the factor analysis, we formed a new indicator, knCOLLAB, to represent the ways of collaboration between employees with an objective to spread knowledge across the organisation.

Factor loadings higher than 0.50 for the organisational performance construct (OP) are presented in Table 2.

Table 2: *Rotated factor matrix for the organisational performance part of model*

	FACTOR		
	1	2	3
OP1		.886	
OP2		.891	
OP3		.804	
OP4	.525		.501
OP5			
OP6	.590		
OP7			.563
OP8			.587
OP9			.707
OP10			.613
OP11	.583		
OP12	.605		
OP13	.695		
OP14	.613		
OP15	.777		
OP16	.584		

Factors 1 and 3 were combined to represent the non-financial indicators of organisational performance (opSUPPLY, opLEARN, opPROCESS) and form the supplier, process and learning perspective. The indicators for customer perspective of BSC (OP4 and OP5) did not meet the required criteria, having factor loadings lower than 0.5 or multiplied over several factors. Factor 2 represents the financial view of organisational performance (opFINANCE), measuring profit growth, return on assets (ROA) and employee value added. Based on the factor analysis and isolation of item OP6, we formed a new indicator, opREPUT, to represent the view of organisational reputation.

To conclude, the first construct (IT) was measured by the following three variables:
- Usage of IT tools and systems for knowledge management (itUSAGE).
- Quality of IT tools and systems for knowledge management (itQUALITY).
- Detected benefits of IT tools and systems for knowledge management (itBENEFIT).

For measuring the second construct, OR, the following variables were used:
- Collaboration among people in the organisation (orCOLLAB).
- Motivation of people in the organisation (orMOTIV).
- The process view of the organisation (orPROCESS).

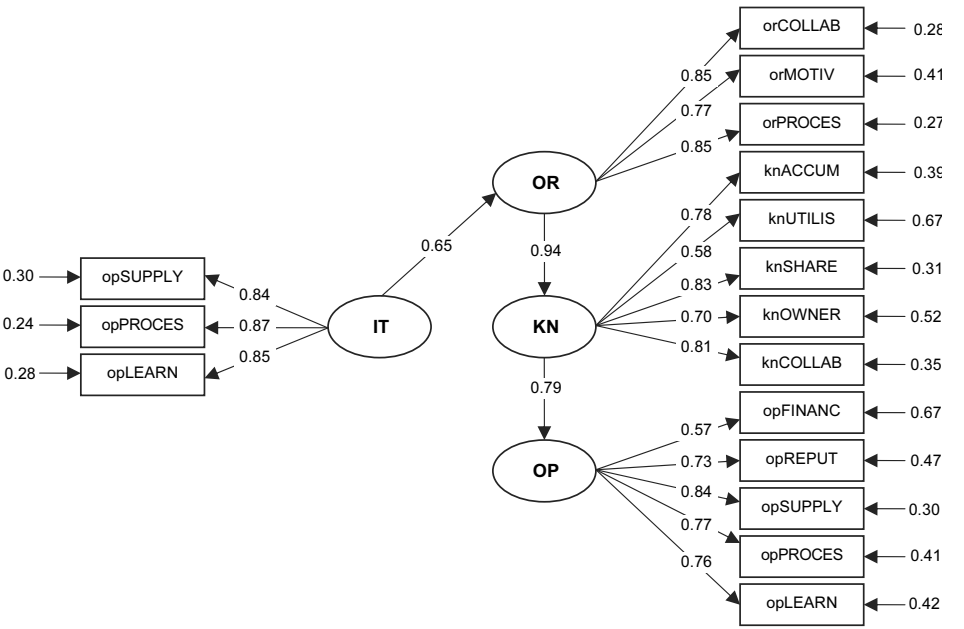
To test the third latent variable, knowledge (KN), these measures were applied:
- Knowledge accumulation (knACCUM).
- Knowledge utilisation (knUTILIS).
- Knowledge sharing practices (knSHARE).
- Knowledge ownership identification (knOWNER).
- Collaboration aspect of people and spreading knowledge (knCOLLAB).

The fourth construct is measured from a financial and non-financial perspective with:
- Financial perspective (opFINANCE).
- Supplier perspective (opSUPPLY).
- Innovation and learning perspective (opLEARN).
- Customer perspective (opCUSTOM).
- Internal processes perspective (opPROCESS).
- Reputation (opREPUT).

5.2. Confirmatory Analysis using Structural Equation Modelling

Model fit signifies the level of consistency of hypothesised model and the data [1, 14]. It is gauged in three steps: (1) overall fit assessment (2) assessment of measurement model and (3) assessment of structural model. The path diagram of the model is presented in Figure 2.

Figure 2: *Path diagram of the conceptualised model*



5.3. Overall Fit Assessment

The aim of assessing the overall model fit is to determine the consistency level of a model as a whole with available empirical data [14]. The most commonly used fit indices are shown in Table 3.

Table 3: *Fit indices*

Fit indices	Reference value	Model value	Overall Model fit
χ^2 per degree of freedom (χ^2/df)	χ^2/df < 5.00	χ^2/df = 2.03	Yes
Root Mean Square Error of Approximation (RMSEA)	RMSEA ≤ 0.100	RMSEA = 0.074	Yes
Non-Normed Fit Index (NNFI)	NNFI closer to 1	NNFI = 0.93	Yes
Comparative Fit Index (CFI)	CFI closer to 1	CFI = 0.94	Yes
Standardised Root Mean Square Residual (S RMR)	S RMR < 0.05	S RMR = 0.052	Acceptable
Goodness of Fit Index (GFI)	GFI closer to 1	GFI = 0.88	Acceptable
Adjusted Goodness of Fit Index (AGFI)	AGFI ≥ 0.90	AGFI = 0.84	No
Parsimony Goodness of Fit Index (PGFI)	PGFI ≥ 0.50	PGFI = 0.65	Yes

The χ^2 test shows whether the data perfectly fits the conceptual model and is therefore not considered to be the best measure for assessing model fit. Root mean square error of approximation (RMSEA) is considered to be one of the most informative fit indices [14]. The values below 0.05 indicate a good fit, the values between 0.05 and 0.08 a mediocre fit [18], while the values between 0.08 and 0.10 represent a poor fit. Nonetheless, researchers mostly use the χ^2 per degree of freedom (χ^2/df) index, the comparative fit index (CFI) and the non-normed or Tucker-Lewis fit index (NNFI) to assess the model fit [20]. The χ^2 per degree of freedom index indicates a reasonable fit when it is lower than 5.00 [28], however ratios between 1.00 and 2.00 are recommended [18]. CFI and NNFI indices should be close to 1.00 to represent a good fit [1, 14].

The Root mean square Residual index (RMR) is based on the residual matrix and is used to compare the fit of two different models with the same data. Values of the standardised RMR index lower 0.05 represent a good model fit [14].

The absolute fit value for the Goodness of fit index (GFI) is not computed; however values closer to 1.00 represent a better model fit [18]. Diamantopulos [14] states that 0.90 is considered to be an appropriate value that represents an acceptable model fit. The same stands for the adjusted goodness of fit index.

The Parsimony Goodness of fit index (PGFI) adjusts the GFI index to complexity of the given model and degrees of freedom. Values above 0.50 represent a good model fit [31]. In our case, the model indices imply that the model has a good overall fit.

5.3.1. Assess ment of Measurement Model

The second step of model fit assessment is to analyse the relationships between latent and manifest variables. The aim of such analysis is to determine the validity and reliability of the used construct measures.

The next step is to assess the measurement model with the focus being on the relationship between latent variables and manifest variables. The aim is to determine the validity

and reliability of the measures used to represent the construct of interest. Validity signifies the extent to which an indicator measures what it is supposed to measure, while the reliability shows the consistency of measurement or the rate to which the measure could be subjected to measurement error [14]. The relationship between manifest variables and latent variables should be significantly different from zero (t-values should exceed 1.96 in absolute terms). As seen in Table 4, all t-values are larger than 1.96. Therefore, the construct validity is assured.

Table 4: *Completely standardised loading estimates and t-values*

Latent variable	Manifest variable	Completely standardised factor loading	t-value
		LAMBDA-Y	
	itUSAGE	0.84	13.65
IT	itQUALIT	0.87	14.49
	itBENEFI	0.85	13.86
		LAMBDA-X	
	orCOLLAB	0.85	- a
OR	orMOTIV	0.77	12.40
	orPROCES	0,85	14.52
	knACCUM	0.78	- a
	knUTILIS	0.58	8.02
KN	knSHARE	0.83	12.34
	knOWNER	0.70	9.97
	knCOLLAB	0.81	11.95
	opFINANC	0.57	- a
	opREPUT	0.73	7.46
OP	opSUPPLY	0.84	8.05
	opPROCES	0.77	7.69
	opLEARN	0.76	7.65

[a] Indicates a fixed parameter

Secondly, the reliability of the model which refers to the measurement consistency needs to be determined. It is determined by assessing the reliability of individual indicators and composite reliability. The former is measured by squared multiple correlations (R^2), which show the share of variance in an indicator that is explained by its latent variable [14]. The least reliable indicators in the model are knUTILIS and opFINANC, while the other indicators range from 0.48 to 0.76, as presented in Table 5.

Table 5: *R^2 values for indicators*

Indicator	R^2 value
itUSAGE	0.70
itQUALIT	0.76
itBENEFI	0.72
orCOLLAB	0.72
orMOTIV	0.59
orPROCES	0.73
knACCUM	0.61
knUTILIS	0.33
knSHARE	0.69
knOWNER	0.48
knCOLLAB	0.65
opFINANC	0.33
opREPUT	0.53
opSUPPLY	0.70
opPROCES	0.59
opLEARN	0.58

In addition to reliability of individual indicators, composite reliability value (ρ_c) is calculated for each latent variable, where values should exceed 0.6 [6]. In the proposed model, all indicators as a set provide a reliable measurement for each construct, as their values are higher than proposed ($\rho_{c(IT)}$=0.88, $\rho_{c(OR)}$=0.87, $\rho_{c(KN)}$=0.86 and $\rho_{c(OP)}$=0.86).

5.3.2. Assessment of Structural Model

The structural model fit assessment is carried out to evaluate whether the data support the hypothesised relationships in the conceptualisation model [14]. Evaluation includes the following assessment: (1) Do signs of parameters indicate the same direction as hypothesised (2) What is the statistical significance and magnitude of estimated parameters and (3) What are the squared multiple correlation factors (R^2) for structural equations. In our model the signs of all relationships (IT-OR, OR-KN and KN-OP) are consistent with hypothesised relationships between latent variables. Moreover, all parameters are statistically significant with t-values 8.44, 11.69 and 6.97, respectively, and are moderate to high (0.65, 0.94 and 0.79). Lastly, R^2 values indicate that independent latent variable IT explains 42 % of variance in endogenous latent variable OR, 89 % of variance of KN and 62 % of variance of OP.

Considering all three aspects of model fit assessment, the confirmatory analysis has verified all three hypotheses.

6. DISCUSSION

6.1. Findings and Implications

Our intention was to investigate and prove the existence of a positive impact of knowledge management on organisational performance. Although researchers often imply this positive effect of knowledge management on organisational performance, the researches that empirically prove the existing link are very rare. For this research, a new survey was developed and tested, and it proves to be a successful and justified new measure of knowledge management constructs in any organisation.

A direct result of this research is also a newly defined knowledge management maturity model that consists of three empirically tested constructs. The new conceptual model consists of information technology, organisational elements and knowledge, each defined and explained throughout chapter 2. This model not only proves that the chosen constructs are a good measure for defining knowledge management maturity, but also evolves into a measurable scale that puts organisations on a 0 - 4 level chart.

There are rare researches that cover all aspects of knowledge management maturity assessment. This research (1) defines their own knowledge management maturity model (2) statistically proves the fit of the chosen constructs (3) develops a survey as a measure of knowledge management maturity (4) applies the measure on a set of companies in two countries and (5) assesses and empirically proves the theoretically implied effect of knowledge management maturity, as a construct of those three factors, on organisational performance.

The results of this research also have several implications. First, the feedback from business practice supported the theoretical framework and hypotheses proposed in Chapter 2. The most important finding is that knowledge management components positively affect organisational performance. In order to have a positive effect on organisational performance, those three components need to be developed, managed and integrated into organisational processes and practice.

Second, this empirical research proved that KM heavily relies on technology. However, business practice shows that many organisations have experienced difficulties in effectively using KM technologies. In order to have a positive impact on elements of knowledge, information technology needs to be introduced through a set of organisational changes. In practice it means that introducing information technology is successful and has a positive impact on knowledge management practices only if it is backed up by changes in people, organisational climate and organisational processes. Organisational change helps an organisation to optimise processes and define process oriented structure; in that case KM can be adopted correctly within the organisation. Effective KM cannot be implemented without a significant behavioural and cultural change. There should be a strong culture, trust and transparency in all areas of the organisation. Besides, the cultural elements, which distinguish organisations from each other, are found

to be related to KM efficiency. It was also discovered that knowledge management practices have a positive impact on organisational performance.

Third, although many researchers have proposed different frameworks for assessing KM maturity, this survey was conducted to identify and to understand three components that play a role in a successful adoption of KM: information technology, organisation and knowledge. The results clearly show that the selected constructs present a good measure for the knowledge management construct.

Moreover, the questionnaire constructed and used in this research could become a standard for measuring knowledge management maturity. Organisations could use the results of the survey as a benchmark.

6.2. Limitations and Further Research

The major limitation of this study is associated with the scope of empirical research, which is limited on two small countries, one of them being an EU member (Slovenia), while the other (Croatia) is not. The research is constrained by the sample size despite the fact it was carried out in two countries. The sample involved 3089 companies. Nonetheless, with the response rate being just slightly over 10 %, it included only 329 respondents in both countries. Furthermore, a bigger sample size would allow the model to be cross-validated. Further research could involve more countries in order to get more comparable results.

Further research is also possible. First of all the survey could be repeated to compare the results and to check the improvement. Besides that the same investigation could be performed in other countries to compare the results and to check how KM maturity is developing.

7. CONCLUSIONS

We conclude that this paper presents three main components important for knowledge management, namely: (1) information technology, (2) organisational elements and (3) knowledge. Connections between those components are presented through main hypotheses and the conceptual model is validated through the empirical research. The results of this research confirmed all three given hypotheses.

Empirical data show that organisational elements (such as culture, climate and collaboration) have a positive impact on elements of knowledge in the context of knowledge management (H1). Through an organisational change we affect the degree of knowledge sharing and application and consequently improve the practices of KM.

The positive indirect effect of IT application on knowledge management adoption through organisational elements was also confirmed (H2). Therefore, the study high-

lights some of the issues raised by IT implementation to improve KM. The codification of knowledge in information systems, databases and knowledge repositories does not guarantee efficient KM, but has a potential to influence it in a positive way. It is important to notice that IT does not have a direct influence on knowledge, but an indirect one through organisational elements as an enabler of a better collaboration among people in the organisation, motivation of people in the organisation and the process view of the organisation.

The results of the empirical investigation also confirmed a positive effect of knowledge management practices on organisational performance (H3). These findings can be used to improve the knowledge management practice of each organisation and each knowledge entity. Possible applications include business process restructuring initiatives, human capital development, knowledge mapping, the introduction of more team, cross-functional working, increased emphasis on collaboration, the introduction of more formal channels for knowledge sharing.

Finally, we argue that the KM conceptual model presented in this paper is a useful starting point to gain a deeper insight into KM elements and their influence to the organisational performance. Despite the claims for a relation between KM and organisational performance, few researchers have actually proved the existence, as well as the nature of this link. In this paper, a positive influence of KM on organisational performance is examined and proved. This conclusion can be applied as a starting point for managers who are to implement KM through their organisation.

REFERENCES

Ahn, J. H. & Chang, S. G. (2004). Assessing the contribution of knowledge to business performance: the KP3 methodology. *Decision Support Systems*, 36 (4), 403–416.

AlMashari, M., Zairi, M. &AlAthari, A. (2002). An empirical study of the impact of knowledge management on organizational performance. *Journal of Computer Information Systems*, 42 (5), 74–82.

An introduction to LISREL 8.80 for Windows. Online article, 11 October 2008: http://www.ssicentral.com/lisrel/techdocs/Session1.pdf

Anantatmula, V. & Kanungo, S. (2006). Structuring the underlying relations among the knowledge management outcomes. *Journal of Knowledge Management*, 10 (4), 25–42.

Artail, H. A. (2006). Application of KM measures to the impact of a specialized groupware system on corporate productivity and operations. *Information & Management*, 43 (4), 551–564.

Bagozzi, R. P. & Yi, Y. (1988). On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science*, 16 (1), 74–94.

Benbya, H., Passiante, G. & Belbaly, N.A. (2004). Corporate portal: a tool for knowledge management synchronization. *International Journal of Information Management*, 24, 201-220.

Carmeli & Tishler, A. (2004). The Relationships between Intangible Organizational Elements and Organizational Performance. *Strategic Management Journal*, 25, 1257–1278.

Chen, C. & Huang, J. (2007). How organizational climate and structure affect knowledge management – The social interaction perspective. *International Journal of Information Management*, 27, 104-118.

Chen, M., Huang, M. & Cheng, Y. (2009). Measuring knowledge management performance using a competitive perspective: An empirical study. *Expert Systems with Applications*, (36), 8449–8459.

Choi, B., Poon, S.K. & Davis, J.G. (2008). Effects of knowledge management strategy on organizational performance: A complementary theory-based approach. *Omega – the International Journal of Management Science*, (36), 235-251.

Chua, A. (2004). Knowledge management system architecture: a bridge between KM consultants and technologists. *International Journal of Information Management*, 24, 87-98.

Čater, T. & Čater, B. (2009). Tangible Resources as Antecedents of a Company's Competitive Advantage and Performance. *Journal for East European Management Studies*, 14 (2), 186–209.

Diamantopoulos A. & Siguaw, J. A. (2000). *Introducing LISREL: A Guide for the Uninitiated*. London, Thousand Oaks (CA), New Delhi: SAGE Publications.

Dimovski, V. et al. (2008). Comparative analysis of the organisational learning process in Slovenia, Croatia and Malaysia. *Expert Systems with Applications*, 34 (4), 3063-3070.

Fugate, B.S., Stank, T.P. & Mentzer, J.T. (2009). Linking improved knowledge management to operational and organizational performance. *Journal of Operations Management*, (27), 247-264.

Greiner, M.E., Böhmann, T. & Krcmar, H. (2007). A strategy for knowledge management. *Journal of Knowledge Management*, Vol. 11, No. 6, 3-15.

Hair, J. F. et al. (1998). *Multivariate data analysis* (5th rev. ed.). Upper Saddle River, N. J.: Prentice Hall.

Kiessling, T.S. et al. (2009). Exploring knowledge management to organizational performance outcomes in a transitional economy. *Journal of World Business*, (44), 421-433.

Koufteros, X. A. (1999). Testing a model of pull production: a paradigm for manufacturing research using structural equation modelling. *Journal of Operations Management*, 17 (4), 467-488.

Kovačič, A., Bosilj Vukšić, V. & Lončar, A. (2006). A Process-Based Approach to Knowledge Management. *Economic Research*, 19 (2), 53–66.

Kruger, C.J.N. & Johnson, R.D. (2009). Information management as an enabler of knowledge management maturity: A South African perspective. *International Journal of Information Management*, doi: 10.1016/j.ijinfomgt.2009.06.007, Article in press.

Kulkarni, U. & St Louis. R. (2003). *Organizational Self Assessment of Knowledge Management Maturity*. Proceedings of the 9th Americas Conference on Information Systems 2542-2551.

Lee, H. & Choi, B. (2003). Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination. *JMIS: Journal of Management Information Systems*, 20 (1), 179–228.

Lee, K. C., Lee, S. & Kang, I. W. (2005). KMPI: measuring knowledge management performance. *Information & Management*, 42 (3), 469–482.

Lee, K. J. & Yu, K. (2004). Corporate culture and organizational performance. *Journal of Managerial Psychology*, 19 (4), 340–359.

Lin, Z. (2000). Organizational restructuring and the impact of knowledge transfer. *The Journal of Mathematical Sociology*, 24 (2), 129–149.

Marsh, H. W. & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups. *Psychological bulletin*, 97 (3), 562–582.

Martin, V. A. et al. (2005). Cultivating knowledge sharing through the relationship management maturity model. *The Learning Organization*, 12 (4), 340–354.

S. Moffett, S., McAdam, R. & Parkinson, S. (2003). An empirical analysis of knowledge management applications. *Journal of Knowledge Management*, 7 (3), 6–26.

Mulaik, S. A. et al. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin*, 105, 430–445.

Nonaka, I. & Takeuchi, H. (1995). The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. New York, Oxford (UK): Oxford University Press.

Nonaka, I. & Takeuchi, H. (1996). A theory of organisational knowledge creation. *IJTM Special Publication on Unlearning and Learning*, 11 (7/8), 833–845.

Pérez, L. S. et al. (2004). Managing knowledge: the link between culture and organizational learning. *Journal of Knowledge Management*, 8 (6), 93–104.

Rašula, J. (2009). *Vloga informacijske tehnologije in drugih dejavnikov zrelosti v modelu zrelosti managementa znanja*. Doctoral dissertation. Ljubljana: University of Ljubljana, Faculty of Economics.

Rašula, J., Bosilj Vukšić, V. & Indihar Štemberger, M. (2008). The Integrated Knowledge Management Maturity Model. *Zagreb International Review of Economics & Business*, 9 (2), 47-62.

Robinson, H. S. et al. (2006). STEPS: a knowledge management maturity roadmap for corporate sustainability. *Business Process Management Journal*, 12 (6), 793–808.

Scarborough, H., Swan, J. A. & Preston, J. (1998). *Knowledge Management and the Learning Organization. Report for the Institute of Personnel Development*, London: Institute of Personnel and Development.

Sher, P. J. & Lee, V. C. (2004). Information technology as a facilitator for enhancing dynamic capabilities through knowledge management. *Information & Management*, 41 (8), 933–945.

Sherif, K., Hoffman, J. & Thomas, B. (2006). Can technology build organizational social capital? The case of a global IT consulting firm. *Information & Management*, 43, 795–804.

Syed-Ikhsan, S. O. S. & Rowland, F. (2004). Knowledge management in a public organization: a study on the relationship between organizational elements and the performance of knowledge transfer. *Journal of Knowledge Management*, 8 (2), 95–111.

Škerlavaj, M. et al. (2006). Organizational learning culture – the missing link between business process change and organizational performance. *International Journal of Production Economics*, 346-367.

Škrinjar, R., Bosilj Vukšić, V. & Indihar Štemberger, M. (2008). The impact of business process orientation on financial and non-financial performance. *Business Process Management Journal*, 14 (5), 738–754.

Williams, L. J., & Anderson, S. E. (1994). An alternative approach to method effects by using latent-variable models: Applications in organizational behavior research. *Journal of Applied Psychology*, 79, 323-331.

Zheng, W., Yang, B. & McLean, G.N. (2009). Linking organizational culture, structure, strategy, and organizational effectiveness. *Mediating role of knowledge management*, article in press.

APPENDIX 1: QUESTIONNAIRE

KNOWLEDGE MANAGEMENT

Please assess to what extent the following statements related to knowledge management apply to your organisation
Indicate the degree of agreement or disagreement that fits the situation in your organisation. Please circle one choice for each of the following statements (1 = completely disagree ... 7 = completely agree; X = do not know / can not answer).

A. Knowledge

1	Our employees obtain a good extent of new knowledge from external sources (e.g. through seminars, conferences, educational courses, subscription journals, expert networks).	1 2 3 4 5 6 7 X
2	Our employees obtain a good extent of new knowledge from business partners (e.g. suppliers, clients).	1 2 3 4 5 6 7 X
3	Our employees exchange knowledge with their co-workers.	1 2 3 4 5 6 7 X
4	In their work, our employees rely on experience, skills and knowledge.	1 2 3 4 5 6 7 X
5	In their work, our employees rely on written sources (e.g. previously implemented projects documentation, organisational procedures, instructions and other documented sources).	1 2 3 4 5 6 7 X
6	Our employees share their knowledge orally at meetings or informal gatherings (e.g. during lunch, in the hallway).	1 2 3 4 5 6 7 X
7	Our employees share their knowledge through formal procedures (e.g. project reports, organisational procedures and instructions, reports and company publications).	1 2 3 4 5 6 7 X
8	Employees in our organisation consider their knowledge as an organisational asset and not their own source of strength.	1 2 3 4 5 6 7 X

B. Information technology

1	In our organisation, IT tools are used to store data on implemented projects, tasks and activities.	1 2 3 4 5 6 7 X
2	In our organisation, IT tools are used to store information on suppliers and customers.	1 2 3 4 5 6 7 X
3	In our organisation, IT tools are used to support collaborative work (e.g. calendars, video conferencing systems, communication tools).	1 2 3 4 5 6 7 X
4	IT tools in our organisation are simple to use and have a user friendly interface.	1 2 3 4 5 6 7 X
5	IT tools in our organisation enable effective work.	1 2 3 4 5 6 7 X
6	In our organisation we see the advantage of using IT tools in the fact that it prevents the loss of knowledge.	1 2 3 4 5 6 7 X

C. Organisation

1	In our organisation, there is a general inclination to cooperation and exchange of experience among employees.	1 2 3 4 5 6 7 X
2	The general management/leadership of our organisation promotes cooperation and exchange of experience among employees.	1 2 3 4 5 6 7 X
3	Our employees generally trust each other; in their work they can easily rely on knowledge and skills of their co-workers.	1 2 3 4 5 6 7 X
4	In our organisation good work is rewarded accordingly.	1 2 3 4 5 6 7 X
5	In our organisation innovative practices are rewarded accordingly.	1 2 3 4 5 6 7 X
6	When that is required, our employees are prepared to take additional efforts and work.	1 2 3 4 5 6 7 X
7	The general management/leadership motivates employees to engage in formal education systems to achieve a higher lever of education.	1 2 3 4 5 6 7 X
8	The general management/leadership motivates employees to engage in informal education systems (e.g. seminars, courses).	1 2 3 4 5 6 7 X
9	In our organisation we support the exchange of data, information and knowledge among organisational units.	1 2 3 4 5 6 7 X