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## **EMPIRICAL VERIFICATION OF THE MODEL OF THE KNOWLEDGE ORIENTATION OF A COMPANY**

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**Abstract:** The paper aims at empirical verification of the conceptual model of the knowledge orientation of a company. The model illustrates the relations among managers' knowledge orientation, the company's knowledge orientation and the economic performance of a company. The model is empirically verified using the structural equation modelling. The results obtained prove that the model needs modifications. Nevertheless, in our research it is proved that the managers' knowledge orientation influences significantly and positively the knowledge orientation of a company and the latter is one of the determinants of the economic performance of a company.

**Key words:** knowledge orientation of a company, structural equation modelling.

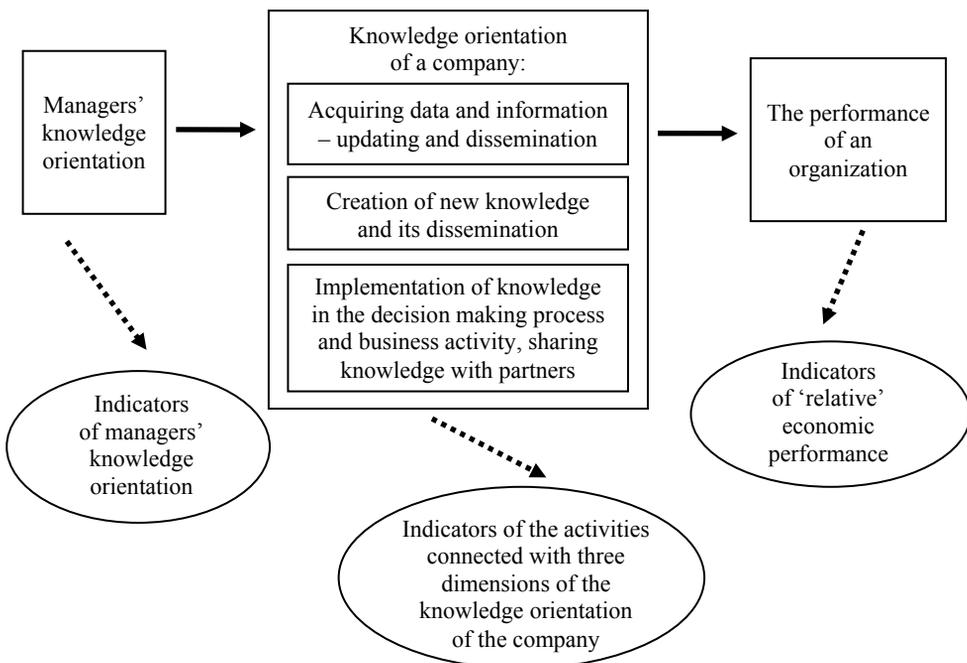
### **1. Introduction**

In the era of a knowledge-based economy, managers realize that in order to benefit from knowledge it is necessary to manage it properly [Kisielnicki 2003; Snyman, Kruger 2004]. Unfortunately there is neither a commonly accepted definition of knowledge management nor commonly accepted knowledge management measures [Nonaka, Takeuchi 2000, pp. 81–82; Conley, Zheng 2009]. Nevertheless there have been many attempts aimed at elaborating them. M.Y. Chen and A.P. Chen [2006] reviewed 108 articles published in English during the decade of 1995–2004 describing various methods of knowledge management measurement. They grouped them into eight categories: (1) qualitative analysis, (2) quantitative analysis, (3) financial indicator analysis, (4) nonfinancial indicator analysis, (5) internal performance analysis, (6) external performance analysis, (7) project-oriented analysis and (8) organization-oriented analysis. They also reviewed the changes in approaches employed to measure knowledge management and suggested that it had *tended towards expert orientation, while knowledge management is a problem-orientated domain* [Chen, Chen 2006, p. 34].

This paper presents another point of view in the discussion of the problem of measuring knowledge in a company and its influence on its performance. The idea of

the measurement presented is based on a concept of the organization’s orientation [Narver, Slater 1990]. The concept of a company’s orientation was used to describe the domain of market orientation by presenting activities and behaviours reflecting the marketing business philosophy [Kohli, Jaworski 1990; Kohli, Jaworski, Kumar 1993]. To describe and measure market orientation, a market orientation scale was developed (MARKOR scale). It is widely used by academics and practitioners and enables to determine the level of the organization’s market orientation and to compare it with the performance measures [Matsuno, Mentzer, Rentz 2000].

This paper aims at empirical verification of the conceptual model of the knowledge orientation of a company [Mazur, Rószkiewicz, Strzyżewska 2005]. This model (Figure 1) assumes the existence of relations among managers’ knowledge orientation, company’s knowledge orientation and organization performance [Kohli, Jaworski 1990; Kohli, Jaworski, Kumar 1993; Darroch, McNaughton 2003; Chen, Chen 2006]. Therefore, the model consists of three main elements: managers’ knowledge orientation, company’s knowledge orientation and economic performance. On the one hand, it is expected that knowledge orientation of a company results from the attitudes to knowledge creation of its managers. On the other hand, the knowledge orientation of a company is expected to support the creation of competitive advantage of a company and thus positively influences its business performance.



**Figure 1.** The conceptual model of the knowledge orientation of a company

Source: [Mazur, Rószkiewicz, Strzyżewska 2005].

In consequence the knowledge orientation of a company is described by three groups of activities incorporated in the knowledge modification process:

- acquiring data and information, their updating and disseminating,
- creation of new knowledge and its dissemination,
- implementation of knowledge in the decision making process and business activity; then sharing it with partners.

Empirical verification of the conceptual model of the knowledge orientation of a company is based on answers to three main questions:

1. How to describe the processes necessary to make the company knowledge oriented in all its dimensions?
2. How to assess to what extent the company and its managers are knowledge oriented?
3. How to verify if there is a connection between the company's knowledge orientation and its economic performance?

## 2. Data

All the computations are based on data from the randomly chosen sample of 852 companies of 50–250 employees. The sample was drawn from the National Official Business Register (REGON). It was proportional and stratified by voivodship and by area of activity (PKD). Since the key element of the whole process of making a company knowledge oriented are the managers, the tailored questionnaire with statements<sup>1</sup> designed to measure all dimensions of knowledge orientation of a company was distributed among them. Although some efforts had been made to determine the opinion of managers on the subject, to the best of our knowledge, no direct approach to measuring the aforementioned relationships had been taken yet.

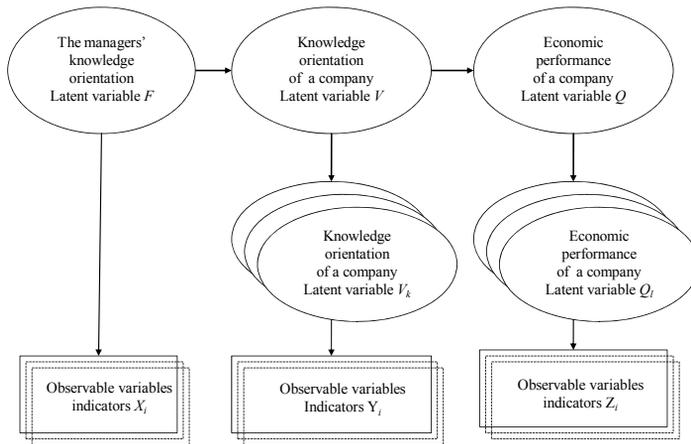
## 3. The operational model of the knowledge orientation of a company

As it is assumed in the conceptual model, the company's knowledge orientation is described by the three groups of activities incorporated in the knowledge modification process: (1) acquiring data and information, its updating and dissemination; (2) creation of new knowledge and its dissemination; (3) implementation of knowledge in the decision making process and business activity, as well as sharing knowledge with partners.

We assume that all constructs in the model of a knowledge orientation of a company are latent constructs, thus they can be measured only via proxies (indicators). In consequence, the verification of the model is based on the construction of six latent variables: index of managers' knowledge orientation ( $F$ ), index of the knowledge orientation of a company ( $V$ ) consisting of three subindices: acquiring,

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<sup>1</sup> All statements are 5-point-Likert-type statements.



**Figure 2.** The operational model of the knowledge orientation of a company

Source: own elaboration.

updating and dissemination of data ( $V_1$ ), creation of a new knowledge and its dissemination ( $V_2$ ) and knowledge implementation ( $V_3$ ) and index of economic performance ( $Q$ ). Therefore there are six latent variables and three distinctive groups of observable variables. Variable  $F$  is the exogenous one and variables  $V_k$  ( $k = 1, 2, 3$ )  $V$  and  $Q$  are endogenous ones. In addition  $V_k$  are the first order factors, whereas  $V$  is the second order factor.  $F$  is measured via indicators of the managers' knowledge orientation  $X_p$ ,  $V_k$  is measured via indicators of partial orientations,  $Y_j$  and  $Z_p$  are descriptors of the economic performance of the company e.g.  $Q$ . The relations among the variables defined in the conceptual model of the knowledge orientation of a company are presented in Figure 2.

### 4. Method

The characters of variables as well as the relations among them lead to the conclusion that the model can be analyzed as the structural equation model defined as:

$$X = A_x F + \delta, \tag{1}$$

$$Y = A_y V_k + \varepsilon, \tag{2}$$

$$V_k = \Delta V + v, \tag{3}$$

$$Z = A_z Q_l + \tau, \tag{4}$$

$$Q_l = \Delta_l Q + \omega, \tag{5}$$

$$V = \Gamma F + \zeta, \tag{6}$$

$$Q = B V + \psi, \tag{7}$$

where matrices  $A$  and  $\Delta$  include factor loadings describing the relations among observable and latent variables, and among first and second order factors respectively; matrices  $F$  and  $B$  contain coefficients describing the relations between latent variables;  $v$ ,  $\varepsilon$ ,  $\delta$ ,  $\psi$ ,  $\zeta$ ,  $\omega$  are the error terms;  $E(\delta) = \mathbf{0}$ ,  $E(\varepsilon) = \mathbf{0}$ ,  $E(v) = \mathbf{0}$ ,  $E(\tau) = \mathbf{0}$ ,  $E(\omega) = \mathbf{0}$ ,  $E(\zeta) = \mathbf{0}$ ,  $E(\psi) = \mathbf{0}$ ; error terms are correlated neither with each other nor with latent variables.

All latent variables ( $F$ ,  $V_1$ ,  $V_2$ ,  $V_3$ ,  $Q$ ) are measured by 5-point-Likert-type statements. Namely:

a) Managers' knowledge orientation ( $F$ ) – by 17 statements.

b) The company knowledge orientation in the field of:

$V_1$  – acquiring data and information, its updating and disseminating – by 14 statements,

$V_2$  – creating new knowledge by a company and disseminating it inside it – by 15 statements,

$V_3$  – implementation of knowledge in the decision making process and business activity, sharing knowledge with partners – by 16 statements.

c) The “relative” economic performance of the company:<sup>2</sup>

$Q_1$  – relative market position – by 4 statements,

$Q_2$  – assessment of the improvement in the economic performance – by 4 statements,

$Q_3$  – plan fulfilment – by 4 statements.

Before the main analysis the adequacy of the statements from the questionnaire is verified. This is done by checking the consistency of the subscales using the Cronbach's alpha coefficient (min. 0.6) and by examination of the correlations among statements (communality in exploratory factor analysis min. 0.4). This results in the exclusion of 7 out of 17 statements designed to measure the managers' knowledge orientation and 21 out of 62 statements designed to measure knowledge orientation of a company. In consequence 51 indicators are used to operationalise all of the orientations separately and an additional 12 indicators – to measure economic performance and 63 indicators – to empirically verify the whole model of the knowledge orientation of a company. Since the descriptors are not normally distributed all models are estimated using Generalized Least Squares (GLS).

The strategy employed is as follows:

1. The models are built separately for each dimension of knowledge orientation of a company in order to achieve the maximum possible model fit – the method employed is CFA; the necessary modification of the measurement models are made.

2. The attempt to aggregate the “partial solutions” into one model of knowledge orientation of a company is undertaken – the method employed is SEM; the necessary modification of the structural model is made.

3. The relations among constructs defined in the conceptual model of knowledge orientation of a company are examined.

<sup>2</sup> As managers responding to these questions had to compare an economic performance of their companies with main opponents we called the measured construct ‘relative’ economic performance  $Q$ .

## 5. Results

Both the conceptual and the operational models of the knowledge orientation of a company consist of: (1) model of the knowledge orientation of managers ( $F$ ), (2) model of the knowledge orientation of the company ( $V$ ), (3) model of “relative” economic performance ( $Q$ ).

The strategy employed to operationalisation of the model of the knowledge orientation of a company (described above) leads to the following results and conclusions (the final form of the model is presented in Figure 3, the estimates obtained are in Table 1):

1. The fit indices proves that the model is of moderately good quality ( $GFI = 0.911$ ,  $AGFI = 0.900$ ,  $RMSEA = 0.034$ ,  $\chi^2/df = 1.984$ ) and the sign of factor loadings is in each case as expected.

2. Since in the finally estimated model only two dimensions of the knowledge orientation of a company have significant factor loadings, it can be assumed that for the companies participating in research, the creation of new knowledge and its dissemination inside the company ( $V_2$ ) is not a significant element of the knowledge orientation of a company.

3. The knowledge orientation of a company is generated (determined) more by knowledge implementation ( $V_3$ ) – standardized factor loading of 1.00 – than by acquiring, updating and dissemination of data ( $V_1$ ) – standardized factor loading of 0.88.

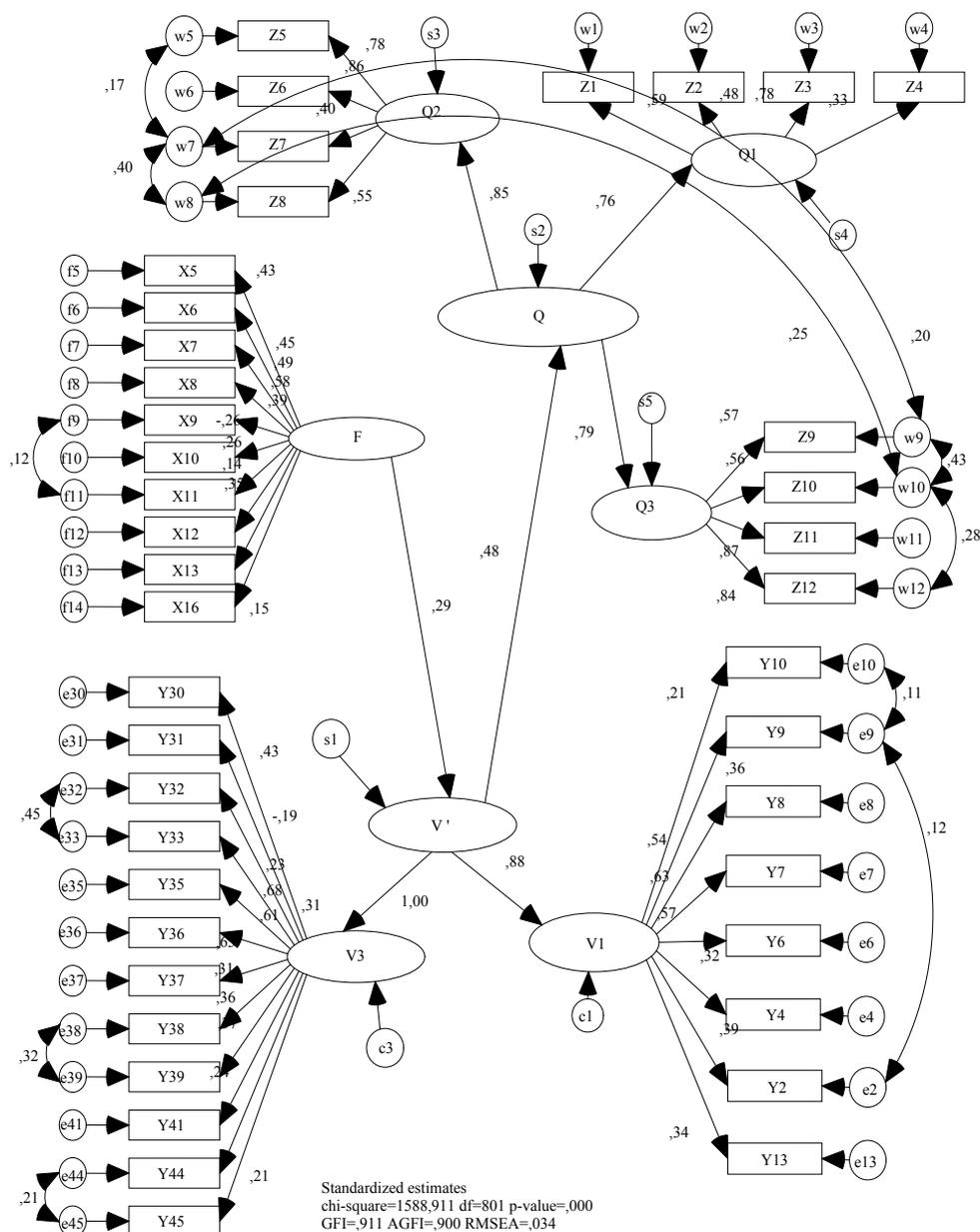
4. The knowledge orientation of managers influences positively and significantly the knowledge orientation of the company.

5. The more the company is knowledge oriented, the better its “relative” economic performance is.

However, in order to obtain such a model fit and such results it is necessary to (1) exclude insignificant indicators and (2) impose some correlations between residuals.<sup>3</sup> In each case not only does this result from the analysis of modification indices but also from the inspection of, inter alia, content and meaning of statements, their wording and location in the questionnaire. In the final model we include only these correlations between residuals that, according to us, are strongly justified.<sup>4</sup>

<sup>3</sup> Imposing the correlation between two residuals results from the assumption that measurement errors, that are connected to indicators to which the residuals are “linked”, are correlated. The origin of the measurement errors is not random.

<sup>4</sup> For example, concerning the correlation between residuals  $e32$  and  $e33$ , it results from the similar wording of corresponding statements (both of them begin with the same eight words and differ with only the two last words) and their adjacent location in the questionnaire. The correlation between residuals  $e44$  and  $e45$  is justified by the same content and meaning of the statements corresponding to them and their adjacent location in the questionnaire. Regarding to the submodel of the “relative” economic performance of a company, the correlations between respective residuals result from very similar content of corresponding statements (i.e.  $Z5$  and  $Z7$  – refer to financial performance,  $Z7$  and  $Z8$



**Figure 3.** The estimated model of the knowledge orientation of a company (final solution)

Source: own calculations using AMOS.

– refer to the comparison of the economic performance in the year 2005 and 2004, Z9 and Z10 – refer to plan fulfilment in the area of financial results and sale, Z10 and Z12 – refer to sale, Z8 and Z10 – refer to sale too, and Z7 and Z9 – refer to financial performance).

**Table 1.** Results of estimation of factor loadings in the model of the knowledge orientation of a company: unstandardized (UsRW) and standardized regression weights (SRW), standard errors of estimation (S.E.) and p-value

Variable	Latent variable		UsRW	SRW	S.E.	p-value
1	2		3	4	5	6
$V^r$	←	$F$	0.93	0.29	0.38	0.015
$Q$	←	$V^r$	1.09	0.48	0.24	< 0.001
$V_1$	←	$V^r$	0.83	0.88	0.22	< 0.001
$V_3$	←	$V^r$	1.00	1.00	–	–
$Q_1$	←	$Q$	0.78	0.76	0.09	< 0.001
$Q_2$	←	$Q$	1.00	0.85	–	–
$Q_3$	←	$Q$	0.86	0.79	0.09	< 0.001
$Y_{10}$	←	$V_1$	1.00	0.21	–	–
$Y_9$	←	$V_1$	1.26	0.36	0.27	< 0.001
$Y_8$	←	$V_1$	2.39	0.54	0.49	< 0.001
$Y_7$	←	$V_1$	2.23	0.63	0.46	< 0.001
$Y_6$	←	$V_1$	1.82	0.57	0.38	< 0.001
$Y_4$	←	$V_1$	1.72	0.32	0.39	< 0.001
$Y_2$	←	$V_1$	1.82	0.39	0.29	< 0.001
$Y_{13}$	←	$V_1$	1.31	0.34	0.30	< 0.001
$Y_{33}$	←	$V_3$	1.00	0.23	–	–
$Y_{32}$	←	$V_3$	1.32	0.31	0.22	< 0.001
$Y_{31}$	←	$V_3$	–0.87	–0.19	0.24	< 0.001
$Y_{30}$	←	$V_3$	2.22	0.43	0.44	< 0.001
$Y_{35}$	←	$V_3$	2.85	0.68	0.54	< 0.001
$Y_{36}$	←	$V_3$	2.55	0.61	0.48	< 0.001
$Y_{37}$	←	$V_3$	2.69	0.65	0.50	< 0.001
$Y_{38}$	←	$V_3$	1.41	0.31	0.31	< 0.001
$Y_{39}$	←	$V_3$	1.64	0.36	0.35	< 0.001
$Y_{41}$	←	$V_3$	0.97	0.37	0.20	< 0.001
$Y_{44}$	←	$V_3$	0.81	0.24	0.21	< 0.001
$Y_{45}$	←	$V_3$	0.62	0.21	0.17	< 0.001
$X_{16}$	←	$F$	1.00	0.15	–	–
$X_{13}$	←	$F$	2.97	0.35	1.00	0.003
$X_{12}$	←	$F$	1.35	0.14	0.60	0.024
$X_{11}$	←	$F$	3.22	0.26	1.22	0.008
$X_{10}$	←	$F$	–3.41	–0.26	1.24	0.006
$X_9$	←	$F$	4.55	0.39	1.53	0.003
$X_8$	←	$F$	4.49	0.58	1.46	0.002
$X_7$	←	$F$	3.37	0.49	1.08	0.002
$X_6$	←	$F$	2.81	0.45	0.91	0.002
$X_5$	←	$F$	2.72	0.43	0.89	0.002

Table 1, cont.

1	2	3	4	5	6	7
$Z_1$	←	$Q_1$	1.00	0.59	–	–
$Z_2$	←	$Q_1$	0.88	0.48	0.09	< 0.001
$Z_3$	←	$Q_1$	1.34	0.78	0.11	< 0.001
$Z_4$	←	$Q_1$	0.66	0.33	0.10	< 0.001
$Z_5$	←	$Q_2$	1.26	0.78	0.09	< 0.001
$Z_6$	←	$Q_2$	1.46	0.86	0.10	< 0.001
$Z_7$	←	$Q_2$	0.76	0.40	0.07	< 0.001
$Z_8$	←	$Q_2$	1.00	0.55	–	–
$Z_9$	←	$Q_3$	1.00	0.57	–	–
$Z_{10}$	←	$Q_3$	1.06	0.56	0.07	< 0.001
$Z_{11}$	←	$Q_3$	1.53	0.87	0.10	< 0.001
$Z_{12}$	←	$Q_3$	1.47	0.84	0.11	< 0.001
Model fit	RMSEA		GFI	AGFI	$\chi^2/df$	
	0.034		0.91	0.90	1.98	

Source: own calculations.

## 6. Conclusions

The empirical confirmation of the theoretical model of the knowledge orientation of a company worked out by J. Mazur, M. Rószkiewicz, and M. Strzyżewska [2005] can be perceived as only moderately successful. Although all theoretical constructs are successfully operationalised and measured separately when they are integrated into one model, they do not work as expected. Therefore, it is necessary to modify the conceptual model. The modification includes, inter alia, the exclusion of insignificant indicators and indicators with an unexpected sign of factor loading.

The final model obtained appears to be of an acceptable fit, therefore its results are interpreted. Concerning the results of constructs quantification, the major finding is that the concept of creation of new knowledge and its dissemination inside a company appears to be not significant for the companies participating in the research. Although the sample of companies chosen to the research is random, we stress that these findings should be extrapolated to the whole population of medium-sized companies very carefully. In our opinion it needs further verification. Additionally, it turns out that the knowledge orientation of a company is generated more by knowledge implementation than by acquiring, updating and dissemination of data. Finally, it turns out that for the companies participating in the research the relative economic performance is the most strongly reflected in the assessment of economic performance improvement ( $Q_2$ ), then by plan fulfilment ( $Q_3$ ) and then by relative market position ( $Q_1$ ).

Concerning the relations among the constructs present in the model of the knowledge orientation of a company, the estimated model enables us to examine all of them. Firstly, it is proved that it is manager's knowledge orientation that influences

significantly and positively the knowledge orientation of a company. Secondly, the knowledge orientation of a company is one of the determinants of its economic performance.

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## MODEL ORIENTACJI NA WIEDZĘ PRZEDSIĘBIORSTWA – EMPIRYCZNA WERYFIKACJA

**Streszczenie:** Celem artykułu jest przedstawienie rezultatów weryfikacji koncepcji orientacji na wiedzę przedsiębiorstwa. Koncepcja ta opisuje występowanie dwóch kategorii – postawy wobec wiedzy oraz orientacji na wiedzę przedsiębiorstwa, rozumianej jako właściwość prowadzonej działalności ekonomicznej. Ukazuje również, jakie związki zachodzą między nimi oraz jaki jest wpływ tych kategorii na wyniki ekonomiczne przedsiębiorstwa. Prezentowany model teoretyczny został zweryfikowany w formule modelowania strukturalnego. Uzyskane wyniki, choć wskazujące na konieczność modyfikacji modelu teoretycznego, świadczą o istnieniu pozytywnego związku między orientacją na wiedzę kadry zarządczej i orientacją na wiedzę przedsiębiorstwa oraz na to, że orientacja na wiedzę przedsiębiorstwa pozostaje w pozytywnym związku z wynikami ekonomicznymi przedsiębiorstwa.

**Słowa kluczowe:** orientacja na wiedzę przedsiębiorstwa, modelowanie równań strukturalnych.