VERSLAS: TEORIJA IR PRAKTIKA / BUSINESS: THEORY AND PRACTICE
ISSN 1648-0627 / eISSN 1822-4202
*http://www.btp.vgtu.lt*
2016 17(3): 216–224
doi:10.3846/btp.2016.643

# MODEL OF MARKET ORIENTATION OF HIGH-TECH FIRMS IN GERMANY: VALIDATION STUDY

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*Received 28 April 2015; accepted 04 March 2016*

**Abstract.** The aim of this validation study was to verify a four-factor model of market orientation on a sample of German high-tech companies in the manufacturing industry. A modified version of the measuring scale (MMOS), composed of twelve items, was used for measurement. The target group consisted of business and marketing managers (N = 374) who recorded their answers on a seven-point Likert scale. The main methods used to achieve the objectives were exploratory and confirmatory factor analyses. Having verified the psychometric properties of the instrument, I proceeded to confirm the hypothesis of a four-factor solution model. Reliability and validity of the measuring instrument was also examined, which allowed a confirmation of the second hypothesis. The research may serve as the evidence of the instrument suitability for measuring market orientation in European cultural conditions. To obtain results from other sectors, the author recommends further research replication using the MMOS instrument.

**Keywords:** market orientation, high-tech sector, Germany, exploratory factor analysis, confirmatory factor analysis, reliability, validity.

**JEL Classification:** M31, M10.

## Introduction

Measuring market orientation of businesses has been a popular research topic in marketing worldwide. In the last three decades, several measurement tools of market orientation have been created, however they differed in their properties. Frequent criticism of the previous models has been a common reason for designing a new model. Some models either showed weak compliance of the model with data, others failed in the area of content validity and in some cases psychometric data as such were unavailable. This study verified a MMOS instrument originally created in the Czech Republic and focusing mainly on customers and competition, which are considered the most important stakeholders in the market by a recognized marketer Kotler *et al.* (2013). This is a shortened version of the instrument, derived from the following known models by Kohli *et al.* (1993), Narver and Slater (1990) and Mohr *et al.* (2014). Kohli and Jaworski (1990) define market orientation as the process of obtaining market information, its dissemination within the company and strategy implementation in response to the information obtained. The author of this study defines market orientation as a process of customer and competitor intelligence generation, intelligence dissemination and integration and responsiveness to market intelligence. The shortened version of the instrument (MMOS) has been designed for practical reasons at the request of managers with company experience. The modified version also includes an important item "integration" of market information within company which is based on the ideas of Mohr *et al.* (2014). Also Deshpandé and Farley (1998) or Farrell and Oczkowski (1997) recommended using shorter versions for measuring market orientation. The fact that this work is another validation study of the MMOS scale on German data served as the motivation to complete this work. The scale consists of four dimensions: customer intelligence generation (CUIG), competitor intelligence



To link to this article: http://dx.doi.org/10.3846/btp.2016.643

generation (COIG), intelligence dissemination & integration (IDI) and responsiveness to market intelligence (RMI).

## 1. The concept of market orientation and its measurement

Farrell (2002) focuses on the study of market orientation after 1989. The first instrument for measuring market orientation was the MKTOR scale developed by Narver and Slater (1990) and containing three components (customer orientation, competitor orientation, interfunctional coordination) and two criteria (profit emphasis, long-range focus). The authors Kohli, Jaworski and Kumar (1993) introduced a measurement tool known as MARKOR – a one-dimensional concept with three components (intelligence generation, intelligence dissemination and responsiveness). The original 32 items in the methodology proposed by Kohli *et al.* (1993) were subsequently reduced to 20 items by Kohli *et al.* (1993) themselves. Both measurements were criticized for several reasons. Such criticism was delivered for example by Farrell and Oczkowski (1997), who pointed out the low psychometric properties of the model. Deng and Dart (1994) researched available literature in order to improve the existing measurement of market orientation and concluded that market orientation consists of the following sub-components: customer orientation, competitor orientation, inter-functional coordination and profit orientation. On this basis, they developed a scale of 44 items obtained from the available professional literature and previous studies. It was subsequently reduced, based on a pre-test, to 33 items. This scale was also criticized for numerous reasons. In the professional literature, there is a general consensus that profit orientation is a consequence, not a component of market orientation. Moreover, this instrument is primarily derived from the MKTOR scale with the addition of many other items. Consequently, the use of its 33 items is rather lengthy and would take up too much of the respondents' time. Also Pelham (1997) proposed a measurement instrument based on Narver and Slater (1990) and Kohli and Jaworski (1990). His scale contained 8 items while 9 items were adopted from Narver and Slater (1990) due to the fact that items designed by Kohli *et al.* (1993) did not show favourable psychometric properties. Gray *et al.* (1998) made it clear that the existing measurement tools are weak, which is obvious from the title of his work, "Developing a better measure of market orientation". It exploits the results of the previous studies by key authors while adding his own thoughts. The end result is a five-dimensional model of market orientation with the following components: customer orientation, competitor orientation, interfunctional coordination, responsiveness and profit emphasis. His measuring scale contains 20 items. Later, Deshpandé and Farley (1998) examined the measures of both Narver and Slater (1990) and Kohli *et al.* (1993) on 82 marketing managers. Based on their results, they suggested a scale titled MORTN with 10 items. However, Narver and Slater (1998) criticized it for being too narrow in content. Ward, Girardi and Lewandowska (2006) replicated the research of the measuring scale MKTOR by structural equation modelling (SEM) using SPSS Statistics and SPSS AMOS. In the theoretical part, they list contradictions in determining the relationship of market orientation with business performance. According to them, the more detailed measurement of Narver and Slater is more in demand as the relationship between market orientation and company performance is less clear outside the US. The authors collected a sample of 217 respondents from four countries. In the case of China, however, they only gathered 16 respondents, while having 81 Australian respondents. The firms ranged from small to giant companies with more than 10 thousand employees. Service industry companies prevailed (60%), yet the distribution between business, retail and government was relatively even. The researchers confirmed that the MKTOR scale consisted of three dimensions – customer orientation, interfunctional coordination and competitive orientation. At the same time, the authors offered a modification of Narver and Slater which consisted of 9 items claiming that it should be also useful for testing in international conditions. Gray *et al.* (1998) asked a fundamental question: What is the most precise way of measuring market orientation? In order to find out, they decided to build on Kohli *et al.* (1993), Slater and Narver (1994) and expand their measurement scales. The items in the questionnaire were created as a synthesis of market orientation measure by Deng and Dart (1994), Kohli *et al.* (1993), Narver and Slater (1990). The result was a final version with 44 items. However, due to its low reliability the originally 44-item questionnaire was reduced to 34 items – omitting intelligence generation, i.e. a component designed by Kohli *et al.* (1993). The testing took place in the New Zealand conditions in various sectors. This is in contrast to the study by Narver and Slater (1990) who researched only one sector. The authors managed to gather a sample of 490 respondents from the ranks of senior managers. An interesting fact is that 30 pairs of managers from the same company (usually the CEO and top marketing manager) answered the same questionnaire. Their answers show that the marketing managers were slightly more optimistic about the degree of market orientation than the CEOs. Therefore, the authors suggest that further research should make use of multiple respondents from the same company. The authors also came to the conclusion that the construct of market orientation in New Zealand consists of five dimensions (customer orientation, competitive orientation, interfunctional coordination, responsiveness, profit emphasis), which should ideally be measured using a five-point Likert scale with 20 items. Gray *et al.*

(1998) mention that the concepts of market orientation and marketing orientation are often confused. Another study conducted by Bhuian (1997) aimed to explore how banks in Saudi Arabia implement the concept of market orientation. Some banks successfully implement market orientation, but there are also those banks that see this concept with scepticism or even reject it. The data were collected from different branches of nine banks. The respondents were employees on the management level (the total number of analysed responses was 92). MARKOR consisting of 18 items and a five-point Likert scale was used to measure market orientation. ROE, ROA indicators and sales per employee were used to measure the performance of the selected banks. Possible explanation for the situation above is that these banks invest in government projects and their earnings are thus certain. The author also believes that decisions are made centrally, in a highly formal way and inter-departmental communication in Saudi Arabia is very bureaucratic. Such conditions are therefore not compatible with market orientation. Overall, the results show that, on average, banks in Saudi Arabia are only marginally market oriented. This author also found out that there is no relationship between market orientation and performance of the banks. One possible reason may be that if the quality of market orientation in banks of Saudi Arabia is low, market orientation may thus not be reflected in higher levels of corporate performance indicators.

## 2. Methodology and research sample

Market orientation in this study was measured using a modified measuring scale MMOS (see Appendix), which consists of four dimensions and twelve items. The group of respondents included business and marketing managers of German high-tech companies in the manufacturing industry. The selection of suitable firms and respondents was conducted in a database of companies Hoppenstedt. The actual data collection was carried out between September to December 2014 by using a CAWI method and IBM SPSS Data Collection software, version 7.0. Having eliminated incorrect or incomplete questionnaires, a total number of 374 questionnaires was analysed using a seven-point Likert scale (1 = absolutely disagree, 7 = completely agree). The data sample was then divided into two halves. The first part ($N_1 = 187$) was used for an exploratory factor analysis while the second part ($N_2 = 187$) was used for a confirmatory factor analysis. At the same time, two reliability tests were conducted. The inner consistency of the items were examined using Cronbach's alpha coefficient (α) and subsequently composite reliability (CR) was calculated. The validity of the instrument was assessed using convergent and discriminant validity. All statistical analyses and modelling were done using the statistical programmes IBM SPSS Statistics version 21 and IBM SPSS AMOS version 22.

**Hypotheses:**

$H_1$: The model of market orientation of German high-tech companies is suitable for the data used.
$H_2$: The shortened version of the measuring MMOS scale is a reliable and valid research instrument for market orientation.

## 3. Statistical results

The overall index of market orientation (MO = 5.14) is calculated as the arithmetic mean of all twelve items (see Table 1).

## 4. Factor analysis

Prior to selecting a model of factor analysis it seems appropriate to consider certain conditions. According to Hair *et al.* (2010), the correlation variable values should be at least 0.3, in order to identify common latent factors in the structure. We met this condition, see Table 2. Another prerequisite is Kaiser-Meyer-Olkin rate. The value (KMO = 0.84) can be considered a very good result. Using Bartlett's test (869, df = 66, $p < 0.001$) it was also confirmed that this is not a correlation matrix unit. The above suggests that the use of exploratory factor analysis in this case is indeed appropriate.

Using exploratory factor analysis (see Table 3), we verified the dimensionality of the market orientation model of firms ($N_1 = 187$). All 12 items of the questionnaire were taken into account. The questionnaire is also enclosed in the Appendix. A principal component analysis method with Varimax rotation was applied for the extraction of factors. The individual factor loadings of the items reached a value above 0.7, which according to Hair *et al.* (2010) is a satisfactory result. The acceptable minimum value lies at 0.5, according to the same author. An exploratory analysis confirmed a four-factor model solution of market

Table 1. Descriptive statistics (source: own elaboration)

| | CUIG1 | CUIG2 | CUIG3 | COIG1 | COIG2 | COIG3 | IDI1 | IDI2 | IDI3 | RMI1 | RMI2 | RMI3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\bar{x}$ | 5.70 | 5.93 | 5.61 | 5.05 | 4.98 | 5.45 | 4.98 | 5.31 | 4.79 | 4.85 | 4.72 | 4.35 |
| SD | 1.29 | 1.16 | 1.17 | 1.29 | 1.28 | 1.25 | 1.46 | 1.30 | 1.36 | 1.29 | 1.30 | 1.39 |

*Note:* $\bar{x}$ (arithmetic mean), SD (standard deviation).

Table 2. Correlation matrix (source: own elaboration)

| Items | CUIG1 | CUIG2 | CUIG3 | COIG1 | COIG2 | COIG3 | IDI1 | IDI2 | IDI3 | RMI1 | RMI2 | RMI3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CUIG1 | 1.00 | | | | | | | | | | | |
| CUIG2 | .582** | 1.00 | | | | | | | | | | |
| CUIG3 | .361** | .598** | 1.00 | | | | | | | | | |
| COIG1 | .174* | .322** | .367** | 1.00 | | | | | | | | |
| COIG2 | .219** | .321** | .446** | .591** | 1.00 | | | | | | | |
| COIG3 | .206** | .283** | .346** | .521** | .583** | 1.00 | | | | | | |
| IDI1 | .206** | .180* | .188** | .150* | .150* | .097 | 1.00 | | | | | |
| IDI2 | .334** | .368** | .293** | .267** | .197** | .218** | .552** | 1.00 | | | | |
| IDI3 | .289** | .304** | .236** | .228** | .215** | .270** | .562** | .704** | 1.00 | | | |
| RMI1 | .225** | .244** | .197** | .299** | .350** | .339** | .393** | .422** | .430** | 1.00 | | |
| RMI2 | .267** | .370** | .300** | .393** | .368** | .295** | .337** | .378** | .335** | .535** | 1.00 | |
| RMI3 | .168* | .272** | .264** | .332** | .383** | .313** | .282** | .284** | .357** | .517** | .449** | 1.00 |

*Note:* ** $p < 0.01$; * $p < 0.05$.

Table 3. Results of exploratory factor analysis (source: own elaboration)

| Model designation | Items | Factor loading | | | |
|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 |
| CUIG | Factor 1 – Customer Intelligence Generation | Cronbach's Alpha = 0.75 | | | |
| CUIG1 | We systematically collect and evaluate data about satisfaction or non-satisfaction of customers. | 0.797 | | | |
| CUIG2 | We have regular meetings with customers in order to learn their future expectations in time. | 0.852 | | | |
| CUIG3 | We permanently strive for a deeper understanding of the hidden needs and requirements of customers. | 0.666 | | | |
| COIG | Factor 2 – Competitor Intelligence Generation | Cronbach's Alpha = 0.80 | | | |
| COIG1 | We monitor mutually competing firms in our branch. | | 0.803 | | |
| COIG2 | We try to predict the future behaviour of competitors. | | 0.798 | | |
| COIG3 | We perform evaluation of strong and weak points of major competitors. | | 0.781 | | |
| IDI | Factor 3 – Intelligence Dissemination and Integration | Cronbach's Alpha = 0.82 | | | |
| IDI1 | We inform each other about successful and unsuccessful experience with customers across all company departments. | | | 0.783 | |
| IDI2 | In our company we hold a lot of formal and informal talks where we solve present business success, market opportunities or risks. | | | 0.826 | |
| IDI3 | Market Information are integrated in this workplace before decisions are made. | | | 0.841 | |
| RMI | Factor 4 – Responsiveness to Market Intelligence | Cronbach's Alpha = 0.74 | | | |
| RMI1 | Our reaction to the competitor's price campaign is very short. | | | | 0.754 |
| RMI2 | Principles of market segmentation control development of new products in our firm. | | | | 0.725 |
| RMI3 | We react immediately if the competition launches intensive advertising campaign aimed at our customers. | | | | 0.762 |

*Note:* The method of main components with rotation Varimax.

orientation (Customer Intelligence Generation, Competitor Intelligence Generation, Intelligence Dissemination and Responsiveness to Market Intelligence). These four identified factors explain 71% of the total variance (19.0%, 18.8%, 16.9% and 16.3%).

**5. Measure of internal consistency (Cronbach's Alpha)**

Reliability as the internal consistency of items of the measuring tool can be determined by using for example the coefficient of Cronbach's alpha. High reliability is a necessary prerequisite for high validity (Urbánek *et al.* 2011: 130). Reliability is therefore a necessary condition for validity. The identified Cronbach's alpha coefficient values for internal consistency confirmation are listed in Table 3. What value should the final alpha coefficient be, so that the method of measuring market orientation is considered reliable? According to Malhotra and Naresh (2010) Cronbach's alpha index for this type of analysis should be higher than $\alpha = 0.6$. In contrast, Kline (2000) provides the minimum value of $\alpha = 0.7$ for homogeneity of the items. Table 3 shows that this value was detected for all manifest and latent variables.

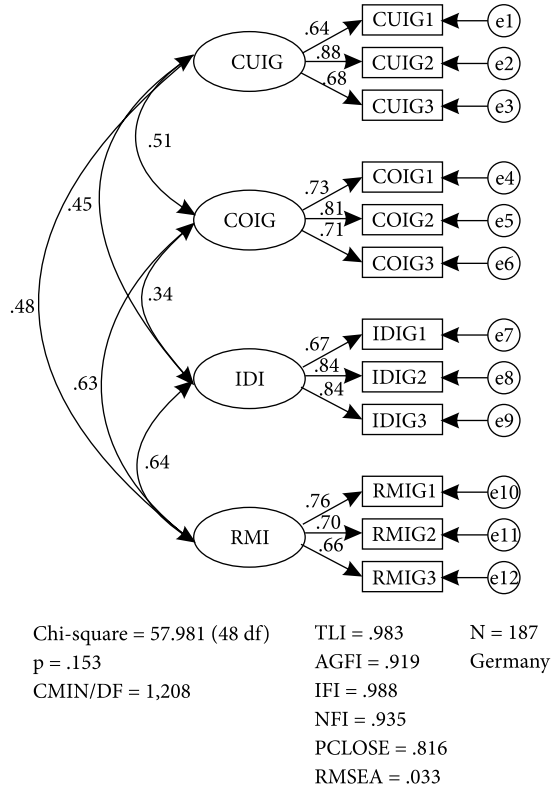
The conducted confirmatory factor analysis (See Table 4; Fig. 1) helped answer the question to what extent the proposed model of market orientation complies with the measured values. The parameters were estimated using the maximum likelihood method. First, the fit of the tested model with data was assessed ($N_2 = 187$). It is paramount here that the covariance matrix generated by the model and the empirically obtained values fit as much as possible. There are several indices to determine the quality of the model. Pearson's chi-square test is the basic and most used criterion in order to decide whether the model will be accepted or rejected. In the analysed model in Figure 1, the value of chi-square ($\chi2 = 57.981$) at 48 degrees of freedom (df) was detected. In order not to reject the model, the p-value (reached significance) is to be $p < 0.05$. The examined model of market orientation meets this criterion ($p = 0.153$). The higher the p-value, the more credible the null hypothesis.

The ratio of the chi-square test and the degrees of freedom ($\chi2$ / df = 1.208) should ideally be in the following interval (1.0; 2.0). Previously, ranges (1.0; 3.0) or even (1.0; 5.0) were tolerated, especially for large models. The highest quality model values are close to 1. The power of chi-square test for structural modelling is closely related to the size of the data sample. The chi-square value for large samples is high, while in contrast it is low for small sample sizes (Urbánek 2000), (Byrne 2010). To avoid erroneous rejection of a model, there are other indices to assess model compliance with the data and the quality of the model (see Table 4). However, there may be variations in the values recommended by different authors. Virtually all leading indices show a satisfactory agreement results for the reference model. The correlation coefficients among latent factors range from 0.34 to 0.64, indicating mild to moderate dependence among latent factors.

In addition to the assessment of the model fit indices, the statistical significance of each parameter on the basis of

Table 4. Results of confirmatory factor analysis (source: own elaboration according to Schumacker, Lomax 2010; Garson 2012)

| Metric – fit index | Value range | Threshold for a well-fitting model |
|---|---|---|
| $\chi2$/df (relative Chi-square) | 1.208 | < 2 for good model fit<br>> 3 for acceptable fit |
| p-value for the model | 0.153 | >.05 |
| CFI (comparative fit index) | 0.988 | >.95 |
| TLI (Tucker-Lewis index) | 0.983 | >.95 |
| AGFI (adjusted goodness of fit index) | 0.919 | >.80 for acceptable model fit<br>> .95 for good model fit |
| RMSEA (root mean square of approximation) | 0.033 | <.08 for acceptable model fit<br>< .05 for good model fit |
| PCLOSE (p-value for H0, H0: RMSEA ≤0.05) | 0.816 | >.05 |




*Note:* The maximum likelihood of the parameters.

Fig. 1. Graphical representation of the model of market orientation (standardized estimates) (source: own elaboration)

the sub-indices can be measured. For each estimated value of the free parameter, the value of the standard error is calculated. On the basis of these two values, the T-test values with statistical significance of individual parameters are calculated. Statistically significant parameters are those with the absolute values of t-values greater than 1.96 (Urbánek 2000: 129). Interpretation is the same as in multiple regression analysis. All relationships in this model are statistically significant (see Table 5).

## 6. Validity and reliability of a measurement instrument

Some psychometric properties of the English version of the measuring scale MMOS were been described in the analyses of the model. In order to be able to use this tool without limitations, it is necessary to verify its reliability (accuracy, reliability) and validity. Kerlinger (1972), for example, considers the factor analysis to be the most significant tool of construct validity. Hair *et al.* (2010) recommend the analysis of the relations between manifest and latent variables of the model as more appropriate for assessing construct validity. In practice, we most often encounter two types of construct validity: convergent and discriminant. Therefore, for the purposes of this study, convergent validity was determined by the relationship between the Composite Reliability (CR) and Average Variance Extracted (AVE). Interpretation (CR) is similar as in the coefficient of Cronbach's alpha, with its values shown in Table 3. Discriminant validity was determined by comparing the MSV, AVE and ASV values. Table 6 shows that all the conditions for confirming the convergent and discriminant validity were met.

Table 5. Regression coefficients and covariances (unstandardized estimates) (source: own elaboration)

| Regression Coefficients | | | Estimate | S.E. | C.R. | p |
|---|---|---|---|---|---|---|
| CUIG1 | <--- | CUIG | 1.00 | - | - | - |
| CUIG2 | <--- | CUIG | 1.25 | 0.16 | 7.97 | *** |
| CUIG3 | <--- | CUIG | 0.97 | 0.13 | 7.50 | *** |
| COIG1 | <--- | COIG | 1.00 | - | - | - |
| COIG2 | <--- | COIG | 1.10 | 0.12 | 9.18 | *** |
| COIG3 | <--- | COIG | 0.94 | 0.11 | 8.53 | *** |
| IDI1 | <--- | IDI | 1.00 | - | - | - |
| IDI2 | <--- | IDI | 1.12 | 0.12 | 9.20 | *** |
| IDI3 | <--- | IDI | 1.16 | 0.13 | 9.18 | *** |
| RMI1 | <--- | RMI | 1.00 | - | - | - |
| RMI2 | <--- | RMI | 0.94 | 0.11 | 8.36 | *** |
| RMI3 | <--- | RMI | 0.94 | 0.12 | 7.94 | *** |
| Covariances | | | Estimate | S.E. | C.R. | p |
| CUIG | <--> | COIG | 0.51 | 0.09 | 4.41 | *** |
| CUIG | <--> | IDI | 0.46 | 0.09 | 4.11 | *** |
| CUIG | <--> | RMI | 0.48 | 0.09 | 4.20 | *** |
| COIG | <--> | IDI | 0.34 | 0.09 | 3.45 | *** |
| COIG | <--> | RMI | 0.63 | 0.11 | 5.27 | *** |
| IDI | <--> | RMI | 0.64 | 0.12 | 5.24 | *** |

*Note:* S.E. = Standard Error, C.R. = Critical Ratio, *** $p < 0.001$, in missing values the factor was fixed to one.

## 7. Discussion

For the purpose of this study the measuring scale MMOS was used. The seven-point Likert scale is most often used in the quantitative empirical research. In some studies, a five-point scale was used, however, it was rejected for this study due to its bad scattering. Also, it would later be more difficult to compare the results with other international studies. The world´s most famous five-point scale is MARKOR and a seven-point scale is MKTOR. In quantitative research and while analysing many companies, the resulting index of market orientation is calculated as the arithmetic mean of the questionnaire items. When evaluating a given company, points of individual items can be added up. The higher its score, the more market-oriented the company is (Mohr *et al.* 2014). In the sample of German firms, the highest ratings from the respondents were recorded in items that are related to obtaining information about customers. On the other hand, the managers showed less self-confidence in items that are related to the response (reaction) to the obtained market information in the form of coordinated action. It follows that German high-tech companies place the greatest emphasis on obtaining information about their

Table 6. Convergent and discriminant validity (source: own elaboration)

| Model designation | CR | AVE | MSV | ASV | Convergent validity | Discriminant validity |
|---|---|---|---|---|---|---|
| | | | | | CR > AVE<br>CR>0.7 ∧ AVE>0.5 | MSV < AVE<br>ASV < AVE |
| CUIG | 0.780 | 0.546 | 0.262 | 0.233 | OK | OK |
| COIG | 0.797 | 0.568 | 0.399 | 0.260 | OK | OK |
| IDI | 0.827 | 0.616 | 0.410 | 0.246 | OK | OK |
| RMI | 0.753 | 0.504 | 0.410 | 0.345 | OK | OK |

*Note:* CR (Composite Reliability), AVE (Average Variance Extracted), MSV (Maximum Shared Squared Variance), ASV (Average Shared Squared Variance); ∧ conditions must be applied concurrently.

customers. The overall index of market orientation ( $\bar{x}$ = 5.14) indicates the average level of market orientation in German high-tech firms in comparison with similar studies, for example by Frejková (2014), who examined the degree of market orientation of the companies in the field of aviation, Tomášková (2005) in high-tech companies or Nožička, Grosová (2012) in small and medium-sized enterprises.

Based on the confirmatory factor analysis, global and local model fit was assessed. The hypothetical model shows a very good fit: $\chi^2$/df = 1.21, p-value = 0.15, CFI = 0.99, TLI = 0.98, RMSEA = 0.03, PCLOSE = 0.82. Validation of the model complies with the German data very well. The parameters of the same model were previously estimated using data from the Czech Republic (N = 161) and the model showed similarly good psychometric properties $\chi^2$/df = 1.27, p-value = 0.10, CFI = 0.99, TLI = 0.98, RMSEA = 0.03, PCLOSE = 0.82. At first sight, it would appear that the German model is slightly better. The sample size also plays an important role in the confirmatory factor analysis. Bentler and Chou (1987) recommended the ratio of the sample size to the number of estimated parameters to be 5:1. This condition was met in both measurements. Other models of market orientation differ in the number of latent and manifest variables, the sample size, industry, etc. Therefore, their detailed comparisons will require a separate study.

The index of Cronbach's alpha values ranged from $\alpha$ = 0.67 to $\alpha$ = 0.85 with composite reliability CR = 0.75 to 0.83 for the German model. For comparison, on a sample of Czech high-tech companies the tested model provided similar values of the coefficient $\alpha$ = 0.77 to $\alpha$ = 0.86. Therefore, it may be concluded that reliability in both cases absolutely ideally suits the recommended values. This study also confirmed validity of the research tool via factor analysis and convergent and discriminant validity. A shortened version of the MMOS scale containing 12 items was examined in detail and it can be considered a reliable and valid measurement instrument for market orientation of companies.

The hypothetical model in this form, has so far been assessed using a factor analysis including reliability and validity in two European countries (the Czech Republic and Germany) and in a single sector (high-tech companies in the manufacturing industry). For this reason, it would be appropriate to replicate the research also in other industrial sectors, in both advanced and emerging economies.

## Conclusions

The study tested two research hypotheses. The author verified the first hypothesis $H_1$ on a sample of German high-tech companies using exploratory and confirmatory factor analysis. The empirical research confirmed the hypothesis of a four-factor structure model. Its dimensions are: Customer Intelligence Generation, Competitor Intelligence Generation, Intelligence Dissemination and Integration, and Responsiveness to Market Intelligence. Also, mild to moderate correlation, as measured by the Pearson's correlation coefficient, was detected among these factors. In previous research, the authors insisted on the original scales without even considering whether their content is still topical and whether or not there have been any possible transformations of the market. Omitting the integration of the acquired information in the companies and their transformation into knowledge can be considered as a serious shortcoming of the current corporate approach. Hence, a modified model has been designed, which is to compensate for this deficiency, at least partly.

Another problem of today's approach to measuring market orientation can be the quality of the measuring tool. Unfortunately, researches often focus only on reliability, which in itself cannot be seen as a sufficient argument for the quality of the measuring instrument. The second hypothesis $H_2$ was therefore concerned with reliability and validity of the tested shortened measuring scale MMOS while its most important psychometric properties are derived directly from the studied model. Neither this hypothesis was rejected.

The created hypothetical model including the MMOS scale may be used as a tool for deeper understanding of the relationships between variables and can serve both, academics and managers in enterprises. In the further empirical research and following this study, the causal relationship between market orientation of companies, their performance and innovation will be examined. A detailed comparison of the various sub-models will be made for the sake of completing by using a multi-group confirmatory factor analysis and multi-group confirmatory causal analysis.

## Acknowledgements

The Author is thankful to the Internal Grant Agency of FaME TBU No. IGA/FaME/2013/029 (Measurement of market orientation of a firm and development of a new model with a focus on contemporary trends in management and marketing) for the financial support of this research.

## Disclosure statement

The author has no competing, financial, professional or personal interests from other parties.

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## APPENDIX

## The Modified Market Orientation Scale (MMOS)

| Construct | Items |
|---|---|
| Customers Intelligence Generation | 1. We systematically collect and evaluate data about satisfaction or non-satisfaction of customers.<br>2. We have regular meetings with customers in order to learn their future expectations in time.<br>3. We permanently strive for a deeper understanding of the hidden needs and requirements of customers. |
| Competitors Intelligence Generation | 4. We monitor mutually competing firms in our branch.<br>5. We perform evaluation of strong and weak points of major competitors.<br>6. We try to predict a future behaviour of competitors. |
| Intelligence Dissemination & Integration | 7. We inform each other about successful and unsuccessful experience with customers across all company departments.<br>8. In our company we hold a lot of formal and informal talks where we solve present business success, market opportunities or risks.<br>9. Market information are integrated in this workplace before decisions are made. |
| Responsiveness to Market Intelligence | 10. Our reaction to the competitor's price campaign is very short.<br>11. Principles of market segmentation control development of new products in our firm.<br>12. We react immediately if the competition launches intensive advertising campaign aimed at our customers. |

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