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Entrepreneurial orientation in high-tech and low-tech SMEs in Malopolska region**

1. Introduction

There is an ongoing discussion in the literature concerning EO and its measurement in different types and groups of enterprises. It has been discussed and tested under different conditions and in various geographies. However, we identified the relatively low number of such publications pertaining to emerging economies in Central and Eastern Europe (CEE). The results suggest that entrepreneurial orientation has a positive effect on business growth in emerging markets in that region (Reijonen et al., 2015). We want to join the discussion on EO by providing results of research from that region and verifying the extent to which the EO of a company is shaped by its other characteristics. In a similar vein, Yordanova researched the EO of Bulgarian companies and analyzed the impact of the form of ownership (family-owned versus non-family-owned) as well as the CEO's level of education and tenure and the company's learning orientation, growth plans, foreign ownership, environmental dynamism, size, and age on the level of EO (Yordanova, 2011).

We decided to measure the EO in SMEs in Malopolska (a region located in the southern part of Poland, with Krakow serving as the capital). Enterprises from the SME sector have been selected as a sample because they play a dominant role in the development of many economies, including the emerging economies of CEE. We focused on the Malopolska region because it is one of the most entrepreneurial and innovative regions in Poland. We assume that such a social and business environment as represented by Malopolska may be supportive for the entrepreneurial behaviors of enterprises. Additionally, we compare the enterprises

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operating in high-tech and low-tech industries in terms of EO. We have focused on these two groups of enterprises, because the first group starts to play an important role in regional development while the second group is still represented by numerous enterprises proud of their tradition in the region.

The aims of the paper are to measure the EO of a sample population and to confirm the relationship between company characteristics (technological development of the industry in which they operate and the stage of organizational development) and EO. Three hypotheses have been proposed and tested in the paper. The EO measurement scale proposed by Covin and Slevin (1989) was implemented in the survey.

The structure of the paper is as follows. First, the theory of entrepreneurship as related to the organizations is reviewed. Second, the concept of entrepreneurial orientation (EO) is explored, and the related research is analyzed. Third, the entrepreneurship literature on innovation and high-tech industries as well as organizational development are studied, and hypotheses are formulated. Fourth, the research methodology is described. Finally, our results are presented along with their limitations, and recommendations for future research are suggested.

2. Theoretical framework and hypotheses

Entrepreneurship is perceived as one of the main forces driving the development of organizations. Hisrich, Peters, and Sheperd identify entrepreneurship as “behaviours that are related to the creation of value through the exploitation of opportunities in novel and innovative ways” (Hisrich et al., 2005, p. 10). One of the key terms in understanding the phenomenon of entrepreneurship is entrepreneurial opportunity. Casson defined it as “those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production” (Casson, 1982, p. 220). For Stevenson and Jarillo, opportunity is a “future situation which is deemed desirable and feasible” (Stevenson and Jarillo, 1990, p. 23).

Entrepreneurship is identified as a “new entry” (Lumpkin and Dess, 1996, p. 136) as well as creating organization (Gartner, 1989, p. 47). But it is also perceived as a process that “involves all the functions, activities, and actions associated with the perceiving of opportunities and the creation of organizations to pursue them” (Bygrave and Hofer, 1991, p. 14).

Entrepreneurship leads to the creation of new organizations, but it is also an important trait of existing entities. Many organizations strive to become entrepreneurial ones. Miller proposed that the entrepreneurial organization is “one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with proactive innovations” (Miller, 1983, p. 771). The

entrepreneurial attitudes of organizations are a subject of corporate entrepreneurship. It is also perceived as a way of “renewal or innovation within the current organization” (Sharma and Chrisman, 1999, p. 13), and it focuses on “formal or informal activities aimed at creating new business in established companies through product and process innovations and market developments” (Zahra, 1991, p. 261).

Morris noted that “entrepreneurship occurs in varying degrees and amounts”. There are several concepts of the measurement of entrepreneurship in organizations. One of them is entrepreneurial orientation (EO), developed by Lumpkin and Dess (1996) on the basis of Miller’s (1983) definition of an entrepreneurial firm. EO is characterized by “a propensity to act autonomously, a willingness to innovate and take risks, and a tendency to be aggressive toward competitors and proactive relative to marketplace opportunities” (Lumpkin and Dess, 1996, p. 137). One of the commonly used measurement scales was proposed by Covin and Slevin. It consists of nine items related to three dimensions: risk-taking, innovativeness, and proactiveness (Covin and Slevin, 1989, p. 75). Hughes and Morgan proposed a scale with 18 questions related to 5 dimensions of entrepreneurial orientation (risk-taking, innovativeness, proactiveness, autonomy, and competitive aggressiveness) and 5 questions related to the business performance of the firm (Hughes, Morgan, 2007, pp. 657–658). Anderson et al., have re-conceptualized EO and posited that “(1) EO is a multidimensional construct consisting of two non-interchangeable dimensions – entrepreneurial behaviors and managerial attitude towards risk; (2) there is positive covariance between these two dimensions; and (3) both dimensions are fundamentally necessary for EO to exist” (Anderson et al., 2015, p. 1583).

There are numerous examples of the utilization of EO scales in research and substantial findings both for theory and practice resulting from those surveys. Saeed et al. posited that the relationship between entrepreneurial orientation (EO) and firm performance is among the best-researched topics in entrepreneurship literature (Saeed S. et al., p. 255). EO and its relationship to performance is examined in different types of enterprises, industries, and cultural environments. Most EO research relates to big companies, but there are also studies on EO-performance relationship in SMEs (Mason et al., 2015; Altinay et al., 2016) and microenterprises (Campos et al., 2013). Wei-Loon examined the influence of EO on the performance of government-linked companies (GLCs). He found that all five dimensions in EO recorded significant positive effects on the performance of GLCs and suggested that EO is not only suitable to be applied in privately owned companies but also in GLCs (Wei-Loon, 2013).

The EO–performance relationship is impacted by national cultural and macroeconomic drivers. Saeed, Yousafzai, and Engelen found that national cultural differences impact the EO–performance relationship through the impact on the behavior of buyers in markets, and they lead to differences in the practices of

individuals in firms (Saeed S. et al., 2014, p. 259). They suggest that EO is related to a firm's performance more strongly in national cultures that are characterized by low uncertainty avoidance, low power distance, high in-group collectivism (partly confirmed), high political stability, and when the country is a developing nation. Kreiser et al. have found that "the various dimensions of cultural values and several of the institutions that are representative of national culture impact the willingness of entrepreneurial firms to display risk taking and proactive behaviors" (Kreiser et al., 2010, p. 959). EO is examined also in relation to an organizational culture. Engelen et al. found that an organizational culture that is an adhocracy is most effective in advancing entrepreneurial orientation, especially in national cultures that are characterized by strong individualism and low power distance, whereas a hierarchical organizational culture is generally a barrier to entrepreneurial orientation (Engelen et al., 2014). Brettel et al. have found that "developmental, group, and rational culture has a strong positive impact on EO, whereas the impact of hierarchical culture is negative" (Brettel et al., 2015, p. 868). However, Covin and Miller suggest that "being entrepreneurial" in an international context "may imply the presence of entrepreneurial 'dimensions' not currently acknowledged or emphasized in the EO conversation" (Covin and Miller, 2014, p. 28).

EO can be utilized in various contexts, including different external environments. This is in line with the suggestion of Zahra et al. (1999, p. 55) about corporate entrepreneurship research in different geographies and industries. Miller indicates that "particular insight may also be generated by comparing contexts that are hypothesized in a theoretically informed typology" or "where the institutional environments and institutional logics may vary greatly, while many other aspects of structure and environment are quite similar" (Miller, 2011, p. 886). Following these prompts, the EO in the enterprises of the Malopolska region of Poland will be explored, especially since the available examples of such research are not numerous (Nogalski and Karpacz, 2011; Bratnicki and Kulikowska-Pawlak, 2011; Dyduch, 2008) and their operationalizations of EO vary (which makes any meta-analysis of secondary data difficult).

There is some research on EO in the high-tech context as well as research focused on innovation's influence on EO. Atuahene-Gima and Ko (2001, p. 56) state that entrepreneurial orientation is "akin to technological orientation" (Atuahene-Gima and Ko, 2001). Nasution et al. have found a positive relationship between entrepreneurship and innovation in organizations operating in the hospitality industry (Nasution et al., 2011, p. 341). Some studies indicate that firms representing entrepreneurial orientation are able to introduce new products that are highly unique and/or breakthrough innovations (Renko et al., 2009, p. 338). However, Kollmann and Stöckmann suggest that the constituent dimensions of EO differ in their effects on exploration and exploitation (as well as performance) in the

context of innovation processes (Kollmann and Stöckmann, 2014). Miller posits that innovativeness may be especially important in the high-tech context (Miller, 2011, p. 880). This is in line with the results of the meta-analysis of Saeed et al. (2014, p. 278), who found that the EO–performance relationship has significant moderator effects and larger effect sizes for firms with a high-tech focus than for firms with a non–high-tech focus (which confirms the findings from Rauch et al.’s (2009) meta-analysis). Kressel identified the importance of innovativeness in small high-tech companies (Kressel, 1995), and Arshad et al. found that four dimensions of EO (innovativeness, proactiveness, competitive aggressiveness, and risk-taking) significantly affect the business performance of technology-based SMEs in their survey in Malaysia (Arshad et al., 2014) The learning processes (which are linked with innovations) are also examined in the view of EO. Wang has found that learning orientation (LO) must be in place to maximize the effect of EO on performance and that, along with EO, LO is an important dimension (Wang, 2008). Altinay et al. (2016) identified a positive relationship between organizational learning capability and EO. Some network structures may enhance EO, and high-tech industry clusters are perceived as an environment that promotes an innovative orientation (Miller, 2011, p. 882).

Therefore, we propose the following hypothesis:

H1: There is a differentiation of enterprise EO between high-tech industries and traditional industries.

The theory of organizational development suggests that, in the early stage, entrepreneurship and innovativeness are among the most important sources of development. This is reflected in the concept proposed by Adizes (1988) as well as Quinn and Cameron (1983). Greiner (1972) also points at innovativeness as a key element in the early development of an organization. Stoner and Wankel suggest that organizations in their early stages of development position themselves in the market and pursue many opportunities but do not perceive planning and coordinating as key managerial activity (Stoner and Wankel, 1994, p. 249). Hughes and Morgan examined EO in firms at the embryonic stage of development and found that organizing activities around proactiveness (and to some extent innovativeness) is essential to securing improved performance (Hughes and Morgan, 2007, p. 657–658). Chaston and Sadler-Smith studied small creative industry enterprises, and they have found that “high-growth small firms are characterized by well-developed internal capabilities allied to an entrepreneurial orientation” (Chaston and Sadler-Smith, 2012, p. 415). Based on their meta-analysis, Saeed et al. (2014, p. 278) found that the EO–performance relationship has more significant moderator effects and larger effect sizes for small firms than for large firms, which confirms the findings from Rauch et al.’s (2009) meta-analysis.

Therefore, we hypothesize:

H2: There is an inverse monotonic relationship between EO and the age of a company.

H3: There is an inverse monotonic relationship between EO and the size of a company expressed in the number of employees.

3. Research methods

In accord with the aims of this study and proposed hypotheses, the surveyed population was defined as companies:

- whose primary activity is in the industry defined by PKD (Polska Klasyfikacja Działalności – Polish Classification of Economic Activities): code 26 – manufacture of computer, electronic, and optical products; code 27 – manufacture of electrical equipment; and code 31 – manufacture of furniture;
- that have their place of business in the Malopolska region;
- that are SMEs.

The abovementioned industries have been chosen to represent different levels of technology. Groups 26 and 27 are very modern industries, while Group 31 manufactures more-traditional products. The choice of these two contrasting groups of companies (PKD 26 and 27 combined as a high-tech group, and 31 as a low-tech group) will facilitate the verification of the hypothesis that there is some inter-industry differentiation of entrepreneurial orientation. Moreover, these groups represent approximately 10% of the whole manufacturing industry in total (section C of PKD) in the region, so their economic significance is substantial.

The whole sample consists of companies from one region – Malopolska (which is an important region of Poland due to its economic, scientific, and educational significance). The entrepreneurial potential of Malopolska has also been recognized by the European Committee of Regions, which awarded this region as European Entrepreneurial Region 2016 (European Union Committee of Regions, 2016).

The survey was carried out in September 2015. The sampling frame preparation, sample drawing, and collection of data was carried out by the Central Statistical Office of Poland (Krakow branch). A professional staff was hired to administer the survey during visits to company facilities. The questionnaire consisted of sample demographic questions and the main item (which was a nine-question entrepreneurial orientation measurement tool developed by Miller (1983) and Covin and Slevin (1989) and presented by Covin and Wales (2012, p. 692), translated to Polish).

The sample size was 100 companies. Since 50 companies refused to take part, a further 47 companies were drawn to take their place. Two companies

were discarded from the sample because they identified their primary activity as something other than PKD 26, 27, or 31. The final sample size is, therefore, 95 companies. The structure of the sample is described in Table 1.

Table 1
Structure of the sample

PKD class	Sample (n)		
	total	small enterprises	medium-sized enterprises
26	17	14	3
27	18	13	5
31	60	52	8
total	95	79	16

Source: own elaboration, based on data delivered by Statistical Office of Poland (Krakow branch)

Entrepreneurial orientation was measured using a tool developed by Miller (1983) and Covin and Slevin (1989). Each of the nine questions measures the respondent's agreement with a pair of opposite statements in a five-point scale, where 1 means "I completely agree with the first statement" and 5 – "I completely agree with the second statement". Three of the questions pertain to the innovativeness of the company, three to its proactiveness, and three to its risk propensity. The indices of innovativeness, proactiveness, and risk-taking were calculated, and the general index of entrepreneurial orientation was been calculated by the summation of the responses.

4. Analysis and results

The choice of the statistical tools is a result of the nature of the data (categorical or ordinal level of measurement) and the postulated relationships between variables (monotonic, but not necessarily linear). Therefore, the Kruskal-Wallis H test was chosen to confirm the existence of statistically significant differences in the medians between groups (Hypothesis 1) and the Spearman correlation of ranks to confirm monotonic relationships between variables (Hypotheses 2 and 3).

Reliability analysis was performed using the Cronbach method. The value of the alpha coefficients for each of the indices presented in Table 2 is greater than 0.7. Hair et al. (2011, p. 255) qualify alpha coefficients between 0.7 and 0.8 as

having good strength of association and those between 0.8 and 0.9 being very good. Therefore, the reliability analysis suggests that the items in the measurement tool used in this study are, in fact, consistent and do measure the same construct.

Table 2

Cronbach alpha coefficients of the index and subindices of entrepreneurial orientation

Index	Cronbach alpha coefficient
innovativeness	0.73
proactivity	0.72
propensity to risk	0.86
entrepreneurial orientation	0.88

Source: own research

The median of entrepreneurial orientation index is 13.5 on a scale of 0 to 36. The midpoint of the frequency distribution is below the midpoint of the scale (which denotes neutral answers). In the subindices, the medians were as follows: 5 for innovativeness; 4 for proactiveness; and 3 for risk propensity (on a scale of 0 to 12). So, the decision-makers assess their companies as prone to well-proven solutions rather than to innovations; they are clearly more risk-averse and reactive than risk-prone and proactive. Therefore, the subject companies are entrepreneurial to a fairly low extent.

In an attempt to test the hypothesis concerning the differentiation of entrepreneurial orientation indices between high-tech and low-tech industries, the sample has been split into two categories: high-tech (PKD 26 [manufacture of computer, electronic, and optical products] and PKD 27 [manufacture of electrical equipment]) and low-tech (PKD 31 [manufacture of furniture]). The sizes of the defined classes are 35 firms in the hi-tech class and 60 firms in the low-tech class.

Table 3

Medians of entrepreneurial orientation index and its subindices (innovativeness, proactivity, and risk-taking) in high-tech and low-tech company classes

The level of technological development	Innovativeness subindex [0–12]	Proactivity subindex [0–12]	Risk-taking subindex [0–12]	Entrepreneurial orientation index [0–36]
Low-tech	5	4	3	10
High-tech	8	5	3	17.5

Data source: own research

The data in Table 3 illustrates a higher level of entrepreneurial orientation index in high-tech companies (median of 17.5 versus 10 for low-tech companies, on a scale of 0 to 36). This is mainly due to the fact that the high-tech companies' innovativeness subindex is considerably higher than that of low-tech companies – the median is 8 as compared to 5, on a scale of 0 to 12. There is also a difference in the proactivity subindex – the median is 5 compared to 4, on a scale of 0 to 12. The median of the risk-taking index is equal for both groups. The statistical significance of the abovementioned differences in medians has been tested using the Kruskal-Wallis H test. It can be concluded that high-tech and low-tech companies are significantly different in their innovativeness ($H [1, N = 93] = 5.5, p = 0.02$) and proactivity ($H [1, N = 92] = 4.54, p = 0.03$) but are not statistically different in their risk-taking ($H [1, N = 93] = 0.92, p = 0.34$). Also, the entrepreneurial orientation index displays a statistically significant difference ($H [1, N = 90] = 5.55, p = 0.02$).

The correlation of EO indices to the development stage of a company was also tested. The development stage variables were the age of the organization and the number of employees. The Spearman rank correlation coefficient for the pair of variables (age of organization and EO) is -0.32 ($p = 0.002$). For EO subindices and age of the organization, the rho coefficient is $rbo = -0.32$ ($p = 0.0016$) for proactivity, $rbo = -0.21$ ($p = 0.04$) for risk-taking, and $rbo = -0.25$ ($p = 0.015$) for innovativeness. Therefore, the monotonic relationship between variables is significant (albeit low) (Ostasiewicz et al., 1995, s. 311), and it is negative (as hypothesized).

The Spearman rank correlation coefficient for the pair of variables: number of employees and EO is 0.2 ($p = 0.06$). For the EO subindices and number of employees, the rho coefficient is $rbo = 0.23$ ($p = 0.03$) for proactivity, $rbo = 0.24$ ($p = 0.02$) for risk-taking, and $rbo = 0.086$ ($p = 0.41$) for innovativeness. Therefore, the monotonic relationship between variables is low or statistically insignificant (Ostasiewicz et al., 1995, s. 311). Furthermore, it is positive, not negative monotonic (as we hypothesized). Table 4 summarises the verification of the hypotheses.

Table 4
Hypotheses verification summary

H1: There is a differentiation of enterprise EO between high-tech industries and traditional industries.	supported
H2: There is an inverse monotonic relationship between EO and the age of a company.	supported
H3: There is an inverse monotonic relationship between EO and the size of a company expressed in the number of employees.	not supported

Source: own research

5. Discussion and implications

This study addressed three research questions. The first question was related to the differentiation of enterprise EO between high-tech and low-tech industries. The next two questions applied to the relationship between EO and organizational development (particularly, EO and the age of a company as well as EO and the number of employees).

With respect to the first question, our results show the existence of a differentiation of EO between enterprises operating in high-tech and traditional industries; i.e., EO is stronger in high-tech enterprises than in low-tech. The findings support our previous assumption and Hypothesis H1 as well as theories presented in the literature. The findings are in line with the results of the meta-analysis of Rauch et al. (2009) and Saeed et al. (2014). This suggests that relationships observed by other researchers in other areas are also relevant to enterprises operating in the emerging economy of the Malopolska region.

Analyzing the medians of the sub-indices of EO, we can observe that the difference between enterprises operating in high-tech and low-tech industries is mainly caused by the innovativeness index. In the case of the proactiveness index, the difference is less pronounced, and it is statistically insignificant in the risk-taking index. This leads to the conclusion that innovativeness is the dominant dimension of EO in enterprises operating in the high-tech industry.

Our results show an inverse relationship between EO and the age of an organization. This relationship is especially strong in the case of proactiveness and significantly lower in the cases of innovativeness and risk-taking. This means that the tendency to behave actively and in an innovative way is stronger in young enterprises, and their attitude toward risk is less conservative than with older companies. These results are in line with theory of organizational development and support Hypothesis H2.

Our results show a correlation between the number of employees and EO. However, the Spearman rho is low in the case of proactiveness and risk-taking (and not statistically significant in the case of innovativeness). What is important, the relationship between EO and the size of an enterprise is positive. Hypothesis H3 is not supported by the results of our study. This finding is somewhat in line with the results obtained by Mickiewicz et al. (2010) in Lithuanian SMEs (where a positive correlation between EO and the number of employees was reported) and also with Yordanova's research into Bulgarian companies (Yordanova, 2011). This suggests that the nature of the connection between EO and company size is not as straightforward as we have hypothesised. Whereas age is obviously an independent variable, a company's size might be a result of its performance (which, in turn, is dependent on EO to a certain degree).

The study here has some limitations. First, the findings are within the context of the Polish economy in the Malopolska region, which calls for caution when generalizing the outcomes globally. Second, the sample was relatively small; it represents only three sub-industries, so this also limits the generalizability of the findings. Third, even though it is widely used in similar research, the methodology of measuring EO used in this study is based on subjective assessments by respondents and not hard metrics. Fourth, statistical analyses in the case of some indicators show relatively low levels of statistical significance.

The abovementioned limitations offer possibilities for future research on EO with bigger samples and in other geographical and industrial contexts. Another track of future research is connected with the development of the EO-measurement methodology; in particular, those based on comparing declarations gathered through traditional EO scales with hard metrics (e.g., in innovative activity) achieved by a company, which are reflected in relevant documentation and registers. Another area that requires more research is the dynamics of EO in connection with organizational development (e.g., how EO and its dimensions change through an organization's life cycle). Additionally, we recommend more detailed EO research into emerging economies, including the environmental and culture factors that influence EO. Among the most promising research problems we see is determining the influence that unstable economic and legal environments have on entrepreneurial behavior and EO.

6. Conclusions

The aim of this paper was to measure the EO of SMEs operating in the Malopolska region of Poland. For our results to be comparable with those from other studies, we used the scale we deemed as the most standard based on a literature review; that is, the EO measurement scale proposed by Covin and Slevin (Covin and Slevin, 1989). The results suggest that the subject companies are entrepreneurial to a fairly low extent.

The second aim was to confirm the relationship between company characteristics (the technological development of the industry in which they operate and their stage of organizational development) and EO. Three hypotheses concerning these relationships were proposed and tested in the paper. The hypothesis concerning the differentiation between high-tech and low-tech companies was supported by the data. The hypothesis stating an inverse correlation between a company's age and EO was also supported by the data. The nature of the relationship postulated by the third hypothesis concerning the inverse correlation between company size and EO is not as straightforward. We have found a positive

correlation, although below a level of statistical significance (which is opposite of the inverse correlation we hypothesised).

This paper is one of the first attempts to utilize EO in the context of Polish SMEs, but we see such research as a promising field of future research.

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