

Is the Importance of Market Orientation Growing? A Study of High-Tech Manufacturing Companies¹

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Abstract

Purpose: The article analyzes the market-orientation level and its impact on high-tech manufacturing companies' competitiveness at two points in time.

Design/methodology/approach: The analysis is based on data from two surveys from 2011 and 2019, conducted with the same questionnaire, in Poland, a state that has experienced many changes after 1989 and after joining the European Union in 2004.

Findings: The results indicated that during the eight years between the surveys, the importance of high-tech manufacturing companies' market orientation grew considerably. Moreover, in 2011 the level of market orientation explained over 11% of the variance in the competitiveness of high-tech manufacturing companies, while in the 2019 survey, it explained over 22% of the variance. Moreover, nearly all highly competitive high-tech manufacturing companies analyzed in the study also revealed high levels of market orientation.

Research limitations: The main limitation of the study is the fact that the findings refer to Polish manufacturing high-tech companies, so any generalizations to other regions or industries should be treated with caution.

Research implications: Managers of high-tech manufacturing companies should develop and maintain the highest possible level of market orientation. However, a high level of market orientation does not automatically guarantee high competitiveness.

Originality: This study is the first to empirically test the influence of market orientation on high-tech companies' competitiveness level in the “new EU countries” at two points in time.

Keywords: market orientation, competitiveness, high-tech, manufacturing, strategic marketing.

JEL: L10, M11, M21, D22, D24

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Introduction

Market orientation is the pillar of modern marketing studies (Deshpandé and Farley, 1998), as it refers to the creation of a business culture in a company, one that is focused outside and seeks to create superior customer value (Slater and Narver, 1994). Market orientation helps companies to better understand their customers, competitors, and the entire business environment in which they operate (Kara *et al.*, 2005). Market-oriented companies systematically collect and exploit market information with more careful planning than other businesses, and unlike many internally oriented competitors, they do so without a reactive approach. As a result, these companies acquire knowledge e.g. about trends and prospective markets (Day, 1994). Given the growing research interest and the number of publications on the matter, market orientation has become the central concept in modern strategic marketing management (Hou, 2008). Interest in the concept of market orientation reached its peak in the 1990s and during the first decade of the twenty-first century, only to slightly decrease in the following decade. However, is it not time to once again consider the concept? To answer this question, this article will focus on companies that play a key role in the twenty-first-century economy, namely those from the high-tech industry.

The article aims to contribute to the literature on strategic marketing. Its main objective is to measure the level and impact of market orientation on high-tech manufacturing companies' competitiveness at two points in time. The rationale for this goal stems from the importance of high-tech companies for the global economy (Goldschlag and Miranda, 2020), the quickly changing environment in which high-tech companies operate – especially in Poland after 1989 – as well as the lack of current studies in this area. The article's objective follows three specific goals. First, to check whether market orientation affects the competitiveness level of high-tech manufacturing companies and if that is the case, to measure the strength of this influence. Second, to examine if the high level of a company's market orientation is essential for achieving a high level of competitiveness in the high-tech market. Detailed definitions of high and low market orientation levels as well as high and low competitiveness levels will be presented in the methods section. Third, to analyze whether the current level and influence of market orientation on the competitiveness level of high-tech manufacturing companies has changed compared to the earlier point of the analysis.

The remainder of the article consists of six more sections. After presenting the theoretical background of the problem, the article will develop its proposition in more detail, followed by a description of the empirical study methodology and results presentation.

The article will conclude with a discussion of findings, management implications, and study limitations.

Theoretical Background

Market orientation is a strategic approach to the management of an organization under uncertainty (Kwak *et al.*, 2013). The concept became popular in 1990, mainly thanks to two teams of researchers: Narver and Slater (1990) and Kohli and Jaworski (1990). Their publications remain among the most frequently cited works on this topic. They define market orientation as “the organization-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization wide responsiveness to it” (Kohli and Jaworski, 1990, p. 6) and as “business culture in which all employees are committed to the continuous creation of superior value for customers” (Narver *et al.*, 1998, p. 241).

By establishing the tenets of organizational behavior regarding customers, competitors, or internal functions, market orientation impacts organizational performance (Han *et al.*, 1998). One of the most frequently mentioned aspects of this concept is the fact that market orientation improves company performance by creating an appropriate business culture and better customer value (e.g. Slater and Narver, 2000; Kara *et al.*, 2005), increasing innovativeness (e.g. Rapp, Schillewaert and Hao, 2008). Taghian and Shaw (2008) go further by stating that the market orientation approach can be considered a company’s intangible resource that shows the direction adopted by the management to achieve organizational objectives. Thanks to market orientation, a company can in the long term acquire more distinctive capabilities compared to its competitors, which contributes to achieving a sustainable competitive advantage (Kumar *et al.*, 2011). The above arguments highlight the importance of market orientation – the importance of maintaining a high level of market orientation by companies, to be exact. Therefore, a valid question to ask should be: What does maintaining a high level of market orientation mean? The simplest answer depends on whether the company behaves – and if so, to what extent? – according to the guidelines known from the tools developed to measure companies’ market orientation. For example, the tool created by Narver and Slater (1990) consists of items concerning customer orientation, competitor orientation, and cross-functional coordination. Thus, the stronger the guidelines compliance, the stronger the market orientation.

The problem of market orientation’s impact on competitiveness is thoroughly analyzed in the literature (Devece *et al.*, 2017). There are studies suggesting that market orien-

tation's influence on organizational performance is either unsupported (e.g. Caruana *et al.*, 1999) or even negative (e.g. Greenley, 1995; Ho *et al.*, 2018). However, most studies report a positive influence in this respect (e.g. Pelham and Wilson, 1995; Cano *et al.*, 2004; Shoham *et al.*, 2005). Caruana *et al.* (1999) emphasize that differences in the obtained results may stem from the fact that authors used different scales for measuring market orientation available in the literature (e.g. Narver and Slater, 1990; Ruckert, 1992; Kohli *et al.*, 1993). Furthermore, this may stem from the fact that most studies were conducted in different countries and business cultures, and they were based on samples of companies from different industries (Appiah-Adu and Ranchhod, 1998). Therefore, we should focus on more homogenous samples, which might help to reduce the number of factors that cannot be controlled and, in many cases, are the source of noise (Haugland *et al.*, 2007). Moreover, previous studies have found differences in the strength of the correlation between market orientation level and performance among companies from the services and manufacturing industries (Cano *et al.*, 2004) or depending on certain industry conditions (Pelham, 2000; Gaur *et al.*, 2011). Hence, the moment of research can also influence the results, not only with specific industry conditions but also with the condition of entire economies, legal restrictions, or unexpected events such as lockdowns. Many authors suggest studying the impact of market orientation on organizational performance in the high-tech sector (e.g. Narver and Slater, 1990; Appiah-Adu and Ranchhod, 1998), given the importance of this sector for whole economies.

In modern economies, we observe the process of resources shift from less to more productive and valuable areas. The literature provides several definitions of the high-tech sector, but most point toward industries with above-average R&D intensity (e.g. Hatzi-chronoglou, 1997; Ortega-Argilés *et al.*, 2009; Galindo-Rueda and Verger, 2016). This article follows suit and will present a detailed definition of the high-tech sector in the methods section. The high-tech sector plays a particularly important role in this process, as it creates the products and services that affect the global economy (Goldschlag and Miranda, 2020). For example, in the USA, high-tech firms provide 12% of all employment while accounting for nearly 23% of total contribution to the country's economy (Wolf and Terrell, 2016). They also count among the most important businesses in the knowledge-based economy (Hong *et al.*, 2016). The key role of the high-tech sector for economic growth has been emphasized for many years (e.g. Bart, 1996), and today it "emerges as leading driver of economic growth" (Brown *et al.*, 2017, p. 57). Similar opinions are expressed by international institutions, such as the European Union (Hansen and Winther, 2011) or Eurostat (2019), with particular emphasis on the importance of the high-tech manufacturing sector (European Commission, 2004). Notably, there are many more industries with high R&D spending in the manufacturing sector

than in the services sector (cf. Galindo-Rueda and Verger, 2016). All the above means that the high-tech sector is particularly important for the economy and worthy of a thorough investigation.

Moreover, many authors recognize the need for analyzing the relationship between companies' market orientation levels and their performance using longitudinal studies, which can provide more valuable insights than other approaches (Narver and Slater, 1990; Noble *et al.*, 2002; Leal-Rodríguez and Albort-Morant, 2016; Mahmoud *et al.*, 2016; Lim *et al.*, 2017). Despite not being a longitudinal study but an analysis conducted at two points in time, this paper may also produce valuable conclusions.

As far as I know, there have been no recent studies on the relationship between market orientation level and the performance of high-tech manufacturing companies at two points in time – particularly in Poland – which has experienced significant changes in recent years. In 1989 – at the time of the change in the economic system – 257,000 people were employed in the high-tech sector, which accounted for 5.4% of all people working in Poland. In the following years, the number of people employed in this sector decreased, and in 2000 it amounted to 84,000. Then it began to grow, oscillating around 120,000 in the second decade of the twentieth century, which constitutes only 0.8% of all people working in Poland. This is a small number compared to most European Union countries (Skórska, 2016; Mohelska *et al.*, 2020). Unfortunately, Poland does not benefit from the dynamic development rate of the sector, as shown by the above employment figures (cf. Tylżanowski, 2012). The weak development of the high-tech sector and its importance for the country's economy makes it noteworthy. In the context of the competitiveness of companies operating in this sector, technical factors certainly constitute an important element. Nevertheless, we should also consider factors related to market orientation, of which Polish companies had practically no experience before 1989. Although the above description provides us with valuable information about the Polish high-tech sector, its limitation stems from the fact that the definition of the high-tech sector adopted in the above publications is narrower. The latter cover only three high-tech industries: air and spacecraft machinery, pharmaceuticals, as well as computers, electronics, and optical products. This article adopts a broader definition of the high-tech sector, following Bakhtiari (2021) and Mulier and Samarin (2021), which will be described in detail in the methods section.

Notable studies on market orientation in Poland include those conducted by Huddleston and Good (1999), Hooley *et al.* (2000, 2003), Kowalik (2011), and more recently, by Soniewicki (2017a, 2017b) and Łobos and Szewczyk (2018). As we may see, the number of publications on the topic is rather limited. Most frequently, the articles present

a positive impact of market orientation on the studied companies' business performance (e.g. Hooley *et al.* 2000; 2003; Soniewicki, 2017a, 2017b; Łobos and Szewczyk, 2018). Moreover, the level of market orientation in the sector of high-tech companies in Poland has never been investigated so far. Similarly, most studies around the world were conducted on mixed industry samples. For example, Matsuno, Mentzer, and Özsomer (2002) used structural equation modeling (SEM) to analyze companies from various manufacturing industries such as food, textiles, or apparel, but also machinery, transportation equipment, electrical equipment, and measuring instruments. Their results show that market orientation is positively related to company performance defined by the use of market share growth, sales generated by new products compared to major competitors, and return on investment (ROI) compared to major competitors (Matsuno *et al.*, 2002). Another example of mixed industry sample research is the one conducted by Talaja *et al.* (2017) who analyze the Croatian medium-sized and large companies with SEM. They find positive the influence of market orientation on business performance, which is defined with the use of six elements: market share, market share growth, sales revenues, sales growth, profitability, and performance sustainability (Talaja *et al.*, 2017). Nevertheless, the results of analyses based on companies operating in very different industries should be interpreted with caution, as Sin *et al.* (2005) prove that industry type has a moderating effect on the influence of market orientation on a company's business performance. The number of studies on high-tech companies is very small, but their results generally show a positive, direct, or indirect effect of the market orientation level on company performance (e.g. Appiah-Adu and Ranchhod, 1998) or on new product performance produced by this group of entities (e.g. Wren *et al.*, 2000).

Hypotheses Development

Economic globalization has made the world's economies more competitive (Kapitonov *et al.*, 2018). For example, thanks to online platforms, companies can easily deliver their products to practically every market (Bughin *et al.*, 2016), which considerably increases the competitiveness among companies from different industries. The level of competitiveness is particularly high among high-tech companies, which is acknowledged by many authors (e.g. Goktan and Miles, 2011; Hsia *et al.*, 2014). High-tech firms must keep analyzing market needs and seek new opportunities for creating competitive products (Tzokas *et al.*, 2015). Moreover, they must cope with the uncertain and dynamic conditions of the consumer market and technological turbulence (Grewal *et al.*, 2013), because the business environment in which high-tech companies operate is full of unpredictable changes (Verdu *et al.*, 2012). This is because markets in which

such firms operate frequently see launches of new-generation technologies and new products with relatively short life cycles (Dutta *et al.*, 1999). As a result, high-tech companies cannot stop developing (Law and Gunasekaran, 2012). In turn, they must choose an appropriate direction of development; if they do not, they may even lose their competitive position, as happened to Nokia or BlackBerry (Tracy, 2019). This is precisely where companies' market orientation comes into play, as it helps companies acquire appropriate market knowledge, which in turn is instrumental in creating innovation (Marinova, 2004; Cillo, 2005; Tödtling and Grillitsch, 2014; Kroh *et al.*, 2018). This is particularly important given the fact that the life cycles of products manufactured by high-tech firms are now much shorter than they used to be (Lin *et al.*, 2012). Consequently, with increasing globalization and Internet access around the world, the number of high-tech companies can be expected to grow. Thus, I posit the following hypotheses:

H1a. The average level of market orientation among high-tech manufacturing companies keeps rising.

H1b. Market orientation level is increasingly important for the competitiveness of high-tech manufacturing companies.

Market orientation level is certainly not the only factor that affects the competitiveness of high-tech manufacturing companies. Other factors mentioned in the literature include core team expertise and its commitment, the company's R&D capacity, type of funding (Chorev and Anderson, 2006), or organizational culture (Deshpande and Webster Jr., 1989). Notably, in product development processes, which are crucial for such firms, knowledge of customer needs is the key element (Bohlmann *et al.*, 2013). Thus, I propose the following hypotheses:

H2. A high level of market orientation is currently an essential quality for high-tech manufacturing companies to achieve high competitiveness levels.

Methods

The 2011 study was based on the industry classification created by Hatzichronoglou (1997). The 2019 study involved the classification developed by Galindo-Rueda and Verger (2016). The first one distinguished between four groups of industries: high-tech, medium high-tech, medium low-tech, and low-tech industries. This classification applied exclusively to manufacturing industries. The 2019 taxonomy distinguished

between manufacturing and non-manufacturing industries, classified into five categories: high, medium-high, medium, medium-low, and low R&D intensity industries. This article focuses on the manufacturing companies representing high and medium-high industries – in the case of Hatzichronoglou’s classification (1997) – or high and medium-high R&D intensity industries, according to Galindo-Rueda and Verger’s classification (2016). These two classifications are not entirely comparable, but in the context of these two groups of industries, they can be regarded as fairly similar (see Table 1). For simplicity, instead of using the terms “high-tech” and “medium high-tech” or “high R&D intensity” and “medium-high R&D intensity,” I will use the term “high-tech industries” to refer to all industries listed in Table 1.

Table 1. Elements of Hatzichronoglou’s (1997) and Galindo-Rueda and Verger’s classifications (2016)

No.	Hatzichronoglou’s classification (1997): high-tech and medium high-tech industries	No.	Galindo-Rueda and Verger’s classification (2016): manufacturing industries, high and medium-high R&D intensity industries
1.	Aerospace	1.	Air and spacecraft machinery
2.	Computers, office machinery	2.	Pharmaceuticals
3.	Electronics-communications	3.	Computers, electronic and optical products
4.	Pharmaceuticals	4.	Weapons and ammunition
5.	Scientific instruments	5.	Motor vehicles, trailers and semi-trailers
6.	Motor vehicles	6.	Medical and dental instruments
7.	Electrical machinery	7.	Other machinery and equipment
8.	Chemicals	8.	Chemicals and chemical products
9.	Other transport equipment	9.	Electrical equipment
10.	Non-electrical machinery	10.	Railway, military vehicles and other transport equipment

Source: Hatzichronoglou (1997); Galindo-Rueda and Verger (2016).

The study examining the activities and results of companies in 2011 was conducted in two stages. The first one took place in 2012 using an online survey created by me with an IT specialist. The second stage, conducted at the start of 2013, involved traditional paper questionnaires, distributed by post. The Kompass Poland database of companies served as the sampling frame. Out of the 1200 completed questionnaires that were returned, only 152 provided information about high-tech manufacturing companies, as the original survey covered companies operating in all industries.

The 2019 survey was commissioned by me from a marketing research firm called Indicator, which in April and May 2020 used the method of computer-assisted telephone interviewing (CATI). The Bisnode database of companies was the sampling frame. The survey focused on manufacturing and non-manufacturing companies operating in high and medium-high R&D intensity industries, according to Galindo-Rueda and Verger's classification (2016). Out of 520 firms surveyed, 377 operated in industries interesting to the study. The structure of both samples in terms of company size is presented in Table 2.

Table 2. Distribution of companies surveyed by the number of employees and reference year

Number of employees	2011		2019	
	Count	Percentage	Count	Percentage
1–9	30	19.7%	83	22.0%
10–49	52	34.2%	92	24.4%
50–249	48	31.6%	97	25.7%
Over 250	22	14.5%	105	27.9%
Total	152	100%	377	100%

Source: own elaboration.

The level of competitiveness was measured using a competitiveness index consisting of three elements (Tables 3 and 4). The measures used in both surveys were very similar. The only difference was the fact that in the first survey respondents were asked to assess “their company’s profit relative to their closest competitors,” while in the second one, they were asked to assess their “operational profit relative to their closest competitors.” In both cases, answers were provided on a five-point ordinal scale, with the following values: 1 – “much lower;” 2 – “lower;” 3 – “comparable;” 4 – “higher;” 5 – “much higher”.

Table 3. Questions concerning the company’s competitiveness from the questionnaire about 2011

No.	Question	Source
1.	Value of sales compared to their closest competitors	Brouthers, 2002; Fonfara, 2009
2.	Market share compared to their closest competitors	Brouthers, 2002; Fonfara, 2009
3.	Total profit compared to their closest competitors	Brouthers, 2002; Fonfara, 2009

Source: own elaboration.

Table 4. Questions concerning the company's competitiveness from the questionnaire about 2019

No.	Question	Source
1.	Value of sales compared to their closest competitors	Brouthers, 2002; Fonfara, 2009
2.	Market share compared to their closest competitors	Brouthers 2002; Fonfara, 2009
3.	Operational profit compared to their closest competitors	Brouthers, 2002; Fonfara, 2009

Source: own elaboration.

In both surveys, the level of market orientation was assessed using the same set of questions from Hooley *et al.* (2000, p. 279; see Table 5), who tested them in the Polish context. Therefore, it was a proven measurement tool based on the well-known scale of Narver and Slater (1990). Answers were also given on a five-point ordinal scale, with the following values: 1 – “I completely disagree;” 2 – “I disagree;” 3 – “I do not disagree or agree;” 4 – “I agree;” 5 – “I completely agree.” In the case of the 2011 survey, convenience sampling was conducted. For the 2019 survey, random selection techniques of companies were applied. The questionnaires of both surveys were addressed to managers of the surveyed companies or other persons well acquainted with their activities.

For this study, the level of market orientation and competitiveness were calculated using the arithmetic average. In most calculations, two key levels were chosen: high > 3.5 and low ≤ 3.5 . For market orientation, one more level was also used: very high > 4 .

Table 5. Statements concerning the level of market orientation used in the surveys about 2011 and 2019

No.	Statements
1.	Our commitment to serving customer needs is closely monitored
2.	Salespeople share information about competitors
3.	Our objectives and strategies are driven by the creation of customer satisfaction
4.	We achieve rapid response to competitive actions
5.	Top management regularly visit important customers
6.	Information about customers is freely communicated throughout the company
7.	Competitive strategies are based on understanding customer needs
8.	Business functions are integrated to serve market needs

9.	Business strategies are driven by increasing value for customers
10.	Customer satisfaction is frequently assessed
11.	Close attention is given to after sales services
12.	Top management regularly discuss competitors' strengths and weaknesses
13.	Our managers understand how employees can contribute to creating value for customers
14.	Customers are targeted when we have an opportunity for competitive advantage

Source: Hooley et al. (2000, p. 279).

Measuring Reliability

Table 6 presents the results of the reliability analysis of the questionnaires, which was conducted by means of Cronbach's alpha. Values of the alpha coefficient can range from 0 to 1, although many sources stress that it should be at least 0.7 (e.g. Kainth and Verma 2011; Liu and Wohlsdorf-Arendt, 2016). Most values of the alpha coefficient for constructs presented in Table 6 are very high, except for "market orientation level (2019)," which falls just a little under the 0.7 threshold. Hair Jr. *et al.* (2009) argue that in exploratory research alpha values at the level of 0.6 are sufficient. According to George and Mallery (2020, p. 244), there is no agreement as to what the minimum value of the alpha coefficient should be, as "a rule of thumb that applies to most situations is: $\alpha = [0].9$ – excellent, $\alpha = [0].8$ – good, $\alpha = [0].7$ – acceptable, $\alpha = [0].6$ – questionable, $\alpha = [0].5$ – poor, $\alpha < [0].5$ – unacceptable".

Table 6. Results of Cronbach's alpha reliability test

Component	Cronbach's alpha	No. of items
Market orientation (2012)	0.888	14
Market orientation (2019)	0.684	14
Competitiveness Index (2012)	0.886	3
Competitiveness Index (2019)	0.939	3

Source: own elaboration.

The statistical significance of the observed differences in companies' market orientation levels in 2011 and 2019 – as well as competitiveness among firms with different levels of market orientation – was checked using the Mann–Whitney U test. The correlation between the analyzed companies' market orientation levels and their competitiveness

levels were analyzed by applying linear regression. All analyses were conducted using IBM SPSS Statistics.

Study Results

The first step of the analysis consisted in determining the average level of market orientation in both samples of high-tech manufacturing companies (see Table 7).

Table 7. The average level of market orientation in high-tech manufacturing companies sampled in 2011 and 2019

Item	Year	Level of market orientation
1.	2011	3.67
2.	2019	3.84
Difference (2. -1.):		0.17***

Source: own elaboration.

As we can see from Table 7, the average level of market orientation was higher in the sampled group of high-tech companies examined in 2011 compared to similar firms analyzed in 2019. Although the increase is not very considerable. The statistical difference of the change was investigated using the Mann–Whitney U test. The null hypothesis was defined as there was no statistical difference between the samples in market orientation levels. The alternative hypothesis was defined as there was a statistical difference between the samples in market orientation levels. Three levels of statistical significance were distinguished: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The analysis results show that the difference in market orientation levels among high-tech manufacturing companies examined in 2011 and comparable firms researched in 2019 was statistically significant, as the p-value was very low (< 0.001), so the null hypothesis had to be rejected. This may have indicated the growing importance of market orientation for high-tech manufacturing companies. However, when interpreting the results of this and following analyses, we should remember that they examined companies coming from two different samples consisting of different companies. Findings of a more important analysis are presented in Table 8, in which the level of companies' market orientation in the two reference years was compared with their level of competitiveness. The statistical significance of observed differences was checked using the Mann–Whitney U test. In each case, the null hypothesis was defined, as there was no statistical difference between the samples in competitiveness levels. The alternative

hypothesis was defined, as there was a statistical difference between the samples in competitiveness levels. Just like in the previous analysis, three levels of statistical significance were distinguished: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8. Market orientation level compared to the competitiveness index value in high-tech manufacturing companies sampled in 2011 and 2019

Item	Level of market orientation	Competitiveness index (2011)	Competitiveness index (2019)
1.	< = 3.5 (low)	2.85	2.55
2.	> 3.5 (high)	3.38	3.38
	Difference (2. -1.):	0.53***	0.83***
3.	> 4 (very high)	3.55	3.73
	Difference (3. -1.):	0.70***	1.17***

Source: own elaboration.

Table 8 above indicates that compared to 2011, the competitiveness of the companies examined in 2019 with a high level of market orientation (> 3.5) remained unchanged (3.38). However, the competitiveness of the companies examined in 2019 with a low level of market orientation (< = 3.5) declined from 2.85 to 2.55. This result suggested that high-tech manufacturing companies with a low level of market orientation (< = 3.5) perceived themselves as less competitive than similar companies examined eight years earlier. In contrast, companies with a very high level of market orientation (> 4.0) viewed themselves as more competitive than comparable firms analyzed eight years earlier. The difference in competitiveness between companies with a high (> 3.5) and low (< = 3.5) level of market orientation was higher among firms examined in 2019 than among those researched in 2011. The discussed difference was even larger when comparing companies with very high (> 4.0) and low (< = 3.5) market orientation studied in the mentioned years. Moreover, there appeared a very large difference in competitiveness between very high (> 4.0) and low (< = 3.5) market-oriented companies examined in 2019. Allow me to emphasize that all differences in the level of competitiveness presented in the Table 8 were statistically significant, as p-value was very low (< 0.001), so in each case, the null hypothesis could have been rejected.

In the following step, linear regression was used to check whether the level of market orientation could be used as a predictor of the level of high-tech manufacturing companies' competitiveness. The results for 2011 are shown in Tables 9, 10, and 11.

Table 9. Summary of the regression model – level of market orientation and competitiveness index

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
1	0.341	0.116	0.110	0.8270

Source: own elaboration.

Table 10. Anova: the level of market orientation and competitiveness index

Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	13.635	1	13.635	19.934	< 0.001
	Residual Error	103.965	152	0.684	–	–
	Total	117.600	153	–	–	–

Source: own elaboration.

Table 11. Coefficients: the level of market orientation and competitiveness index

Model		Unstandardised coefficients		Standardised coefficients	t-value	Significance
		B	Standard error	Beta		
1	Constant	1.241	0.434	–	2.857	0.005
	Market orientation	0.522	0.117	0.341	4.465	< 0.001

Source: own elaboration.

As can be seen in Tables 9, 10, and 11, the correlation coefficient for data from 2011 was 0.341. This meant that the model predicted 11.6% of variance in the company's competitiveness. The predictor was statistically significant since the p-value was very low (< 0.001). The regression results indicated that a unit increase in market orientation level increased competitiveness by 0.522. The same analysis was applied to data for 2019, shown in Tables 12, 13, and 14.

Table 12. Summary of the regression model: the level of market orientation and competitiveness index

Model	R	R-squared	Adjusted R-squared	Std. Error of the Estimate
1	0.476	0.227	0.225	0.7445

Source: own elaboration.

Table 13. Anova: level of market orientation and competitiveness index

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	60.979	1	60.979	110.014	< 0.001
	Residual	207.857	375	0.554	–	–
	Total	268.836	376	–	–	–

Source: own elaboration.

Table 14. Coefficients: level of market orientation and competitiveness index

	Model	Unstandardised coefficients		Standardised coefficients	t-value	Significance
		B	Standard error	Beta		
1	Constant	-1.042	0.409	–	-2.546	0.011
	Market orientation	1.113	0.106	0.476	10.489	< 0.001

Source: own elaboration.

In the case of data for 2019, the Pearson correlation coefficient was considerably higher and equaled 0.476. This meant that the model predicted 22.7% of the variance in company competitiveness; almost twice as much as in the case of data for 2011. The p-value was also very low (< 0.001), which meant that the predictor was statistically significant. Therefore, a unit increase in market orientation level increased competitiveness by 1.113, which was more than double the value obtained from data for 2011.

Another aspect investigated in the analysis was the proportion of companies with a low and high level of market orientation among companies with a low (≤ 3.5) and high (> 3.5) level of competitiveness. This analysis concentrated only on the data sample collected in 2019 (see Table 15).

Results in Table 15 indicated that 94.5% of companies with a high level of competitiveness were also characterized by a high level of market orientation. Only in 5.5% of the group – namely eight companies – was the level of market orientation low. Notably, for three out of these eight companies, the level of market orientation was assessed at 3.5, for another three – between 3.3 and 3.5, and only in one case – below 3.0. One example of a company that might have not been very highly market-oriented but focused exclusively on technology was Universal Display Corporation, founded in 1994, which holds 2000 patents and has 1600 pending patents for the production of OLED displays (Ewing, 2016). Patents concerning a popular technology in high demand

allowed the company to maintain a high level of competitiveness. However, such companies are rare exceptions.

Table 15. Share of firms with a low and high level of market orientation among companies with a low and high level of competitiveness in 2019

Level of competitiveness \ Level of market orientation	Low level of market orientation (< = 3.5)	High level of market orientation (> 3.5)
Low level of competitiveness (< = 3.5)	25.9% (60 companies)	74.1% (172 companies)
High level of competitiveness (> 3.5)	5.5% (8 companies)	94.5% (137 companies)

Source: own elaboration.

The second group included companies with low levels of competitiveness. The majority (74.5%) had a high level of market orientation. Despite this positive quality, they did not manage to achieve a high level of competitiveness.

The fact that a very small number of highly competitive companies was characterized by a low level of market orientation and a large number of firms with a low level of competitiveness were found to be highly market-oriented suggests that, today, the high level of market orientation is in most cases the key prerequisite for achieving a high level of competitiveness. However, the high level of market orientation does not guarantee that a company will achieve a high level of competitiveness.

Discussion

The above results indicate that the importance of market orientation for the competitiveness of high-tech manufacturing companies in the last eight years has increased considerably. Firms with a low level of market orientation were assessed as less competitive than similar companies in the earlier reference year. In the case of very highly market-oriented companies, the assessment of competitiveness improved over the same period. Moreover, the results of linear regression showed that the level of market orientation predicted 11.6% of the variance in competitiveness in the case of companies examined in 2011 and 22.7% in the case of comparable firms surveyed in 2019. These results confirmed H1b. Other analyses showed that the average level of market

orientation among high-tech manufacturing companies increased. The change was statistically significant, which confirmed hypothesis 1a. The increase implies that high-tech manufacturing companies have partially adjusted to market requirements. Companies with a high level of market orientation better understand their customers and the markets in which they operate (Lefferty and Hult, 2001). The high-tech market has been changing very rapidly in recent years, which resulted in a polarization in terms of entities' competitiveness: the less market-oriented companies have become less competitive, while the competitiveness of the most market-oriented companies has increased.

One of the most important findings of the study was the abovementioned growing contribution of the market orientation concept in explaining variance in competitiveness. Among high-tech manufacturing companies examined in 2011, market orientation amounted to 11.6%. In the group of comparable firms studied in 2019, market orientation rose to 22.7%. Other studies – conducted previously among different groups of companies and using different research approaches – produced similar results: 10% – Pitt *et al.* (1996); 12% – Cano *et al.* (2004); and 10% – Morgan *et al.* (2009). The growing contribution of market orientation in explaining the variance in the analyzed group of companies shows that in order to increase their level of competitiveness today, high-tech manufacturing companies should devote more attention to tailoring their products to the needs of their customers, instead of focusing on the product's technical aspects/specifications; a clear example of what Apple is currently doing (Shrout, 2017).

The rise in the importance of market orientation in explaining company competitiveness in 2019 could be attributed first to economic and cultural changes happening in Poland, which made the country culturally closer to Western Europe, and to the economic transition that happened since 1989. When Poland joined the EU in 2004, many people emigrated for work, especially to the United Kingdom. After a few years, some returned (Burrell, 2016), especially after Brexit. Ellis's (2006) study results indicated that the coefficient of determination (R^2) and is also relatively high in Western Europe.

Another factor that may have contributed to the increasing role of market orientation was the fact that Poland's economy experienced relatively high GDP growth in the period between 2011 and 2019 – on average by 3.63% (World Bank, 2020) – which substantially changed in the period between stages of the research. Moreover, the high-tech sector was affected by globalization at a much faster pace than other sectors. For instance, many Polish firms now have customers in Western countries, where they can sell their products at much higher prices. To effectively compete in these foreign markets, they must be highly market-oriented.

My study results indicate that almost all the 2019 high-tech manufacturing companies (94.5%) with a high level of competitiveness were also highly market-oriented. Only one firm was characterized by a very low level of market orientation (below 3.0). This finding confirmed hypothesis 2 and provided empirical support to the observation expressed in the article by Slater and Narver (1994): “Thinking in terms of the market (not marketing) is essential in the highly competitive arenas of today” (p. 22). Moreover, this result broadens our understanding of the role market orientation plays in the competitive position of high-tech manufacturing companies.

The main implication for managers of high-tech manufacturing companies is the need to develop and maintain the highest possible level of market orientation, as it is essential for maintaining high competitiveness. Market orientation is especially important now when the markets are changing because of the Covid-19 pandemic, thus companies must change as well. However, we should be aware of the fact that – while being a key prerequisite – the high level of the company’s market orientation does not automatically guarantee a high level of competitiveness. Notably, high-tech companies are a specific group of companies in which engineers play a key role, and without them, the operations of such companies would not be possible (Menzel *et al.*, 2007). As a result, the implementation of market orientation may create a problem of a conflict between marketers and engineers, which is a common issue found in high-tech companies (Keaveney, 2008). Nevertheless, increasing the level of market orientation in high-tech companies will require closer and more effective collaboration between these two groups. American manufacturing employers repeatedly signaled the importance of soft skills and the need to include courses such as communication in university curricula (Javdekar *et al.*, 2016). Such courses are especially necessary at technical universities, as people in technical positions often lack soft skills (Soniewicki, 2022). Moreover, the latest studies show that more attention to technical staff openness may help in market knowledge sharing inside a company (Soniewicki, 2022), which is an important element of market orientation.

Finally, there are certain limitations to the above studies. First, the studies were based on self-assessment data, which are typically used as a measure of competitiveness. Therefore, I recommend that future studies are based on more objective sources of data. Second, this paper does not constitute a longitudinal study; it is an analysis conducted at two points in time among different firms that may vary in business models, values, and goals. Different databases were used as sampling frames in each survey. The number of studied companies and the structure of samples were also slightly different, which could further influence the presented results. Third, the findings referred to Polish manufacturing high-tech companies, so any generalizations about

other regions or industries should be treated with caution. However, since the results for this group of companies proved to be quite interesting, future research should conduct a similar study on companies from other industries and other countries. It would be particularly interesting to examine the influence of the market orientation level on the competitiveness level of companies in other countries that joined the European Union in 2004. Moreover, future studies on this topic with a longitudinal approach would be an interesting option that could provide more detailed results.

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