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INTERNATIONAL DETERMINANTS OF PROFITABILITY IN THE INDUSTRY OF MINING MACHINES AND APPLIANCES IN POLAND

Summary: The objective of the article is to identify international demand and supply determinants shaping profitability of Polish enterprises in the industry of mining machines and appliances. The results of conducted quantitative research allow to conclude that profitability of these enterprises is strongly correlated with hard coal consumption in the world. The qualitative research indicates that the basic sources of competitive advantage for Polish producers on the foreign markets are: price, quality and reliability. The Polish enterprises should then use a good economic situation as well as the sources of competitive advantage in order to intensify internationalization which creates the opportunity for development and profitability improvement.

Keywords: profitability, industry of mining machines and appliances, internationalization.

1. Introduction

In the age of globalization survival and development of many enterprises becomes more and more dependent on the degree of internationalization of operations. Internationalization provides an opportunity to gain new markets. It also creates a chance to increase sales revenues when the demand of the domestic buyers has been satisfied. At the same time in a situation in which rationalization of manufacturing costs has already been mostly or even completely used, it is the only method of improving the profitability of operations. However, internationalization is connected with additional sources of risk too. Their occurrence and realization may jeopardize the assumed improvement of financial results.

Due to the importance of internationalization of enterprises, in this article the issue of international determinants of profitability is raised, based on the example of mining machines and appliances. The main objective of these considerations is to identify the international supply and demand determinants, affecting the profitability of Polish enterprises that are providing appliances to the hard coal mining industry.

2. Effectiveness and profitability in the light of literature studies

Effectiveness belongs to the group of issues used to describe management processes [Ghalayini, Noble 2006, p. 63-80]. It is a universal category but it is not always defined precisely and unambiguously [Powell 2004, p. 1017-1023]. The notion of rationality of management is strictly tied to the issue of effectiveness. Rationality of management takes into consideration in its theory two formulas: efficiency formula and savings formula. The efficiency formula assumes achieving maximum effects with constant determined expenditures. The savings formula predicts achieving determined effects while aiming at minimizing the costs incurred [Matwiejczuk 2006, p. 77]. The theory of rationality of management therefore defines the effectiveness of the enterprise's operations by comparing its effects and expenditures and, consequently, the result of economic activity of the enterprise.

The basic condition enabling the use of effectiveness categories is presenting the expenditures and results in measurable units, which allows to state clearly whether the given actions of enterprises are, or will be effective, and what would be the degree of this effectiveness [*Efektywność…* 2007, p. 233]. Effectiveness may be assessed using indicators (relative values) determining the relation between costs and revenues as well as the other way round [Kowalczyk 2007, p. 3]. From the perspective of relative values, effectiveness is the relation of results and expenditures in the form of numerical values, which presents what results are generated by expenditures [Pun, White 2005, p. 49-71]. The result achieved constitutes the indicator of effectiveness known also as the indicator of operational effectiveness [Reilly, Bron 2001, p. 631]. The indicators of operational effectiveness are used by the enterprise in different areas, depending on the goal of research. The following indicators are included among the key indicators of effectiveness: indicators of profitability, productivity, resource management – efficiency and effectiveness indicators.

The most common measures of effectiveness are the indicators of profitability [Styś 1996, p. 85-91]. They are necessary to assess the capability of enterprises to generate new capital [Sierpińska, Jachna 2004, p. 103]. In practice three areas of profitability are distinguished:

- return on sales,
- return on equity also known as economic profitability,
- return on assets (financial profitability).

3. Research methodology

The methodology of conducted research encompasses two trends – qualitative and quantitative. In the quantitative trend the aforementioned indicators of assessing

profitability have been used [Sierpińska, Jachna 2007, p. 102-108]. The way of their calculation is presented below:

$$ROS = \frac{NP}{SR} \times 100$$

$$ROE = \frac{NP}{E} \times 100$$

$$ROA = \frac{NP}{A} \times 100$$

where: ROS – return on sales,
ROE – return on equity,
ROA – return on assets,
NP – net profit,
SR – sales,
E – shareholder's equity,
A – total assets.

Additionally, in the qualitative trend the Pearson's coefficient of linear correlation was used in order to determine the relations between sales revenues of the examined enterprises and the chosen international demand determinants of their profitability. This coefficient was calculated in the following way:

$$r_{xy} = \frac{\sum_{x=1}^{n} (x_i - \bar{x}) \times (y_i - \bar{y})}{N \times s(x) \times s(y)}$$

where: $s(x)$ − standard deviation of variable x,
$s(y)$ − standard deviation of variable y,
$\bar{x}$ − arithmetic mean of variable x,
$\bar{y}$ − arithmetic mean of variable y.

The coefficient of determination (r_{xy}^2)was calculated as well, which makes it possible to determine how much of the variability of sales revenues of the examined enterprises is explained by the variability of chosen demand determinants [Sobczyk 2010, p. 104-106).

The research included four largest enterprises operating in Poland in the industry of mining machines and appliances. The research period, depending on the availability of data, encompassed maximally the years 2002-2011 and minimally the years 2005-2011.

The qualitative research was based on the results of questionnaire research conducted in the industry of mining machines and appliances in Poland in 2011. The research included 19 out of 23 enterprises operating in Poland, that provide equipment for hard coal mining industry, including the companies that were subjected to the assessment of profitability. In the questionnaire there were 25 questions concerning 5 issues. In this article, due to its subject scope and the extent of the survey conducted, only the answers concerning international supply determinants were used, included in part 2.

4. Characteristics of the industry of mining machines and appliances in Poland

The industry of mining machines and appliances is a market strongly connected with the mining industry. In Poland, because of a long-term tradition and strategic significance for the country, it is the market mostly linked to hard coal mining. A great importance for this market has lignite and copper extraction too. Poland is a significant producer of these resources in the world. The domestic recipients constitute a relatively stable and certain source of product and services sales for the industry of mining machines.

The industry structure is varied, depending on the kind of products and services offered. There may be its core distinguished which consists of machines and appliances producers for mining and enterprises of a more universal character, being the suppliers of machines and appliances of a bigger range of use than the mining industry. The latter ones are connected with the processes accompanying the underground exploitation: mechanic, electric, transporting, ventilation, air-conditioning or providing safety of extraction.

Currently, in Poland there are about 90 contractors, enterprises and institutional subjects cooperating. Over two hundred ones constitute the providers of machines, appliances and services for mining. The core of the industry providing equipment specific for the mining enterprises consists in about twenty enterprises. The industry leaders are the enterprises functioning in the form of consolidated capital groups: FamurJsc., KopexJsc., FasingJsc.and BumechJsc. In the further part of the hereby article there is an assessment of activity profitability conducted in the aforementioned enterprises using the methodology presented.

5. The measurement of profitability in the industry of mining machines and equipment

The measurement of profitability of enterprises in the industry of mining machines and appliances has been conducted based on the ROA, ROE and ROS indicators, presented in the methodological part. The results for the four examined enterprises

are presented in table 1. It is worth noting that in the whole analyzed period only KopexJsc. is unprofitable in the year 2010. All the other enterprises are characterized by positive indicators of profitability. The highest level of effectiveness is achieved by BumechJsc. and FamurJsc. KopexJsc. and FasingJsc. have slightly lower levels of profitability.

Table 1. Profitability of total assets, equity capital and sales for the examined enterprises from the industry of mining machines and appliances in 2002-2011 [in %]

Profitability indicators	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
KopexJsc.										
ROA	1.12	3.42	4.80	5.23	4.51	88.25	0.54	0.14	-0.24	1.09
ROE	3.45	9.52	18.08	18.72	12.84	11.42	0.69	0.16	-0.29	1.44
ROS	0.98	3.35	3.82	3.32	2.66	18.24	1.06	0.24	-0.38	2.57
FasingJsc.										
ROA	2.03	0.79	1.24	1.76	1.72	9.94	2.72	2.54	1.13	6.14
ROE	3.14	1.31	2.26	3.31	3.18	15.10	5.22	4.45	2.18	12.29
ROS	2.14	0.94	1.59	1.69	1.66	12.92	5.49	2.85	1.45	6.96
FamurJsc.										
ROA	l.d.	11.17	19.07	10.51	13.69	10.03	4.52	5.59	6.26	10.60
ROE	l.d.	19.01	28.41	29.39	22.79	19.25	8.89	8.14	9.96	20.03
ROS	l.d.	28.64	31.10	20.12	18.09	12.85	5.43	8.55	9.03	13.94
BumechJsc.										
ROA	l.d.	l.d.	l.d.	25.67	10.27	14.63	14.62	4.81	6.71	4.83
ROE	l.d.	l.d.	l.d.	47.22	20.34	1.81	26.47	11.89	16.05	14.48
ROS	l.d.	l.d.	l.d.	8.74	4.48	14.36	19.56	5.69	9.74	7.20

l.d.- lack of data

Source: own work based on the financial statements of the examined enterprises.

6. International determinants of demand

As it is mentioned at the beginning, the Polish industry of mining machines and appliances is strongly related to the mining industry, especially to the hard coal mining industry. The perspectives of the latter one are currently supporting the improvement of good economic conditions in the sector of machines [Karbownik, Turek 2011, p. 11-18; Jonek-Kowalska 2013(a), p. 152-162]. The reason is that extraction and consumption of hard coal is increasing in the world. Hard coal still remains the most important source of energy in the world [Jonek-Kowalska 2011(b), p. 107-130]. Therefore, the strongest determinant of enterprises profitability producing mining machines and appliances is considered to be the quantity of coal's consumption in the world [Jonek-Kowalska 2013(b), p. 456-466]. In order to evaluate the scale of this factor's influence on the profitability of the examined enterprises, the Pearson's correlation coefficient was calculated for sales revenues

of mining machines and appliances in the examined enterprises as well as for the quantity of hard coal consumption in the world. The calculation results are included in table 2.

Table 2. Pearson's correlation coefficient for sales revenues of mining machines and appliances in the examined enterprises as well as for the quantity of hard coal consumption in the world

Name of enterprise	Coefficient result	Name of enterprise	Coefficient result
KopexJsc.	0.9125	FamurJsc.	0.8793
FasingJsc.	0.8820	BumechJsc.	0.9426

Source: own work based on the financial statements of the examined enterprises and *Statistical Review of World Energy − full report 2012*.

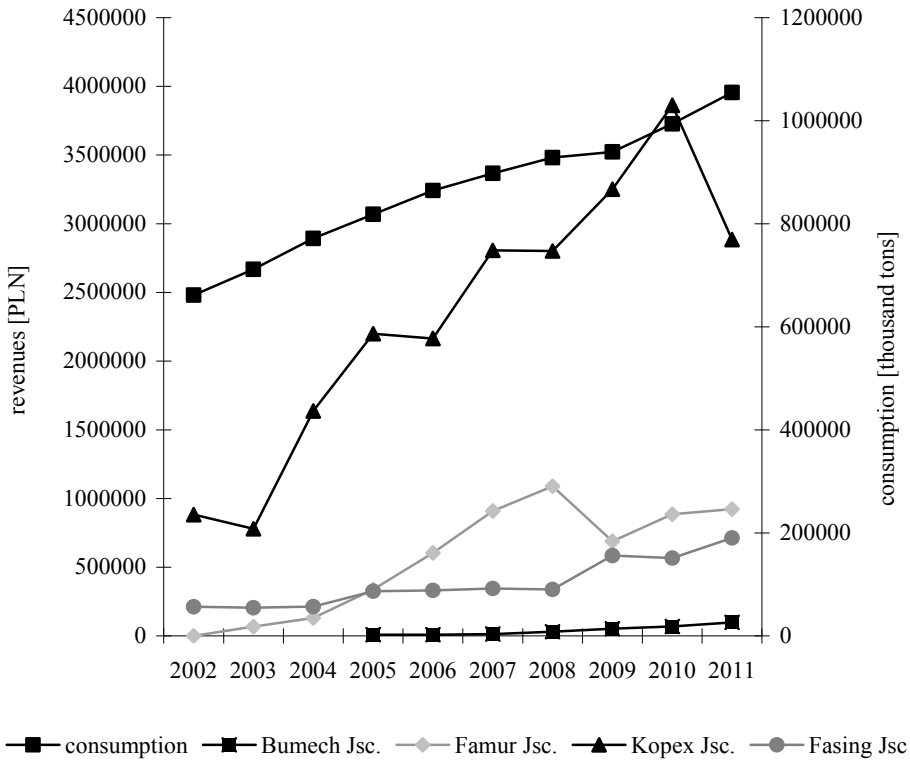

Chart 1. Sales revenues of the examined enterprises and hard coal consumption in the world in 2002-2011

Source: own work based on the financial statements of the examined enterprises and *Statistical Review of World Energy − full report 2012*.

According to the coefficients calculated, there is a strong dependence between the hard coal consumption in the world and sales revenues for Polish producers of mining machines and appliances. A graphic confirmation of this dependence is also chart 1. According to the determination coefficients, the variation of sales revenues of mining machines and appliances is in: 77% (FamurJsc.), 78% (FasingJsc.), 83% (KopexJsc.) and 92% (BumechJsc.) determined by the variation of hard coal consumption in the world. Until the year 2008 the quantity of hard coal consumption in the world had been systematically increasing. Also sales revenues were rising in the examined enterprises. In 2009 the consumption slowdown caused a stoppage of increase pace of sales revenues which started to grow again along with economic improvement in 2010. However, in 2011 sales revenues started to fall in KopexJsc. It was caused by delays in bids on Australian market, not completing the contracts in the Balkans as well as by weather changes disabling the realization of investment for Jastrzębska Spółka WęglowaJsc.

According to the above, the functioning of industry of mining machines and appliances is dependent on the hard coal consumption in the world. It is a necessary condition for the existence of this industry. Taking into account rising hard coal consumption and a dominant share of this resource in satisfying energetic needs in the world, it may be stated that the international demand determinants are favoring the development of enterprises producing the mining machines and appliances.

7. International supply determinants

Supply determinants of profitability for Polish producers of mining machines and appliances were identified on the basis of the questionnaire research described in the methodological part. The first of the chosen questions was related to the determination of range of products offered on foreign markets by the examined enterprises. The distribution of answers to that question is presented in chart 2. The biggest group of the examined enterprises exports belt conveyors and transportation systems. The enterprises also deliver long wall coal-cutting complex machines, wall and other comb conveyors, longwall powered supports and heading machines to foreign markets.

The sources of competitive advantage are different in particular countries. On the Russian market the following are indicated: price, quality and reliability. On the German market meeting the deadlines of orders is considered to be the most important source of competitive advantage.In China Polish producers are appreciated for quality and price. These two factors are also valued on the Ukrainian market along with the manufacturing technology. In turn, price and quality are the parameters which allow to get to the Czech market. In Morocco Polish producers obtain the advantage thanks to flexible adaptation to individual orders. Argentina appreciates price, quality and reliability of Polish mining machines and appliances. Such factors as meeting the deadlines of orders and additional services are less important in the competitive struggle on foreign markets.

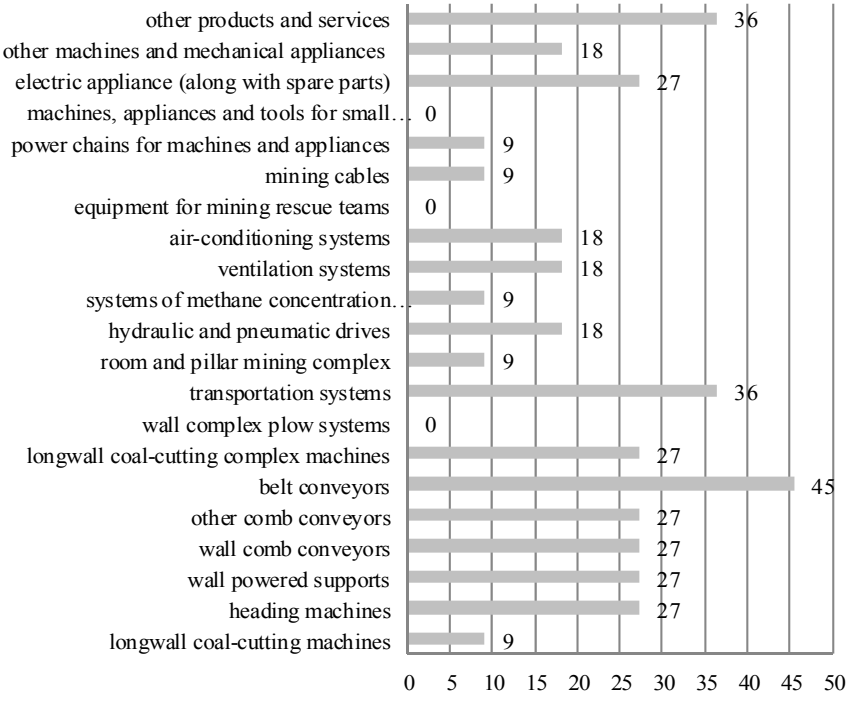

Chart 2. Products offer of the examined enterprises directed to foreign markets [% of indications]

Source: own work based on the questionnaire research.

In the next question the interviewees were indicating which of the factors included in table 3 were the most important for the three biggest foreign recipients of enterprises' products (1 − most important, 7 – least important).

Table 3. Cafeteria of answers to the question concerning the factors of own competitive advantage

Factor	Name of country 1 ……..	Name of country 2 ……..	Name of country 3 ……..
	Ranking from 1 to 7	Ranking from 1 to 7	Ranking from 1 to 7
Price			
Quality			
Reliability			
Technology			
Individual adaptation of orders (flexibility)			
Meeting the deadlines of orders			
Additional services (e.g. servicing, maintenance)			

Source: own work.

Next the interviewees were identifying the sources of competitive advantage of rivals performing on the indicated foreign markets, having the listing of factors included in table 3 at their disposal. Consequently, price is the basic source of competitive advantage of competitors on the foreign markets. There are also other important factors, among which there are recommendations and certifications from recipients. The competitors also gain the advantage thanks to the factors considered as less important by the Polish producers such as meeting the deadlines of orders and additional services.

8. Conclusions

The most important demand determinant of profitability in Polish enterprises in the industry of mining machines and appliances is demand for hard coal and consumption [Jonek-Kowalska 2011(a), p. 129-150]. The trends on the world markets analyzed in this matter provide sales markets for producers of mining machines and appliances. Nevertheless, it means for the Polish entrepreneurs that it is necessary to intensify internationalization because the Polish market of recipients of mining machines and appliances is not a market of a high rising potential [Michalak, Turek 2011, p. 77-90; Turek, Jonek-Kowalska 2013(b), p.176-179; Michalak, Jonek-Kowalska 2012].

Polish producers of mining machines and appliances possess many strengths among which the following should be indicated: very good financial results, industrial consolidation, long-term domestic and international experience. Such advantages connected with favorable determinants of international environment, manifesting themselves in the rise of hard coal consumption enable and facilitate the use of internationalization strategy in enterprise's development [Urbonavicius, Vytatuas 2010, p. 31-47].

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MIĘDZYNARODOWE UWARUNKOWANIA RENTOWNOŚCI W BRANŻY MASZYN I URZĄDZEŃ GÓRNICZYCH W POLSCE

Streszczenie: Celem artykułu jest identyfikacja międzynarodowych popytowych i podażowych determinant kształtujących rentowność polskich przedsiębiorstw branży maszyn i urządzeń górniczych. Wyniki prowadzonych badań ilościowych pozwalają stwierdzić, że rentowność tych przedsiębiorstw jest silnie skorelowana z poziomem konsumpcji węgla kamiennego na świecie. Badania jakościowe wykazują, że podstawowym źródłem przewagi polskich producentów na rynkach zagranicznych są: cena, jakość i niezawodność. Polskie przedsiębiorstwa powinny wykorzystać dobrą koniunkturę i źródła przewagi konkurencyjnej w celu intensyfikacji internacjonalizacji stwarzającej szansę rozwoju i poprawy rentowności.

Słowa kluczowe: rentowność, branża maszyn i urządzeń górniczych, internacjonalizacja.