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Article

Determinants of sales profitability for Polish agricultural distributors

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Research Article

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Determinants of sales profitability for Polish agricultural distributors

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Abstract: Due to volatile micro- and macroeconomic conditions and increasing competition, companies experience great difficulties in attaining required profitability. The objective of this paper is to identify the profitability determinants for Polish agricultural distributors in a recent period, i.e., 2006–2016. The potential determinants of profitability identified during the course of literature review and after interviews with industry experts are classified into internal and external. With the use of Spearman correlation ranks and regression analysis of figures relating to 24 Polish agricultural distributors, the following internal profitability determinants are identified: age, size, working capital components, indebtedness, salaries, and sales margins. Additionally, the study confirmed the influence of the following selected external profitability determinants: market share, unemployment rate, and several industry-specific variables. This paper proposes the first set of sales profitability determinants for Polish agricultural distributors. The results of this study are interesting for industry-level management.

Keywords: profitability, sales, return on sales (ROS), distribution, agriculture

JEL codes: M10, M41, A12, Q17, L11, L21

1 Introduction

Profitability has been, for decades, an interesting subject for many scholars and business practitioners. Nonetheless, because of constantly changing micro- and macroeconomic conditions, including increasing competition, companies still experience great difficulties in attaining required profitability. Although the literature on firms' profitability is extensive, the results of various studies from different countries and different industries are inconsistent and tend to differ. Furthermore, the findings of different studies on specific variables are also frequently inconsistent or even contradictory. For example, according to Nunes et al. [2009] and Tyagi and Nauriyal [2017], the size of companies influences profitability in a positive way, while according to Dhawan [2001] and Goddard et al. [2005], it influences profitability in a negative way. It can be concluded, therefore, that the issue of profitability determinants, for specific industries, countries, and periods still remains an open question in the empirical literature. The question of what factors influence profitability of companies is, accordingly, of high priority for both practitioners and scholars. Based on the above considerations, the objective of this paper is to identify the profitability determinants for Polish agricultural distributors in a recent period, i.e., 2006–2016. The selection of the agricultural distribution industry stems primarily from the fact that this industry has not been sufficiently studied, although it plays a significant role in Polish agricultural supply chains, which, in turn, are significant parts of larger international food chains.

The remainder of the paper is organized as follows. Section 2 provides insight into what is already identified in management literature. Section 3 describes the results of interviews conducted with two industry experts. Section 4 contains the data extracted from various databases and explains the methodology of the empirical part of the study. Section 5 presents the results of the statistical verifications. Section 6 discusses

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the results obtained, while Section 7 sums up the key findings and highlights the limitations of the research, points out some managerial implications, and provides indications for further research.

This study contributes to the extant literature by empirically investigating the relationships between sales profitability and its determinants for Polish agricultural distributors.

2 Literature review

The literature on firm profitability determinants can be, in general, classified into two major streams. Studies in the first stream analyze the internal determinants of firm profitability [Mahoney and Pandian, 1992; McGahan and Porter, 1997]. Studies in the second stream analyze the external determinants of firm profitability [Bowman and Helfat, 2001; McGahan and Porter, 2002; Hawawini et al., 2003]. The results of key studies in terms of factors identified during the course of literature review are given in the same order, respectively.

Although relationships between the age of companies and their profitability have been extensively studied, the findings presented in the literature are mixed. Older firms are considered to be more experienced, enjoy learning benefits, have better access to resources, are not prone to the liabilities of newness, as well as having more information, better reputation, greater access to business networks, and financial institutions; therefore, they are more profitable [Stinchcombe, 1965; Curran et al., 1993; Yazdanfar, 2013]. Other scholars, however, postulate that the relationship between firms' age and profitability is negative. This is because bureaucratic ossification increases with firm's age and, therefore, older companies become inflexible, which makes them less profitable, as compared to younger ones [Majumdar, 1997]. Based on the above-presented theoretical background and in agreement with the majority of scholars, the following is hypothesized:

H1 Age of the company positively influences the profitability of the firm.

Results of studies in various sectors and various countries most frequently indicate the positive relationship between the size of a firm and profitability. This is primarily because larger companies have more resources than smaller ones, so they can enjoy the economies of scale. Additionally, larger companies can easily diversify product range, which again results in increased profitability [Hall and Weiss, 1967; Nunes et al., 2009; Tyagi and Nauriyal, 2017]. Not all studies claim a positive relationship between the size of the company and profitability. Dhawan [2001] and Goddard et al. [2005] state that the relationship between firm size and profitability is negative. In this paper, in agreement with Hall and Weiss [1967], Nunes et al. [2009], and Tyagi and Nauriyal [2017], a positive relationship between the size of the firm and profitability is assumed. Therefore, the following hypothesis is postulated:

H2 There is a positive relationship between the firm size and the firm profitability.

The literature on relationships between working capital levels and firm profitability is extensive. The results of majority of studies from different countries and industries consistently show that aggressive working capital management, i.e., with shorter cash conversion cycle, improves the profitability of companies [Lazaridis and Tryfonidis, 2006; Raheman and Nasr, 2007; García-Teruel and Martínez-Solano, 2007; Karadagli, 2012]. Studies on the relationships between working capital components and profitability have also confirmed the stated negative relationships, i.e., that lower accounts receivable and inventory balances improve profitability [DeLoof, 2003; Falope and Ajilore, 2009; Pais and Gama, 2015]. Based on the above-presented theoretical background, the following two hypotheses are formulated:

H3 Lower accounts receivable levels improve firm profitability.

H4 Lower inventory levels improve firm profitability.

The use of debt offers several advantages to a firm, including inter alia, benefits of a tax shield on interests. Moreover, if the cost of equity is higher than the cost of the debt, the firm with higher debt levels tends to present higher profitability of equity [Abu-Tapanjeh, 2006]. Despite that, the majority of scholars claim that

profitability is negatively related to total gearing [Cassar and Holmes, 2003; Gedajlovic et al., 2003; Lincoln et al., 1996]. According to Myers [1984], profitable firms are less likely to increase debt levels, whereas according to Abu-Tapanjeh [2006], lower debt level decreases the risk of insolvency, which in turn should increase the profitability of the company. Some scholars claim that the relationship between gearing and profitability is statistically insignificant [Jordan et al., 1998; Hall et al., 2000]. In agreement with the majority of the scholars, the following hypothesis is developed:

H5 There is a negative relationship between indebtedness and firm profitability.

A significant number of scholars claim that environment has a strong impact on firms' financial performance [Boyd et al., 2005; Kandir, 2008; Ibrahim and Aziz, 2003; Barakat et al., 2016, Issah and Antwi, 2017]. Among the most frequently studied macroeconomic variables assumed to influence the performance of companies are the gross domestic product (GDP), exchange rates, inflation, interest rates, unemployment rates, stock exchange ratios, gold prices, and others [Gutu et al., 2015; Gurloveleen and Bhatia, 2015; Issah and Antwi, 2017]. Based on the above considerations, the following is hypothesized:

H6 Macroeconomic environment has an impact on firm profitability.

A considerable number of studies on external profitability determinants focuses on the market share–profitability relationship. That influence is commonly acknowledged to be positive [Szymanski et al., 1993; Tyagi and Nauriyal, 2017]. Dawkins et al. [2007] claim that this is primarily because the companies with higher market shares have higher market power and, so, they are able to charge higher sales prices. Other scholars claim that high market share is mainly an offshoot of high customer awareness, which results in deeper market penetration [Hussinger, 2008; Raymond et al., 2010]. Several recent studies have found a nonmonotonic, U-shaped market share–profitability relationship [Feeny and Rogers, 2000]. Accordingly, the following hypothesis is postulated:

H7 There is a positive relationship between market share and the profitability of a company.

During the course of literature review, several other factors determining the profitability of companies have been identified. These factors include, inter alia, ownership structure [Abu-Tapanjeh, 2006], lagged profitability, growth [Yazdanfar, 2013], internationalization [Mazur and Zaborek, 2013], customer loyalty [Korneta, 2018], customer satisfaction [Carù and Cugini, 1999], and research-and-development intensity [Tyagi and Nauriyal, 2017]. These factors, however, mainly because of data insufficiencies, are not subject to verifications in the empirical section of those papers.

3 Interviews with experts

Pursuant to literature review, two industry experts with more than 10 years' experience in agricultural distribution have been interviewed. One of the interviewed experts is a founder and owner of the studied agricultural distributor, and the second one is a member of the management board at the Polish subsidiary of the international distributor. The objective of this part of the study is two pronged. First of all, we aim to confirm the relevance of the findings identified during literature review for Polish agricultural distributors. Secondly, our aim is to expand the study by finding potential profitability determinants not identified in the literature.

Both experts confirmed the hypotheses developed based on literature review. Additionally, the experts suggested to include two more variables in the study, as, in practice, these two variables are considered to have significant contribution to the profitability of studied companies. These two variables, with a brief explanation of their assumed significance, are provided below.

The interviewees indicated that a relevant product mix is the variable with the highest influence on the profitability of agricultural distributors. Polish agricultural distributors operate in the following five key segments of the market: (1) crop protection; (2) fertilizers; (3) seeds; (4) crop trading; and (5) feeds trading.

The most important segment of the market is crop protection because of two reasons. Firstly, the margins on crop protection are high. Secondly, farmers have considerable difficulties with the selection of proper crop protection products. Therefore, Polish distributors provide advisory services for farmers concerning selection of the most suitable mix of crop protection products. These advisory services are free of charge; however, once the farmer selects a mix of crop protection products recommended by the distributor, the farmers tend to buy other products also from that distributor. As a result, the distributor firm earns its margin. Hence, crop protection products constitute the sales driver in the Polish agricultural industry. The experts also indicated that, if the farms have crop diseases, this is a great opportunity to gain a new client or to increase the level of sales of crop protection products. The remaining four groups of products are rather straightforward for Polish farmers; hence, no significant advisory services are required for these products. The lowest margins are earned on crop and feeds trading. The margins on these products are around 1%. Given such low margins on these groups of products, a significant proportion of distributors focus only on three key segments: crop protection, seeds, and fertilizers, while they do not operate in crop and feeds trading. As for the specific products, the experts stated that seeds of oilseed rapes and crop protection for these seeds are widely acknowledged to have the highest margin. Based on these arguments, the following hypothesis is formulated:

H8 Sales margins influence the profitability of Polish agricultural distributors.

The second variable assumed to affect profitability is the construct of salaries. Since there is a shortage of skillful sales representatives in the market, the studied distributors try to attract new employees with higher salaries. Since sales representatives with good results are usually appreciated in their companies, higher salaries do not attract them, leaving distributors with the risk of overpayment of average employees. With respect to the aforementioned points, the following is hypothesized:

H9 There is a negative relationship between the level of salaries and a firm's profitability.

The experts also stated that since the sales margins are low, many Polish agricultural distributors tend to control sales margins and other costs as a percentage of sales, so as to be profitable. In that sense, the interviewees suggested return on sales (ROS) to be a good proxy for profitability in the studied industry.

At the end of the interviews, the experts reviewed the list of the studied companies and confirmed that, according to their point of view, all significant Polish agricultural distributors have been included in the study.

4 Methodology

The sample for this study comprises 24 Polish agricultural distributors with figures concerning profitability and its determinants for 11 consecutive years between 2006 and 2016. The data used in this study originate from the following three data sources:

- Commercial Court Register (CCR): The dates of incorporation of companies are obtained from this source. This information is used to calculate the age of the studied companies in each of the analyzed years.
- Emerging Markets Information Service (EMIS): Financial statements of the 24 studied companies for the 11 consecutive financial periods between 2006 and 2016 have been obtained from this database. However, since the financial statements of a few companies relating to several analyzed years are not present in this database, the number of observations is reduced to 229. A detailed list of the companies with the number of studied financial observations is provided in Appendix 1.
- Central Statistical Office (CSO): The macroeconomic figures for the periods spanning 2006–2016 have been obtained from this database. The stated macroeconomic figures represent both Polish economy and Polish agricultural industry.

The dependent variable in this study is sales profitability, measured as the ratio of net amount to total amount of sales revenues (i.e., ROS). This ratio reveals the amount of profit that a business can extract from its total sales. Many scholars have used ROS as the measure of profitability in their studies [Baah-Acquah et al., 2017, Tyagi and Nauriyal, 2017; Rehman et al., 2014]. The remaining variables used in the study are presented and described in Table 1.

Table 1. Variables used in the study

Variable	Acronym	Description	Source
Internal determinants of profitability			
Age	AGE	Difference between the year of incorporation and the year of a study	CCR
Size 1	SIZES	Natural logarithm of sales	EMIS
Size 2	SIZETA	Natural logarithm of total assets	EMIS
Accounts receivable	ARS	Ratio of accounts receivable to sales	EMIS
Inventory	INVS	Ratio of inventory to sales	EMIS
Indebtedness	DTA	Ratio of loans [and long-term payables] to total assets	EMIS
Sales margins	SM	Ratio of sales margin on merchandises to sales of merchandises	EMIS
Salaries	PAY	Ratio of salaries [with social charges] to sales	EMIS
External determinants of profitability			
Market share	MSH	Ratio of sales of the firm in a year t to sales of the 24 studied companies in a year t	EMIS
Market share squared	MSH ²	Squared market share	EMIS
Crop	C	Yearly crop in Poland	CSO
Crop – prior year	CPY	Prior year's crop in Poland	CSO
Oilseed rape crop	OSR	Crop of oilseed rapes in Poland	CSO
Oilseed rape crop – prior year	OSRPY	Prior year's crop of oilseed rapes in Poland	CSO
Agricultural prices	P	Average agricultural product prices [prior year = 100] in Poland	CSO
Unemployment rate	UR	Unemployment rate in Poland	CSO
Gross domestic product	GDP	Growth of GDP in Poland	CSO
Return on sales	ROS	Ratio of net amount to total amount of sales	EMIS

The most frequently used proxies in management studies for the size of a company are the total sales, the total assets, or the number of employees measured by natural logarithms [Tyagi and Nauriyal, 2017; Yazdanfar, 2013]. In this study, the size of the company is measured by the natural logarithm of the total sales (SIZES) and the total assets (SIZETA).

In order to verify the influence of the environment on the profitability of agricultural distributors, the following industry-specific variables are used: C, CPY, OSR, OSRPY, and P. Additionally, two other general macroeconomic and country-specific variables are used, viz., UR and GDP.

As some scholars claim a U-shaped market share-and-profitability relationship, in this study, MSH and squared MSH are used to verify H7.

The bulk of the test of significance requires the normality assumption of both the tested variables to be at least approximately met. Therefore, prior to computation of the statistical test of significance, the normal distribution of the studied variables is verified. Based on the results of these tests, adequate statistics are selected. Additionally, to identify the direction of influence, regression analysis is used. Results of the undertaken calculations are provided in the following section of the paper.

5 Results

Table 2 provides the descriptive statistics of the variables used in the study. Due to a shift in the Polish economy from socialism to capitalism in the early 1990s, the studied companies are relatively young, as their mean age in the studied period totals 7.89 years.

Mean sales margins indicate the range of costs as a percentage of sales that the companies incur as to remain profitable. The reported low sales margins of 0.086 result from the fact that the studied companies are distributors earning only a small margin in the whole supply chain of products.

Mean growth of the GDP totaled 0.038. The minimum GDP value of 0.014 (positive) indicates that the studied sample includes no negative observations. Hence, it should be noted that the studied 11-year period does not include a recession, i.e., the study focuses only on a time of economic expansion.

The sample of studied distributor firms displays a low mean value of ROS (0.015). The maximum value of ROS in the studied sample is 0.07, while the minimum is 0.15 (negative). It should be noted that 18 of the 229 ROS observations are negative; hence, the vast majority of observations are positive.

Table 2. Descriptive statistics of variables used in the study

Variables	Mean	SD	Median	Min	Max	Skewness	Kurtosis
AGE	7.89	4	8	0	15	-0.17	-0.78
SIZES	12.54	0.96	12.61	8.95	14.23	-0.38	0.03
SIZETA	11.32	0.97	11.23	8.58	13.83	0	-0.11
ARS	0.13	0.08	0.1	0.02	0.63	2.14	6.98
INVS	0.13	0.08	0.11	0.01	0.54	2.45	8.85
DTA	0.39	1.44	0.24	0	20.01	12.12	155.46
SM	0.09	0.03	0.08	-0.08	0.15	-0.74	6.4
PAY	0.03	0.02	0.03	0	0.2	5.57	52.89
MSH	0.05	0.04	0.03	0	0.19	1.01	0.22
MSH2	0.004	0.01	0.001	0	0.03	2.16	5.78
C	35.52	4.26	35.6	26	42.7	-0.5	0.25
CPY	34.79	4.06	34.8	26	42.7	-0.23	0.44
OSR	2292.3	445.28	2219	1652	3276	0.68	-0.14
OSRPY	2222.39	507.57	2130	1450	3276	0.46	-0.48
P	104.17	12.44	99.1	86.9	126.7	0.41	-1.1
UR	0.12	0.02	0.12	0.08	0.15	-0.3	-0.73
GDP	0.04	0.02	0.04	0.01	0.07	0.43	-0.61
ROS	0.015	0.03	0.01	-0.16	0.07	-2.73	16.8
AGE	7.89	4	8	0	15	-0.17	-0.78
SIZES	12.54	0.96	12.61	8.95	14.23	-0.38	0.03

Source: Author's compilation based on 229 observations.

Next, all the studied variables have been subjected to Doornik–Hansen and Shapiro–Wilk statistical tests. These tests aim to verify the normal distribution of the studied variables. Both the selected tests have the same null hypothesis, which states that the variables are normally distributed. The results of the undertaken tests are presented in Table 3.

The results of the computations presented in Table 3 indicate, assuming a *P*-level of 0.05, that the majority of variables have no normal distributions. Based on these results, the Spearman's coefficient of rank correlation has been used in further research. The selected statistic is a nonparametric correlation based on ranked figures instead of actual ones. The Spearman statistic is used, inter alia, when the normality assumption is not met [Brau et al., 2009, Chan et al., 2009].

As provided in Table 4, the Spearman correlation rank coefficients are statistically significant and positive for the following internal profitability determinants: SIZES, SIZATA, INVS, and SM. The relationship between indebtedness (DTA) and ROS is also statistically significant, however, conversely to other internal determinants, negative. As for the external determinants of profitability, market share (MSH and MSH²) is positively and statistically significantly related to the profitability of the studied companies. Moreover, the Spearman coefficients confirmed the negative and statistically significant relationships between the factors C, CPY, and OSR and the dependent variable profitability.

The results of regression analysis are provided in Table 5. The regression analysis confirmed, together with Spearman correlation, the relationships between profitability and the variables SIZES, SIZATA, INVS,

Table 3. Results of the selected normality tests and respective *P*-values

Test	Doornik–Hansen		Shapiro–Wilk	
	Variable	Result	Result	<i>P</i> ($\alpha=5\%$)
AGE		9.89765	0.97029	9.851e-005
SIZES		6.16262	0.97858	0.00151235
SIZETA		0.000323009	0.993696	0.447568*
ARS		179.122	0.81898	1.29356e-015
INVS		254.635	0.791157	8.56903e-017
DTA		21259.2	0.136772	4.76925e-031
SM		112.083	0.928297	4.10533e-009
PAY		812.3	0.646111	1.50604e-021
MSH		97.1915	0.889546	6.66675e-012
MSH ²		278.928	0.70686	8.90185e-020
C		11.9835	0.92870	5.89382e-010
CPY		4.10753	0.916443	5.47388e-011
OSR		41.4505	0.911185	2.11768e-011
OSRPY		22.8493	0.933558	1.62383e-009
P		52.7621	0.902558	4.81683e-012
UR		17.0994	0.934979	2.2038e-009
GDP		24.9032	0.923325	2.01676e-010
ROS		120.817	0.74721	1.92898e-018

Note: *Significant at 5%.

Source: Author's compilation based on 229 observations.

Table 4. Spearman correlation rank coefficients between profitability (ROS) and studied variables

Internal variable	Coefficient		External variable	Coefficient	
AGE	0.0396		MSH	0.2583	*
SIZES	0.1921	*	MSH ²	0.2583	*
SIZETA	0.2363	*	C	−0.1687	*
ARS	−0.0872		CPY	−0.1333	*
INVS	0.2513	*	OSRPY	−0.1174	
DTA	−0.2274	*	OSR	−0.1527	*
SM	0.4768	*	P	0.0700	
PAY	−0.1188		UR	0.1279	
			GDP	0.0540	

Notes: *Significant at $\alpha < 0.05$; $p > 0.1297$.

Source: Author's compilation based on 229 observations.

SM, and DTA. Additionally, regression analysis identified statistically significant relationships between the remaining variables (AGE, ARS, and PAY) and ROS. Accordingly, regression analysis confirmed that all the studied internal determinants influence the profitability of agricultural companies.

Based on the results presented in Table 6, it can be concluded that MSH, MSH², P, and UR affect ROS in a positive and statistically significant way, whereas variables C, OSR, and OSRPY influence profitability in a statistically significant but a negative way.

6 Discussion

The results of the regression analysis investigating the relationship between the age of companies and profitability are statistically significant and positive. Accordingly, H1, postulating the positive relationship between the age of the firm and profitability, is accepted. This finding is aligned to the

Table 5. Regression analysis of profitability (dependent variable) and its internal determinants (independent variables)

Variable	Coefficient	Std. error	t-ratio	P-value	
Age					
AGE	0.00112157	0.00041577	2.6976	0.00751	***
Const.	0.00596091	0.00367619	1.6215	0.10630	
Size 1					
SIZES	0.00701696	0.00169385	4.1426	0.00005	***
Const.	-0.0732012	0.0213076	-3.4354	0.00070	***
Size 2					
SIZETA	0.00790913	0.00166369	4.7540	<0.00001	***
Const.	-0.07471	0.0188992	-3.9531	0.00010	***
Accounts receivable					
ARS	-0.0721615	0.0195378	-3.6934	0.00028	***
Const.	0.0240339	0.00298559	8.0500	<0.00001	***
Inventory					
INVS	0.0642469	0.021065	3.0499	0.00256	***
Const.	0.00668563	0.00313446	2.1329	0.03400	**
Indebtedness					
DTA	-0.00579902	0.00110973	-5.2256	<0.00001	***
Const.	0.0170606	0.00164912	10.3453	<0.00001	***
Sales margins					
SM	0.472413	0.0559907	8.4373	<0.00001	***
Const.	-0.02593	0.00504749	-5.1372	<0.00001	***
Salaries					
PAY	-0.672554	0.0910289	-7.3884	<0.00001	***
Const.	0.0335883	0.00295768	11.3563	<0.00001	***

Note: ***, **, and * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively.

Source: Author's compilation based on 229 observations.

results presented by Stinchcombe [1965], Curran et al. [1993], Yazdanfar [2013] and opposite to what is claimed by Majumdar [1997].

Both Spearman and regression coefficients confirm the statistically significant and positive relationship between the size of the company and its profitability. These findings support the thesis that larger companies enjoy economies of scale. As a result H2 postulating there is a positive relationship between the firm size and the firm profitability, must be accepted. Hence, the results of this study endorse the findings of other studies by Hall and Weiss [1967], Nunes et al. [2009], and Tyagi and Nauriyal [2017]. Simultaneously, the findings of this study do not confirm what has been postulated by Dhawan [2001] and Goddard et al. [2005].

The results obtained in this study are not fully aligned to the findings presented by the majority of scholars with respect to the findings on relationships of the working capital components with profitability, according to which, lower balances of accounts receivable and inventories improve profitability. This paper indicates that lower levels of accounts receivable and higher levels of inventories improve the profitability of the studied companies. As a consequence, H3 is accepted, whereas H4 must be rejected. The distribution industry, conversely to other industries, might require higher levels of stocks; therefore, the frequently identified negative relationship between stock levels and profitability in other studies has not been confirmed; instead, a positive relationship has been observed.

This study confirms that lower debt levels improve the firms' profitability. Hence, H5 is accepted. These findings are therefore aligned to the findings presented in the literature by, inter alia, Cassar and Holmes [2003], Gedajlovic et al. [2003], and Lincoln et al. [1996].

The results of this study confirm that the environment influences the profitability of Polish agricultural distributors. Hence, H6 is accepted. The findings of this study are aligned to results presented by other scholars for other industries. Furthermore, the negative and statistically significant relationships between profitability and crop-related variables (C, CPY, OSR, and OSRPY) confirm the thesis formulated by industry experts.

Table 6. Regression analysis of profitability (dependent variable) and its external determinants (independent variables)

	Coefficient	Std. error	t-ratio	P-value	
MSH					
MSH	0.179704	0.0429658	4.1825	0.00004	***
Const.	0.00617894	0.00262593	2.3530	0.01947	**
Squared MSH					
MSH ²	1.22363	0.306833	3.9879	0.00009	***
Const.	0.0102404	0.00199168	5.1416	<0.00001	***
Crop					
C	-0.000829093	0.000403887	-2.0528	0.04124	**
Const.	0.0445037	0.0145606	3.0564	0.00251	***
Crop – prior year					
CPY	-0.000564952	0.0004142	-1.3640	0.17393	
Const.	0.0345658	0.0145803	2.3707	0.01859	**
Oilseed rape crop					
OSR	-9.14215e-06	3.66473e-06	-2.4946	0.01332	**
Const.	0.0360109	0.00865928	4.1587	0.00005	***
Oilseed rape crop – prior year					
OSRPY	-6.80975e-06	3.31166e-06	-2.0563	0.04090	**
Const.	0.0300963	0.00761863	3.9504	0.00010	***
Agricultural prices					
P	0.000264379	0.000134957	1.9590	0.05134	*
Const.	-0.0126431	0.0141137	-0.8958	0.37131	
Unemployment rate					
UR	0.188311	0.0920717	2.0453	0.04198	**
Const.	-0.00717373	0.010878	-0.6595	0.51026	
Gross domestic product					
GDP	0.0693383	0.10331	0.6712	0.50279	
Const.	0.0122228	0.00420767	2.9049	0.00404	***

Note: ***, **, and * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively.

Source: Author's compilation based on 229 observations.

According to the interviewees, crop protection products are sales drivers. The stated negative relationships indicate that if the crop produce is low, farmers are more likely to buy, in the current year and the following year, more crop protection products recommended by distributors. When the crop yields are low, farmers buy more crop protection products in order to improve crop yields. Since crop protection products are high-margin products, the profitability of the distributors improves. Conversely, if the crop levels are high, the farmers tend to spend less on crop protection products. This, in turn, does not allow distributors to earn extra margins.

The results obtained in this study confirm the positive relationship between market share of the company and profitability (H7). As a consequence, these results endorse what is postulated by Szymanski et al. [1993] and Tyagi and Nauriyal [2017]. However, the claim by Feeny and Rogers [2000] about a U-shaped market share-and-profitability relationship is not confirmed for Polish agricultural distributors. This is because the *P*-values obtained in the regression analysis for MSH² are not higher than for the MSH variable.

Finally, the empirical part of the study confirms both the hypotheses developed based on experts' indications, i.e., H8 and H9. Therefore, it can be concluded that higher margins and lower salaries improve the profitability of Polish agricultural distributors.

7 Conclusions

The profitability determinants identified during the course of literature review can be classified into internal and external ones. In this study, the following internal profitability determinants for Polish agricultural distributors have been identified: age, size, accounts receivables, inventory, indebtedness, salaries, and

sales margins. All the stated determinants, with the exception of accounts receivables, indebtedness, and salaries, influence profitability in a positive way. Among the studied external profitability determinants for Polish agricultural distributors, this study has confirmed positive and statistically significant relationships between the determinants market share, crop prices, and unemployment rates on the one hand and profitability on the other. Additionally, the findings of this study indicate negative relationships between yearly crop yields and profitability of the studied companies.

The results of this study are especially interesting for industry-level management. In particular, the managerial implication of this research is to focus on reduction of indebtedness, accounts receivable balances, and salaries of Polish agricultural distributors and to reasonably increase inventories, sales margins, and market shares. The managers of the studied industry should also keep in mind the following profitability determinants, which although not manageable, should be considered through business operations planning process: age, size, yearly crop yields, crop prices, and unemployment rates.

This study has, however, several limitations. The sample of studied companies relates only to one industry and one country; the findings, therefore, might not be generalizable to other countries or other industries. Additionally, the studied period does not comprise the time of recession but only includes the time of economic expansion. Associations between the studied variables might be different during economic slowdowns.

The aforementioned limitations of the study are, however, a good indication for further research. Additionally, future research could focus on other determinants of profitability not identified in this study.

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Appendix 1: Mean values of the selected variables relating to the companies investigated in the study

	Company	N	AGE	SIZES	SIZETA	ARS	INVS	DTA	SM	PAY	MSH	MSH ²	ROS
1	Chemiról	11	10	13.905	13.17	0.207	0.153	0.102	0.125	0.031	0.136	0.019	0.052
2	Osadkowski	10	6.5	13.82	12.444	0.083	0.116	0.22	0.085	0.026	0.114	0.013	0.011
3	Agrolók	11	10	13.606	12.273	0.151	0.09	0.262	0.086	0.022	0.102	0.011	0.012
4	AmpolMeról	11	10	13.537	12.108	0.102	0.094	0.288	0.081	0.023	0.093	0.009	0.016
5	Agrosimex	11	10	12.98	11.883	0.045	0.212	0.011	0.127	0.02	0.053	0.003	0.049
6	Scandagra	11	9	13.069	11.907	0.146	0.097	0.042	0.079	0.029	0.06	0.004	−0.004
7	Agrii	11	10	13.464	11.503	0.095	0.026	0.218	0.098	0.024	0.087	0.008	0.019
8	Procam	10	10.5	12.713	11.98	0.339	0.114	0.065	0.111	0.044	0.04	0.002	0.019
9	Osadkowski-Cebulski	11	9	12.878	11.853	0.174	0.121	0.507	0.084	0.027	0.048	0.002	0.021
10	ATR	11	9	12.191	11.193	0.217	0.11	0.52	0.075	0.022	0.025	0.001	0.009
11	AgroSieć	11	9	12.271	10.946	0.094	0.097	0.359	0.062	0.021	0.026	0.001	0.008
12	Narolco	11	8	11.069	10.132	0.172	0.152	0.343	0.091	0.027	0.008	0	0.008
13	Ulenberg	7	4	10.743	10.42	0.117	0.38	0.303	0.117	0.018	0.005	0	0.05
14	Progress Chem	6	0	11.261	9.866	0.055	0.119	0.372	0.083	0.031	0.01	0	0.01
15	Wialan	11	10	12.176	10.868	0.073	0.133	0.216	0.107	0.046	0.024	0.001	0.026
16	Kazgod	9	9	12.113	10.747	0.117	0.091	0.271	0.076	0.038	0.025	0.001	0.009
17	Agro-Efekt	10	9.4	13.059	11.826	0.093	0.109	0.31	0.088	0.029	0.055	0.003	0.019
18	AgroBakałarzewo	9	8	12.662	10.903	0.101	0.053	0.223	0.06	0.014	0.043	0.002	0.007
19	Agroskład	11	1.9	12.552	11.007	0.069	0.108	0.191	0.047	0.013	0.035	0.001	0.021
20	Agricola-Lublin	10	5.5	11.805	10.069	0.049	0.092	0.162	0.076	0.04	0.015	0	0.011
21	ChemagroTrade	9	5	11.865	10.489	0.1	0.13	0.575	0.055	0.008	0.018	0	−0.009
22	Adler Agro	11	8	11.637	10.59	0.065	0.223	0.195	0.079	0.027	0.014	0	0.013
23	Polish Agro	3	2	11.822	10.957	0.17	0.16	0.664	0.075	0.043	0.013	0	−0.042
24	Baywa	3	1	10.557	10.255	0.459	0.192	9.834	0.112	0.127	0.005	0	−0.099
	Average	9.541	7.28	12.41	11.22	0.14	0.13	0.68	0.09	0.03	0.048	0.004	0.01

Note: N – number of observations.