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SMALL BUSINESS MANAGEMENT IN RELATIONSHIPS OF MICRO AND MACRO ENVIRONMENT

Abstract:

Building the economy of a country and its competitive strength on international markets constitutes the determinant of the economic power of globalization. Countries, wishing to take an active part in creating this power must exert impact on their economy in terms of innovation, entrepreneurship and flexibility of management of their business. However, building the economy of the country begins from the bottom, therefore, from the local - regional industry. In Poland, this industry consists in the enterprises of the SME sector, where there predominate small companies that do not have the financial potential e.g. for the development being the result of using modern technologies. The State (the policy run by the authorities) and aid programs of the European Union have a significant share in the development of such companies. However, the progress in business greatly depends on the enterprise itself and, particularly, the strategy selected as the leading one.

The paper is an attempt to select factors both from the micro and macro environment. Degree of dependence and impact of these factors on each other/ the company represents valuable information for those managing small businesses. It may constitute the first step towards the decision in what direction the enterprise will develop or if it will be able to satisfy the requirements set e.g. by the external environment.

Keywords:

small business, business environment, management

JEL Classification: M21, F64, Q56

Introduction

Building the economy of a country and its competitive strength on international markets constitutes the determinant of the economic power of globalization. Countries, wishing to take an active part in creating this power must exert impact on their economy in terms of innovation, entrepreneurship and flexibility of management of their business. However, building the economy of the country begins from the bottom, therefore, from the local – regional industry. In Poland, this industry consists in the enterprises of the SME sector, where there predominate small companies that do not have the financial potential e.g. for the development being the result of using modern technologies. The State (the policy run by the authorities) and aid programs of the European Union have a significant share in the development of such companies. However, the progress in business greatly depends on the enterprise itself and, particularly, the strategy selected as the leading one. (Mesjasz-Lech, Zabój, 2007) The paper is an attempt to select factors both from the micro and macro environment. Degree of dependence and impact of these factors on each other/ the company represents valuable information for those managing small businesses. It may constitute the first step towards the decision in what direction the enterprise will develop or if it will be able to satisfy the requirements set e.g. by the external environment.

The analysis of micro and macro factors refers to small business management on the example of the footwear industry on a regional scale. For the purpose of the research there were used quantitative methods. There were built two econometric models for appropriate variables:

- a. Microeconomic meters,
- b. Macroeconomic meters in the context of long-term dependencies.

The conducted modelling allows for acquiring the data on which variables significantly affect the process of decision-making associated with small business management. The obtained information in the field of internal (mainly productive) factors directly influencing the enterprise (micro meters) and external (mainly national economy) factors indirectly influencing the region in which the enterprise operates (macro meters), will allow to indicate the variables which should be taken into account in the selected mode of conduct while implementing e.g. changes since certain variables will create the desired results the most significantly in the process of introducing innovative solutions, associated with the development of entrepreneurship in small businesses.

Microeconometric model

The modeling procedure refers to building four separate models due to diversified dependent variables and the same, in each case, independent variables. The aim of such a conduct was to indicate variables which, at the stage of the elimination of variables, will indicate the ones which will be the most important for the adopted

criterion. The selected criteria were associated with independent variables, thus the determinants of: profit maximization for the profit criterion (Y_Z), cost minimization for the cost criterion (Y_K), the number of days of production of (footwear) collection for the time criterion (Y_{CZ}) and the number of manufactured pairs of footwear per month for the quantitative criterion (Y_I). The obtained information will serve the creation of the solution path recognized by the decision-maker as optimal. The process of acquiring key independent variables was built using a simple graph method by S. Bartosiewicz (Bartosiewicz, 1973), which will allow to indicate variables (X_1, \dots, X_n) exerting the greatest impact on the dependent variable (Y).

The subsequent stages of conduct are the following (Strahl et al. 2004):

- a. Building correlation coefficient matrix **W**
- b. Building correlation coefficient vector **R₀** of the variable Y with candidates for independent variables
- c. Building correlation coefficient matrix **R** between candidates for independent variables
- d. Determining critical value of correlation coefficient
- e. Constructing the modified correlation coefficient matrix **R'**
- f. Building the graph of relationships between candidates for independent variables
- g. Determining the degree of each node of the graph **k**
- h. Selecting independent variables of the model

There were adopted the following internal factors, which constitute potential independent variables:

X_1 – number of employees [single persons]

X_2 – amount of production and transport machinery and equipment [items]

X_3 – average value of machinery and equipment [PLN thousand]

X_4 – mid-term pace of changes of the number of footwear companies in the region[%]

X_5 – number of enterprises in the footwear industry in the region [items]

X_6 – profit per unit [PLN]

X_7 – unit cost [PLN]

X_8 – amount of man-hours [items]

X_9 – minimum daily production [items]

There were adopted the subsequent values of Y for the criterion according to the following division:

Y_Z – profit maximization for the profit criterion [PLN]

Y_K – cost minimization for the cost criterion [PLN]

Y_{CZ} – number of days of the collection production for the time criterion [number of days]

Y_I – number of manufactured pairs per month for the quantitative criterion [items]

In relation to the above assumptions, there were built four models, obtained on the basis of the relationships presented in Table 1.

Table 1: The number of connections within the nodes

number of connections	criterion			
	profits (Z)	cost (K)	time (CZ)	quantities (I)
$k_{Z,K,CZ,I} X_1 = 3$	$[r_{01}] = 0,994$	$[r_{01}] = 0,716$	$[r_{01}] = 0,189$	$[r_{01}] = 0,500$
$k_{Z,K,CZ,I} X_4 = 3$	$[r_{04}] = 0,994$	$[r_{04}] = 0,716$	$[r_{04}] = 0,189$	$[r_{04}] = 0,500$
$k_{Z,K,CZ,I} X_5 = 3$	$[r_{05}] = 0,994$	$[r_{05}] = 0,716$	$[r_{05}] = 0,189$	$[r_{05}] = 0,500$
$k_{Z,K,CZ,I} X_6 = 3$	$[r_{06}] = 0,994$	$[r_{06}] = 0,716$	$[r_{06}] = 0,189$	$[r_{06}] = 0,500$
$k_{Z,K,CZ,I} X_2 = 3$	$[r_{02}] = 0,401$	$[r_{02}] = 0,962$	$[r_{02}] = 0,756$	$[r_{02}] = 1,000$
$k_{Z,K,CZ,I} X_3 = 3$	$[r_{03}] = 0,401$	$[r_{03}] = 0,962$	$[r_{03}] = 0,756$	$[r_{03}] = 1,000$
$k_{Z,K,CZ,I} X_7 = 3$	$[r_{07}] = 0,374$	$[r_{07}] = 0,954$	$[r_{07}] = 0,775$	$[r_{07}] = 1,000$
$k_{Z,K,CZ,I} X_9 = 3$	$[r_{09}] = 0,401$	$[r_{09}] = 0,962$	$[r_{09}] = 0,756$	$[r_{09}] = 1,000$
$k_{Z,K,CZ,I} X_8 = 0$	$[r_{08}] = 0,541$	$[r_{08}] = 0,307$	$[r_{08}] = 0,964$	$[r_{08}] = 0,553$

Source: Own study based on data established

On the basis of the above elimination of variables, finally, the individual criteria were described by the following models:

— Profit criterion:

$$Y_Z = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_4 + \alpha_3 X_5 + \alpha_4 X_6 + \varepsilon$$

— Cost criterion:

$$Y_K = \alpha_0 + \alpha_1 X_2 + \alpha_2 X_3 + \alpha_3 X_9 + \varepsilon$$

— Time criterion:

$$Y_{CZ} = \alpha_0 + \alpha_1 X_2 + \alpha_2 X_3 + \alpha_3 X_8 + \alpha_4 X_9 + \varepsilon$$

— Quantitative criterion:

$$Y_I = \alpha_0 + \alpha_1 X_2 + \alpha_2 X_3 + \alpha_3 X_7 + \alpha_4 X_9 + \varepsilon$$

On the basis of the conducted modelling – perceiving the models generally, as a whole – it can be concluded that the most frequently, the key factors depicting the condition of the surveyed small business are affected by the variables X_2 , X_3 and X_9 , which respectively represent: amount of production and transport machinery and equipment; average value of machinery and equipment and minimum daily production. Therefore, the individual independent variables affecting the dependent variables

constitute strategic factors which the management staff should pay particular attention to in the course of the conduct of the development process.

Macroeconometric model

The procedure of building the model refers to identifying independent variables (X_n) affecting the dependent variable (Y) and, subsequently, subjecting them to verification to assess their significance. The stage of selection of candidate variables takes place in the same way as in the microeconomic model. Another step is estimation of the parameters of the model and verification, which refers to the following stages in the conducted studies:[3]

- a. Coincidence
- b. Admissibility
- c. Normality of distribution of random element
- d. Symmetry of random distribution
- e. Randomness of distribution of random element
- f. Significance of structural parameters
- g. Stationarity of random deviations (heteroskedasticity)
- h. Autocorrelation of random element

The econometric model was built on the basis of the data from the period of 10 years (2006-2015) and refers to the dependent variable Y , which is represented by the number of footwear companies in the surveyed region, described with six candidate factors for independent variables (X_1, \dots, X_6), which include:

X_1 – gross domestic product [PLN billion]

X_2 – sold production of industry [PLN billion]

X_3 – export of goods [EUR million]

X_4 – import of goods [EUR million]

X_5 – average employment in the economy [thousands of people]

X_6 – average nominal monthly gross salary in the national economy in the enterprise sector [PLN]

The selection of the above potential variables is justified by the factors creating the national economy, whose share is constituted by footwear companies, and individual variables indirectly regulate the number of companies in the surveyed area. Therefore, it is important to have the knowledge of economic variables significantly affecting the size of the local market of the surveyed sector. The process of implementation of changes in the context of innovative solutions in the company requires information fully describing the external environment, therefore, in the course of the conducted research, there was made the selection of variables for all potential independent

variables ($X_1 - X_6$) and for potential variables with the exclusion of the strong variable describing GDP (it directly creates the national economy), to assess which, out of the other ones, influences the dependent variable (Y). To obtain the overall view, the subsequent stages of verification referred to the model of all variables. Taking into account the above assumptions allowed for building the model for which the preliminary results were obtained (Table 2), which subsequently were classified in accordance with the adopted conduct research methodology.

Table 2. Selection of variables by accepted level of significance $\alpha = 0,01$

for variables $X_1 - X_6$		for variables $X_2 - X_6$	
$r_i \leq r^*$		$r_i \leq r^*$	
0,990	$[r_{1,1}] = 0,990$	0,971	$[r_{6,1}] = 0,979$
0,971	$[r_{1,2}] = 0,983$	0,960	$[r_{6,2}] = 0,967$
0,960	$[r_{1,3}] = 0,974$	0,923	$[r_{6,3}] = 0,957$
0,923	$[r_{1,4}] = 0,949$	0,863	$[r_{6,4}] = 0,936$
0,863	$[r_{1,5}] = 0,904$	0,979	$[r_{6,5}] = 0,924$
0,979	$[r_{1,6}] = 0,995$		

Source: Own study based on data obtained from Central Statistical Office (www.stat.gov.pl)

In the process of selection of independent changes towards all the candidates, the variable X_1 influences the dependent variable. The model has the form: $Y = \alpha_0 + \alpha_1 X_1 + \varepsilon$. In turn, during the selection of independent changes excluding the variable of GDP, the variable X_6 influences the dependent variable. Therefore, the model has the form: $Y = \alpha_0 + \alpha_1 X_6 + \varepsilon$. Another step is parameter estimation. For this purpose, using the packet of *Data Analysis – MS Excel*, there were obtained the models presented in table 3.

Table 3. Parameter estimation

for one variable X_1	$\hat{Y}_t = \frac{2007,913}{(53,924)} - \frac{1,010X_{1t}}{(0,048)}$
for one variable X_6	$\hat{Y}_t = \frac{2334,264}{(101,059)} - \frac{0,513X_{6t}}{(0,036)}$
for all variables $X_1 - X_6$	$\hat{Y}_t = \frac{2368,653}{(813,866)} + \frac{1,027X_{1t}}{(2,777)} - \frac{0,041X_{2t}}{(0,622)} - \frac{0,026X_{3t}}{(0,017)} + \frac{0,018X_{4t}}{(0,011)} - \frac{0,092X_{5t}}{(0,110)} - \frac{0,473X_{6t}}{(0,812)}$

Source: Own study based on Central Statistical Office (www.stat.gov.pl)

The above data allow for the following conclusions:

In the case of the variable X_1 – if the value of GDP decreases by PLN 1 billion, the average fall in the number of footwear companies in the surveyed region will amount to 1.010 companies. The standard error of the evaluation of the structural parameter at the variable X_{1t} means that in the situation of re-examination on a different sample of the same size this evaluation could fluctuate on average by $\pm 0,048$.

In the case of the variable X_6 – if the value of the average nominal monthly gross salary in the national economy decreases by PLN 1, the average fall in the number of footwear companies in the surveyed region will amount to 0.513 company. The standard error of the evaluation of the structural parameter at the variable X_{6t} means that in the case of re-examination on a different sample of the same size, this evaluation could fluctuate on average by $\pm 0,036$.

In the case of the variables $X_1 - X_6$ – if the value of GDP decreases by PLN 1 billion, the average fall in the number of footwear companies in the surveyed region will amount to 1.027 companies, assuming that the other variables do not change. If the value of sold production of industry decreases by PLN 1 billion, the average fall in the number of footwear companies in the surveyed region will amount to 0.041 company, assuming that the other variables do not change. If the value of export of goods decreases by EUR 1 million, the average fall in the number of footwear companies in the surveyed region will amount to 0.026 company, assuming that the other variables do not change. If the value of import of goods increases by EUR 1 million, the average increase in the number of footwear companies in the surveyed region will amount to 0.018 company, assuming that the other variables do not change. If the value of the average employment in the economy decreases by 1 thousand of people, the average fall in the number of footwear companies in the surveyed region will amount to 0.092 company, assuming that the other variables do not change. If the value of an average nominal monthly gross salary in the national economy in the enterprise sector decreases by PLN 1 the average fall in the number of footwear companies in the surveyed region will amount to 0.473 company, assuming that the other variables do not change.

Verifying the reasonability of the evaluation of structural parameters due to the sign indicated that not all estimates of the parameters standing at independent variables are reasonable because of the sign, the model does not possess the properties of coincidence, which may result from the occurrence of statistical collinearity of variables.

The value of the coefficient of determination means that in 99.6% the variability of the dependent variable was explained by the independent variables of the model, i.e. it is formed under the influence of the factors included in the model – the model is admissible.

In the course of verifying the conformity of distribution of random element with normal distribution, on the basis of the formulated hypotheses, (significance level $\alpha = 0,01$) it

can be stated that distribution function of residues is similar to distribution function of normal distribution, which allows for constructing statistical tests for the evaluation of the quality of the econometric model.

Subsequently, on the basis of appropriately defined hypotheses and 10% estimation error, there were verified:

- correctness of the analytical form of the model – random element has symmetrical distribution, i.e. the numbers corresponding to the values of the valuable distribute symmetrically around the largest number
- correctness of the selection of the analytical form of the model – residual distribution is randomized
- significance of the impact of the independent variables on the dependent variable – comparing the results of F-Test and Student's t-test, the variables X_1 and X_4 exert relatively greatest impact on the variable Y
- stability of the variance of random deviations – the variance changes with time
- if the sequence of residuals is the sequence of independent random variables – the lack of autocorrelation indicates that there is not a linear relationship of random deviations coming from different periods of the research.

The above modelling indicated that the macroeconomic factors influencing the number of footwear companies in the surveyed region may include: the variable representing GDP and an average monthly gross salary in the national economy in the enterprise sector. However, all the variables were subjected to the process of subsequent calculations for the purpose of the thorough examination of their impact on the number of enterprises operating in the area of the surveyed region. The research indicated that the analysis of significance of structural parameters isolated the variable defined as 'import of goods', having statistically significant impact of the dependent variable, which was confirmed by the importance index. A high value of the coefficient of determination and the lack of autocorrelation of the first and second order indicates the appropriately selected analytical form of the model and good adjustment of the variables. The obtained data will serve as the information which allows for the conclusion that the observation of the variables X_1 , X_4 and X_6 will enable the management staff to introduce changes in the decision-making process in the course of development of entrepreneurship in footwear small business.

Cointegration of the selected variables (X_1 , X_6)

The conducted research is aimed at determining long-term relationship between the macroeconomic phenomena referring to the relationship between GDP and an average monthly gross salary in the national economy in the enterprise sector compared to the number of enterprises in the surveyed region, as well as between the independent variables themselves. The selection of variables is justified by the verification made during verifying the macroeconometric model and possessing knowledge in the field of the influence of these variables on each other, therefore,

whether it is possible to observe a single variable whose variability will reflect the reality for another variable.

The research includes the analysis of (Strahl et al. 2004):

- Long-run equilibrium using spurious regression,
- Degree of integration using a single-element test,
- Cointegration test through the examination of cointegration of variables,
- ECM for cointegrated time series using Engle-Ganger two-step method.

The conducted analyses referred to the combination of the variable Y with the variable X_1 and the variable Y with the variable X_6 , as well as the variable X_1 with the variable X_6 . In the course of the conducted research, there were obtained the results presented in Table 4, classified in accordance with the adopted conduct research methodology.

Table 4. Summary results of cointegration for adopted variables

	for variable		
	Y with variable X_1	Y with variable X_6	X_1 with variable X_6
character of model	$\hat{Y}_t = \frac{2007,913}{(53,924)} - \frac{1,009X_{1t}}{(0,048)}$	$\hat{Y}_t = \frac{2334,264}{(101,059)} - \frac{0,513X_{6t}}{(0,036)}$	$\hat{X}_{1t} = \frac{-332,702}{(46,234)} + \frac{0,512X_{6t}}{(0,016)}$
spurious regression $DW > R^2$	yes	yes	no
degree of integration for a single variable	$X_1 \sim I(3)$	$X_6 \sim I(3)$	$Y \sim I(1)$
cointegration testing	Y, $X_1 \sim CI(1 \text{ i } 3, 1)$ – lack of cointegration	Y, $X_6 \sim CI(1 \text{ i } 3, 3)$ –lack of cointegration	$X_1, X_6 \sim CI(3)$

Source: Own study based on Central Statistical Office (www.stat.gov.pl)

The above data allow for the following conclusions.

The occurrence of spurious regression in the case of the relationship of the independent variables with the dependent variable allows to define if the relationships based on the economic theory, are confirmed in the results of the empirical analyses, which may indicate an apparent significant relationship between the examined variables. Relationships between the independent variables are significant in nature only in the case of the relationships of the dependent variables.

During the conducted research, there was used the zero intercept model where, in the course of calculations, to obtain stationarity, there was made, so called, differentiation, i.e. calculating increments. There was obtained the lack of autocorrelation of random

deviations and there was observed the integration of the third order for the independent variables whereas the first increments Y_t are stationary and the variable is integrated in the first order.

It can be acknowledged that two variables are cointegrated when they are nonstationary, integrated in the same way and their linear combination is stationary or integrated to a lower extent. Time series are cointegrated when $Y_t, X_t \sim CI(d, b)$ for $d \leq b > 0$. (Engle, Granger, 1987)

Only time series X_1, X_6 comply with the above theoretical assumptions for the occurrence of cointegration between the examined variables. Therefore, the statement that the relationship between GDP and an average nominal monthly gross salary in the national economy in the enterprise sector is a long-term relationship is reasonable. There was used ECM for the cointegrated variables with reference to these variables, obtaining its form $\widehat{X}_{1t} = 51,143 + 0,196\Delta X_{6t} + 0,206ECM_{t-1}$. The calculations indicated that the average increase in GDP increment, resulting from unit growth of increments of average nominal monthly gross salaries in the national economy in the enterprise sector amounts to PLN 0.196 whereas 20.6% is the error for the model in the long-run equilibrium, which can be underestimation or overestimation of the postulated equilibrium compared to real data (and, therefore, the degree of order correction mechanism).

Conclusions

The conducted research has been to indicate the factors which will represent the areas having real impact on small business management from two perspectives. The first one referred to the microenvironment, which is built through: the number of employees (1); amount of production and transport machinery and equipment (2); average value of machinery and equipment (3); mid-term pace of changes in the number of footwear companies in the region (4); number of enterprises in the region in the footwear industry (5); profit per unit (6); unit cost (7); amount of man-hours (8); minimum daily production (9) with reference to (Z) profit maximization for the profit criterion; (K) cost minimization for the cost criterion; (CZ) number of days of the collection production for the time criterion (I) and number of manufactured pairs monthly for the quantitative criterion. The other one referred to the macroenvironment consisting of: number of footwear companies in the surveyed region (Y); gross domestic product (1); sold production (2); export (3); import of goods (4); average employment in the economy (5) and average nominal monthly gross salary in the national economy in the enterprise sector (6).

Summing up the conducted modelling, there can be indicated the combinations of variables for the model of micro- and macroeconomic factors. In the internal case, for the criteria assigned to them: time (X_2, X_3, X_7, X_9), cost minimization (X_2, X_3, X_9), quantitative (X_2, X_3, X_8, X_9) and profit maximization (X_1, X_4, X_5, X_6), as well as the external factors (X_1, X_4, X_6). The obtained data allow for the observation of these variables, which indicators show the strongest relationships and which are important in

the process of selection of the optimal path of introducing changes. The calculations indicate that the amount of production and transport machinery and equipment, average value of machinery and equipment and minimum daily production constitute the factors which will create the decision-making process the most significantly. This indication is directly related to the innovative process and, therefore, it can be concluded that footwear small business management, in the perspective of internal changes, is dependent of the level of technical equipment of the machine park, which will amount to daily production. Estimating the significance of the components of the macroenvironment seems to be in close relationship with the microenvironment since it is GDP along with an average nominal monthly gross salary that exert impact on a small footwear company. They are, and even more precisely GDP, the measure of the volume of production, i.e. what the entrepreneur will produce and sell. Therefore, during the process of decision-making, associated with innovative and entrepreneurial small business management, there should be taken into account the needs and capabilities of the company itself since only the development of individual enterprises will create a powerful economy of the whole country.

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