

## **THE IMPORTANCE OF THE STRATEGY OF CREATING NEW VALUES FOR THE PRODUCTIVITY OF METAL PROCESSING INDUSTRY**

**Lena Sigurnjak** | Ph.D., Assistant professor, University of Slavonski Brod, Croatia;  
lena.sigurnjak@unisb.hr; ORCID ID: 0000-0002-4833-1517

***Abstract:** Strategy is one of the tools that achieves the desired market position, or competitiveness of the company. To achieve a competitive advantage, enterprise must have a well-designed and formulated strategy. The technological environment is a factor that represents the overall knowledge that people possess about how things are done, how innovations are created, how production, distribution and sales are carried out. The technology sector involves the creation of new knowledge and the exploitation of knowledge that creates new products: products, processes and materials. The development of technology is easily seen in new products, tools, machines and productivity. Three main goals of paper are presented: to analyse theoretical framework of production and competitiveness, to analyse and explain areas of Croatian metal processing industry, and to conduct research about entrepreneurial development based on creating new values and productivity. Methodology of this paper is based on research and statistical analysis (Spearman's correlation, Kruskal Wallis test. Research is conducted on 508 firms (large size, small and medium) in sectors of Croatian metal processing industry. For data collecting is used postal Business Croatia and for data analysis is used SPSS statistical program (version 16.0, SPSS Inc., Chicago, IL, USA). Result of the paper is strategic recommendation that could create new values and improve level of productivity in metal processing industry. Nowadays, is necessary to find strategic models according to set parameters, how creating of new values can develop and increase a productivity and competitive position.*

**Key words:** Strategy, Productivity, Competitiveness, Metalprocessing, Industry

**JEL classification:** L16

### **INTRODUCTION**

Choosing a strategy is necessary to identify potential competitors in the market, anticipate their actions, and the outcomes and procedures that result from their business actions. In order to choose an effective strategy, a company must know its capabilities and capabilities, and must anticipate and recognize the strategies of its competitors. The key concept for selection comes down to the ideas of motivation,

information and evaluation that form the golden triangle for strategy selection. These three elements must work together and at the same time. (Zeckhauser, 1991.) When company implement strategy there are several elements that it includes. These can be: Building a capable organization, redirecting resources to strategic critical activities, setting a strategic-imitating policy, maintaining best practices and programs for continuous improvement, setting up information, communication and operating systems, motivating people to follow set goals, linking rewards to the results obtained, creating a corporate culture that supports the strategy, using the leadership needed to drive the process forward and sustain improvement. (Buble, 2005) Successful strategy bring company toward a competitiveness. The competitiveness of a company lies in specific resources, resources that are extremely difficult to copy and imitate, which ultimately manifests itself in lower operating costs, higher product quality, innovation or product inventions, etc. (Tece, Pisano, & Shuen, Vol. 18. No. 7.) Production strategy is a component of mission, competitive advantages (specific capabilities), goals and policies. By achieving its goals, production contributes to achieving the goals of the company as a whole. The production strategy is aimed at achieving the company's goals. (Schroeder, 1999.) Production goals are quantitative and measurable. The strategic importance of production is important for the development of the entire production company. The theoretical reference framework for competitiveness in production begins with resource strategic theory. Since the 1970s, competitive strategies in manufacturing have dramatically changed the business world and the way we do business. Competitive priorities belong to the first phase of production strategies that act as a bridge between business strategy and production goals. The production strategy contributes to long-term competitiveness and business success. The production process means what happens to the objects from the entry of raw materials into production, to the exit of finished products from production. This process consists of: work at production workplaces, quality control, internal transport, storage, preventive protection at work, preventive maintenance of means of work, energy and water supply. (Žugalj & Strahonja, 1992.)

Production competitiveness stimulates the interest of the company to invest and seek innovative outputs, such as innovation (products or processes), or in terms of change (individual or radical), and their impact on the business of the company. Product innovation is usually linked to strategic factors and innovation processes driven by market pressures. (Roper & Hewitt-Dundas, 2008.) On the other hand, radical innovation can be a means of entering a new business, while incremental innovation contributes to improvement and maintaining financial performance. Product innovation corresponds to the creation of a new production function that includes the possibility of differentiating existing products. The process of innovation can be seen as an external element of the existing supply function, which corresponds to lower variable costs in the production of an existing product or service, thus increasing productivity. (Cohen & Klepper, 1996.) Different types of innovation show different effects on enterprise productivity and growth. In some cases, innovation increases efficiency primarily through reducing human labour inputs. In others, innovation raises productivity mainly through the expansion of production. (Eiriz, Faria, & Barbosa, 2013.) The concept of competitive positioning is a multidimensional phenomenon based on a strategic approach and the company's efforts to achieve a positive market performance through

material characteristics and positive customer perception of the company through intangible resources. (Agić, Kurtović, & Čičić, 2012.)

Introducing new products is a risky venture for the company, because about 90% of new products fail. The failure rate of industrial products can be up to 30%. (Harvey, 2000.) In competitive markets, the most successful companies achieve growth and profitability in the long run thanks to the successful development and launch of new products and services.

How industry is attractive can be one of main elements of firms' profitability and success. So according to Porter strategy for achieving competitive position on market must be determined with understanding of competing rules that make industry attractive. Core aim of competitive strategy is compliance and enforcement of rules, and enforcing the rules in firm in order to achieve competitive position on market. (Porter, 2008.)

The metal processing industry in the Republic of Croatia has a long tradition of successful business and development until 1990. Industry power, competitiveness and attractiveness depends on its quality. Development and quality of an industry are defined by elements such as structure, planning, controlling, technology, capital and investments, human resource structure, production and product competitiveness, skills of workers, etc. (Stiperski, 1995.) The main feature of industrial development is the technological improvement of production. The cause of the success and competitiveness of the Japanese industrial product is more in continuous technological improvement than in great scientific discoveries. An industry that is not technologically improving is doomed. Technological improvement of production requires significant financial resources and special professional skills of the workforce. (Sayer, 1989.)

According to the National Classification of Activities 2007 (NKD 2007), the metal processing industry belongs to Section C, which includes the activities of the processing industry that deals with the transformation of raw materials into new products. When classifying activities, there can often be ambiguity about the boundary between the boundaries between the manufacturing industry and other areas of the classification system. (Državni zavod za statistiku, 2022.) The metal industry sector includes:

- C24 Manufacture of basic metals
- C25 Manufacture of fabricated metal products, except machinery and equipment
- C28 Manufacture of machinery and equipment

## LITERATURE REVIEW

Competitiveness is one of the most commonly defined terms in economics. It is based on the implementation of the strategy. In production, in addition to an effective strategy, it is necessary to constantly introduce innovations in the production process. Many authors research productivity, strategy, competitiveness, and innovation. The literature review provides an overview of research on scientific and professional articles by domestic and foreign authors dealing with this topic.

Oeji et. al. in their research tries to improve industrial productivity of enterprises and organisations. The aim of paper is to develop strategy for organisation productivity by creating uniformed strategy for productivity, which can be applied on all industry branches. (Oeji, Have, Van Rhijn, & Kuijt-Evers, 2012.)

Clougherty research productivity and strategy. Business stagnation is nowadays characteristics of market, because of lack of productivity growth. "While the extant literature focuses on specific transformational strategies that particular firms, or industries, take in responding to productivity threats, questions regarding which transformational strategies are commonly employed and commonly successful have been neglected." (Clougherty, Duso, Seldeslachts, & Ciari, 2000.)

Belova in paper research new strategy business models such as blue ocean strategy. Blue ocean strategy vs. red ocean strategy is new strategical model that determines a competitive position and pathway of enterprise. "For their distribution on success and challenges the method of comparison was used. The evaluation of factors of success challenges was carried out by expert methods." Application of the methodology worked out by authors will allow to define the readiness to the realization of blue ocean strategy. (Belova, Krainiuchenko, Rozumei, & Pietukhova, 2000.)

Author Linag in paper tries to analyse the technological development and competitive situation of domestic dairy enterprises in an all-round way. The characteristics and differences of patent behaviour and patent strategy are analysed and compared in order to provide suggestions and countermeasures for the optimization of patent technology research and development activities and patent strategy of dairy enterprises, and to help dairy enterprises to enhance economic benefits and international competitiveness better and faster. (Liang, Liang, & Shi, 2020.)

Rohanova in paper determining the financial strategy. Their research follows period of five years where financial indicators of enterprises are calculated in matrix. Calculations are defeminated according strategy of finance and strategy indicators in order to improve financial condition on firm. (Rohanova & Yaryna, 2021.) Nedeliaková research quality and strategy correlation. "When determining the **strategy** in the company, it is necessary to find the right method and way of management and implementation. This can be facilitated by a number of models, tools and methodologies." (Nedeliaková & Hranický, 2021.) The paper defines the starting points for setting changes in the **strategy** affecting the quality of the company's services.

Kowo research competitive strategies for small and medium firms based on cost leadership and cost reduced operations. For research in paper is used questionnaire survey. (Kowo, Sabitu, & Adegbite, 2018.) Burrit et. al research strategy, options for achieve level of sustainability and management board that is oriented towards sustainability. Also, "local cultural sustainability perspectives in developed and developing host countries; MNEs with home in developing/emerging countries; and resource availability for implementing sustainability initiatives." (Burritt, Christ, Rammal, & Schaltegger, 2020.)

According to Hao to paper presents how green economy and innovation can create sustainability. "Environmental regulation and managerial ties, as two important external moderation variables." (Hao, Fan, Long, & Pan, 2019.) Cooke et. al. claims that internationalization strategies could be conceptualized with implications for human resource management. (Cooke, Wu, Zhou, Zhong, & Wang, 2018.) Gloor in paper made statemen that strategic adjustments to keep up with the strains on the economic environment. (Gloor, Bürgi, & Pauli, 2008.) The article of Sestacovscaia is dedicated to the problem of investment strategy. "Different visions of investment strategy concept within the framework of an enterprise and their importance in the course of en-

terprise's long-term development.” (Sestacovscaia, 2013.) According Baranov, paper presents components of strategic management that are crucial for firms' operations and implementation of strategic purposes choices and how to realise and achieve them. (Baranov, 2012.) According Du and Miao the rapid development of e-commerce is driving many traditional manufacturing enterprises to establish online channels. (Du, Cui, & Su, 2018.)

Ko and Liu base their paper and research on resource theory and strategy of small and medium firms. They research how to create a framework that helps to analyse business processes according to firm's strategy (Ko & Liu, 2017.) According Yaprak, Demirbag, and Wood global economy is transformed since last few decades in way of internationalization in comparison with local markets. (Yaprak & Demirbag, 2018.) Andres and Poler research that business networks are created form partners, where each has own specific strategy (Andres & Poler, 2016.) According Kubon and Krasnodębski competitive position and advantage is based on costs and cost management (Kubon & Krasnodębski, 2010.)

Zakrzewska-Bielawska in their paper research correlation between high developed firms according to technology level and technology implementation and on the other hand its strategy. Research presents impact of management on innovation process and development. (Zakrzewska-Bielawska, 2016.) Radicic and Pugh in their paper brings research of influence of open innovation on small and medium firms in different sectors. (Radicic, 2019.)

Matey et. al. research productivity in their paper, so organizational behaviour management strategies and lean manufacturing approaches are compatible and produce positive changes in performance. (Matey, Gravina, Davis, George, & Rosbrook, 2021.) According to Tausky and Curt when individual accountability was introduced, productivity rose steeply and then subsided as accountability decreased. It is noted that discontent rose with productivity. (Tausky & Chelte, 1983.) Authors Quintana and Leung “identify, study and quantify the effects of lighting on yield and productivity in manual electronics assembly (MEA) and inspection as a limiting work design criterion.” (Quintana, Leung, & Chen, 2008.) According to Omić et. al. in their paper analyse metal processing industry. Paper is based on human resource analysis (job satisfaction, job safety, productivity, and other dimensions of workplace). (Omić, Brkić, Spasojevic- Golubović, Brkić, & Klarin, 2017.)

## **METHODOLOGY**

This paper is made according research of 508 metal processing firms (small sized, medium sized and large. Research is conducted on three main sectors in metal processing industry: C 24, C 25 and C 28. Sample of firms is taken form all areas of Croatia (20 counties plus City of Zagreb, total 21 areas). Data were taken from Business Croatia and statistically analysed according 39 financial indicators for each firm.

Categorical data are presented in absolute and relative frequencies. Numerical data are described median and limits interquartile range in case of distribution that does not follow a normal distribution. The normality of the distribution of numerical variables was tested by Kolmogorov-Smirnov test. Differences normally distributed numerical variables between the two groups were tested for departure from the normal



distribution Mann-Whitney U test, and in the case of three or more groups were tested by Kruskal-Wallis test. The link between numerical variables was assessed by Spearman correlation coefficient  $\rho$  (rho). To study the influence of individual predictors of the dependent variable, and the impact of the model as a whole, was used univariate and multivariate regression analysis. All P values are two-sided. The level of significance was set at  $\alpha = 0.05$ . For statistical analysis of the statistical program SPSS (version 16.0, SPSS Inc., Chicago, IL, USA).

## RESULTS AND DISCUSSION

The results of the research are based on data about enterprises taken from Poslovna Hrvatska in Croatia.

H: Strategically oriented companies creating new value in the metalworking industry are generally significantly more productive.

To test the hypothesis: Strategically oriented companies to create new value in the metalworking industry are generally significantly more productive, to assess the correlation of newly created value with other parameters will use Spearman's correlation coefficient which is nonparametric equivalent Pearson's correlation coefficient (correlation between product rank) variables (newly created value with observed parameters: credit rating, total income and expenses, EBITDA, EBIT, EBT, income tax, net profit, newly created value, productivity, money, exports and imports, assets / liabilities, fixed and current assets, capital and reserves, current liquidity ratio, Altman Z scor, days of receivables and liabilities in days, operating margin, money cycle in days, ROE, ROA, income per employee and net profit per employee, average net salary of employees). It is based on measuring the consistency of the correlation between ordered variables, and the form of the correlation (e.g. the linear form which is a prerequisite for using the Pearson coefficient) is not relevant.

The cases in which the Spearman coefficient is used are, for example, when there is no linear relationship between the variables, and it is not possible to apply an appropriate transformation that would translate the relationship into a linear one. The Spearman correlation coefficient as a result gives an approximate value of the correlation coefficient which is treated as its sufficiently good approximation. The calculation of the coefficient is done by using the values of the assigned ranks. The Spearman coefficient is denoted by Rho ( $r$ ). The basis of Spearman's rank correlation coefficient are pairs of rank-variable variables or numerical variables transformed into rank-variables. The modalities are each rank variable from the set of first  $n$  natural numbers. If the ranks are equal in each pair, their differences are equal to zero, and the coefficient takes the value 1, in which case we speak of a complete positive correlation of rank. When the modality order of one rank variable is reversed from the order of the other variable in the pair, the coefficient will assume a value of -1, so the association score is complete and negative. If the significance level is 0.05, the decision is made by comparing the test size (sample rank correlation coefficient) with the critical value of the sampling-distribution of the rank correlation coefficient for probability, ie for the significance level and sample size. The alternative hypothesis contains the opposite claim that there are tendencies that large values of one variable are paired with large values of another variable (positive correlation) or that large values of one variable are related to small values of another variable (negative correlation). Correlation coefficient val-

ues greater than 0.5 and less than -0.5 are said to be good, i.e. the closer the value is to number 1 or -1 the excellent the correlation.

For the purposes of the test, two assumptions are made:

H1: there is no connection between the newly created value and the observed parameters,

H2: there is a correlation between the newly created value and the observed parameters.

The level of significance of the test was set to  $\alpha = 0.05$ . Therefore, if the significance level of the test is less than 5% (significance level of 5% equals 95% reliability), the assumption H1 will be rejected and the alternative assumption H2 will be accepted, ie there will be a significant correlation between the number of employees and the observed parameters. If the significance is higher than 5%, H2 will be rejected and H1 will be accepted, ie a statistically significant correlation between the number of employees and the observed parameters will not be proven.

After the correlation analysis, univariate and multivariate regression analysis will be performed to see how much of each of the predictors most influences the newly created value, and then the influence of the model (all significant predictors of univariate analysis) on the newly created value (dependent variable).

The correlation matrix of the correlation of the newly created value with the observed parameters shows that all parameters are statistically significantly correlated with the observed parameters. The highest level of correlation is shown by the predictors: average net salary ( $r = 0.774$ ), trade receivables ( $r = 0.820$ ), trade payables ( $r = 0.754$ ), total assets / liabilities ( $r = 0.828$ ), current assets ( $r = 0.859$ ), capital and reserves ( $r = 0.791$ ) and the difference between operating income and operating expenses of the company that does not include depreciation expense (EBITDA) ( $r = 0.728$ ). The weakest is the positive correlation with the rate of return on equity (ROE) ( $r = 0.206$ ). liability days, receivables days and credit rating.

Negative correlations of newly created value are with liabilities binding days, receivables binding days and credit rating.

Spearman's correlation coefficient gives an estimate of the correlation of the newly created value with the observed parameters. A good correlation (greater than 0.500) of the newly created value with most parameters has been proven. As the correlation coefficient ( $Rho$ )  $r > 0.500$  and the significance is less than 0.05, the assumption .2 is accepted that there are significant correlations of newly created value with average net salary, EBITDA, EBIT, EBT, income tax, net profit, productivity, net working capital, money, trade receivables, trade payables, exports and imports, total assets / liabilities, fixed and current assets, with capital and reserves, and income per employee (Table 1). From the above, it is clear that the hypothesis has been confirmed.

**Table 1.** Spearman's correlation coefficient of the newly created value with the observed parameters

	Spearman's coefficient (Rho)	
	Rho(r)	p
Average net salary	0,774	<0,001
Credit rating	-0,495	<0,001
Number of board members	0,317	<0,001
EBITDA	0,728	<0,001
EBIT	0,647	<0,001
EBT	0,656	<0,001
Profit tax	0,515	<0,001
Net profit	0,650	<0,001
Productivity	0,671	<0,001
Net working capital	0,502	<0,001
Money	0,698	<0,001
Trade receivables	0,820	<0,001
Commitments towards suppliers	0,754	<0,001
Export	0,777	<0,001
Import	0,648	<0,001
Total assets / liabilities	0,828	<0,001
Fixed assets	0,746	<0,001
Current assets	0,859	<0,001
Capital and reserves	0,791	<0,001
Current ratio	0,283	<0,001
Altman Z score	0,295	<0,001
Receivables binding days (days)	-0,208	<0,001
Commitment days (days)	-0,129	<0,001
Operating margin	0,272	<0,001
ROE	0,206	<0,001
ROA	0,385	<0,001
Income per employee (HRK)	0,514	<0,001
Net profit per employee (in HRK)	0,349	<0,001

Source: author

To avoid erroneous predictions of regression coefficients, the statistical insignificance of some independent variables that are actually significant in relation to the dependent variables (newly created value), and vice versa, independent variables that strongly correlate with each other are excluded from further analysis. For the univariate analysis, the following variables are taken: credit rating, number of members of the management board, profit tax, productivity, money, trade receivables, imports, current liquidity ratio, Altman Z scor, income per employee and net profit per employee. The newly created value is significantly influenced by the credit rating, the number of members of the management board, profit tax, productivity, money, trade receivables and imports (Table 2).



**Table 2.** Individual influence of parameters on the change of newly created value - univariate regression analysis

Parameter	Standardized Coefficient b	t	p
Credit rating	-0,229	-5,007	<0,001
Number of board members	0,238	5,223	<0,001
Profit tax	0,398	9,756	<0,001
Productivity	0,216	4,569	<0,001
Money	0,618	17,7	<0,001
Trade receivables	0,673	20,46	<0,001
Import	0,413	10,19	<0,001
Current ratio	-0,027	-0,597	0,550
Altman Z score	0,015	0,338	0,736
Income per employee (HRK)	0,068	1,384	0,167
Net profit per employee (in HRK)	0,036	0,740	0,460

Source: author

Significant predictors (credit rating, number of board members, profit tax, productivity, money, trade receivables and imports) were observed as the model that most influences the newly created value. The model as a whole is statistically significant,  $p < 0.001$  and as a whole explains 62.4% of the variance of the newly created value, and a correction of 61.9%. Five independent predictors give a unique statistically significant contribution to the model (number of board members, income tax, money, trade receivables, imports). The strongest predictor affecting newly created value is trade receivables ( $b = 0.529$ ) (Table 3).

**Table 3.** Final model of the impact on the change of newly created value - multivariate regression analysis

Parameter	Standardized Coefficient $\beta$	t	p
Number of board members	0,086	2,502	0,013
Profit tax	0,207	6,035	<0,001
Money	0,371	9,516	<0,001
Trade receivables	0,529	12,934	<0,001
Import	-0,137	-3,225	0,001
Konstanta		-1,425	0,155

Source: author

The newly created value is significantly affected by the credit rating ( $p < 0.001$ ), number of board members ( $p < 0.001$ ), profit tax ( $p < 0.001$ ), productivity ( $p < 0.001$ ), money ( $p < 0.001$ ), trade receivables ( $p < 0.001$ ) and imports ( $p < 0.001$ ), while other parameters do not significantly contribute to the newly created value. Predictors that

have a significant individual contribution (credit rating, number of board members, profit tax, productivity, money, trade receivables and imports) were observed as the model that most influences the newly created value. The model as a whole is statistically significant (all parameters together, significantly contribute to the newly created value), ( $p < 0.001$ ) and as a whole explains 62.4% of the variance of the newly created value, and the correction of 61.9% of the variance of the newly created value. Five independent predictors give a unique statistically significant contribution to the model (number of board members, income tax, money, trade receivables, imports). Of the five significant predictors, we single out trade receivables ( $b = 0.529$ ), as the strongest predictor that affects the newly created value. The standardized coefficient  $b$  shows the number of standard deviations for which the values of the dependent variable (newly created value) would change if the predictor (trade receivables) were changed by one unit of standard deviation.

## CONCLUSION

The strategy is one of the most important guidelines for achieving a greater competitive advantage of companies based on the productivity of manufacturing companies. The aim of this paper was to investigate division of metal processing industry in Croatia and to research influence of creating new values on productivity in metal processing industry. Data were collected by Poslovna Hrvatska for 508 enterprises in metal processing industry in Republic of Croatia. According extensive analysis conducted, it is spotted the significance of new values to the manufacturing industry, and on the overall productivity of enterprises in Croatia. Research has shown that the metal processing industry has great potential, and it is important to implement strategic methods and models so that industry could achieve higher productivity level. The paper should contribute to determining strategic models that develops productivity of manufacturing enterprises in metal processing industry. in Croatia. This research can be a starting point for more detailed research - to include more parameters, more enterprises and more detail research.

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