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**DEVELOPMENT OF THE QUANTITATIVE FIVE FORCES ANALYSIS
AS A STRATEGIC MANAGEMENT TOOL**

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In the article opportunities for the development and improvement of Porter's Five Forces Model implementation for strategic management were found. Main criterions of determining the strength of competitive forces within the industry, and thus affecting the industry attractiveness were identified. The methodology of Quantitative Five Forces Analysis for determining the attractiveness of industry in quantitative terms was designed, which can become the tool for strategic decision-making.

Key words: *strategic planning, strategic analysis, industry analysis, competitive forces, Five Forces Model, industry attractiveness.*

JEL code: L 10, L19, M10

INTRODUCTION

Many researchers now emphasize that strategic planning and decision making is one of the most important aspects any manager should undertake. The essence of strategy lies in the establishing a balance between company's competences and the conditions of external environment in which it operates.

As the industry environment is quite complex and has a significant bearing on the company's strategic actions, industry analysis is considered to be complicated and important stage of strategic planning. Industry analysis, therefore, must be carried out in a systematic way to find the attractiveness of a particular field and the competitive position enjoyed by a company within that area.

Many aspects of strategic planning were investigated and developed by such foreign scientists as I. Ansoff, G. Hamel, H. Mintzberg, M. Porter, C. K. Prahalad; and in particular – in a field of strategic industry analysis - by W. I. Boucher, A. V. Bruno, G. B. Daniel, L. Fahey, F. Heckner, R. Grant, R. Grunig, R. Kuhn, J. K. Leidecker, T. V. Mecca, J. L. Morrison, V. K. Narayanan, M. Porter, etc. Currently there is a shortage of investigations on industry analysis as a strategic management tool in the national science. The works of Ukrainian scientists, including Y. Ivanov, G. Kindratska,

N. Kudenko, Z. Shershnyova, V. Smolin, A. Tyshchenko and others are primarily focused on strategic planning process and formulation of competitive strategies.

PROBLEM STATEMENT

The relevance of this work is determined by the growing need for effective tool on strategic decision-making in the modern market conditions that imply strong competition between business entities for consumers and leading market position. Under such circumstances, the effective implementation of industry analysis can be decisive for the companies' long-run survival and growth.

What is apparent throughout the previous studies is that there are a lot of different approaches for strategic analysis that can be applied for each firm. The Five Forces Model of industry structure, developed by Michael Porter, is considered to be a useful tool to analyze industry's competitive forces and to shape organization's strategy according to the results of the analysis. Despite the criticism of this framework as rather analytical tool than practical, we consider it as functional and perspective for using as decision-making technique in strategy.

The aim of the research is to develop the comprehensive methodology for strategic decision-making based on the quantitative assessment of competition forces structure and industry attractiveness.

RESULTS

In their work G. Stonehouse and B. Snowdon (Stonehouse and Snowdon, 2007) cited Porter's statements and according to them the Five Forces framework allows a company to assess both the attractiveness of its industry and its competitive position within that industry through an evaluation of the strength of the threat of new entrants to the industry; the threat of substitute products; the power of buyers or customers; the power of suppliers; and the degree and nature of rivalry among businesses in the industry.

Porter's framework helps to explain how a company might build market barriers and determines the most reasonable strategy to achieve an advantage within the structure of the 5 Forces. According to Porter, the potential for a company to be profitable is negatively associated with increased competition, lower barriers to entry, a large number of substitutes and increased bargaining power of customers and suppliers. On the basis of analysis of these Forces, Porter argues that an organization can develop a generic competitive strategy of differentiation or cost leadership, capable of delivering superior performance through an appropriate configuration and coordination of its value chain activities (Stonehouse and Snowdon, 2007).

Some scientists called this approach "technocratic" and critiqued it for its reliance on a rational, logical and linear model of the analysis and planning. According to T. Grundy this model is self-contained, thus not being specifically related, for example, to 'PEST' factors, or the dynamics of growth in a particular market (Grundy Tony, 2006). We can add that simplification of the microeconomic tendencies into only 5 Forces may lead to fail assumptions; as well as subjectivity of the evaluation using the expert method brings the bias into results.

However, this description is not complete to embrace all the elegance and completeness of Porter's model, which we think is, to our opinion, the most

potential tool for further using. This kind of structuring of the Forces may exist in several dimensions, depending on focus of the researcher: life cycle of the industry, type of standardization of the product, placement of the element in value chain. And what is the most important, it allows to consider the dynamic of the Forces' Strength by implementing readable and comprehensive quantitative evaluation of every Force.

That's why we designed the following methodology for Quantitative Five Forces Analysis that includes the following steps.

Step 1. Gathering the information on each of the Five Forces

Here managers should analyze the competitive structure of their industry in terms of Porter's Five Forces framework (Porter, 1979, 2008). It is necessary to gather all relevant information about the industry and to check each impact-factor influencing each competitive force. The most important factors or second order determinants of the Forces are identified below.

- Threat of new entrants: barriers to entry (economies of scale, product differentiation, costs inequity, customer switching costs, cost or quality advantages offered by main players, access to distribution channels, government policy restrictions), expected retaliation (availability of resources to fight back, competitors' willingness to cut prices, industry growth).

- Bargaining power of suppliers: number of suppliers, level of supplier concentration, switching costs in changing a supplier, differentiation of purchased resources, importance of industry for supplier, potential threat of forward integration.

- Bargaining power of buyers: number of buyers, level of buyer concentration/ purchase volumes, level of buyers' sophistication, buyers' switching costs, proportion of industry product purchase in buyers' expenditures structure, buyer price sensitivity, importance of the products or services quality for the buyers, potential threat of backward integration.

- Threat of substitutes: number of substitutes, obvious advantage of substitute, buyers' switching costs to the substitute, profitability level of industries offering substitutes (their ability to grow fast).

- Intensity of rivalry: numbers of equal (in size and power) competitors, industry growth, product differentiation, magnitude of capacity of expansion required, exit barriers, diversity of rivals, threat of horizontal integration.

Step 2. Analyzing and estimating the results, displaying them on a chart

After gathering all the information, strategist should analyze it and determine how each Force is affecting the industry. In order to do so, it is necessary to identify each of the Five Forces strength using expert evaluation of the factors mentioned above. Expert estimates vary from 0 to 3 points, and are adjusted for the weights of criteria. The patterns for expert evaluation of each Force are presented below (please see Tables 1-5).

Table 1 – Threats of entrants evaluation

Criteria	Weight	Expert Estimate					
<u>Barriers to entry</u>							
Economies of scale gained by main players	0.1	High	0	1	2	3	Low
Product differentiation	0.1	Low	0	1	2	3	High
Costs inequity (i.e. due to learning curve)	0.1	High	0	1	2	3	Low
Customer switching costs	0.1	High	0	1	2	3	Low
Main players' costs or quality advantages	0.1	High	0	1	2	3	Low
Access to distribution channels	0.1	Limited	0	1	2	3	Free
Government policy restrictions	0.1	High	0	1	2	3	Low
<u>Expected retaliation</u>							
Availability of resources to fight back the entrants' attack	0.1	Available	0	1	2	3	Unavailable
Competitors' willingness to cut prices	0.1	High	0	1	2	3	Low
Industry growth	0.1	Low	0	1	2	3	High
Total	1						

Table 2 – Bargaining power of suppliers evaluation

Criteria	Weight	Expert Estimate					
Number of suppliers	0.2	Few	0	1	2	3	Many
Level of supplier concentration	0.2	Low	0	1	2	3	High
Switching costs in changing a supplier	0.15	High	0	1	2	3	Low
Differentiation of purchased resources	0.15	Low	0	1	2	3	High
Importance of industry for supplier	0.15	Unimportant	0	1	2	3	Important
Potential threat of forward integration	0.15	Low	0	1	2	3	High
Total	1						

Table 3 – Bargaining power of buyers evaluation

Criteria	Weight	Expert Estimate					
Number of buyers	0.2	Few	0	1	2	3	Many
Level of buyer concentration	0.2	Low	0	1	2	3	High
Level of buyers' sophistication	0.2	Low	0	1	2	3	High
Buyers' switching costs	0.1	High	0	1	2	3	Low
Buyer price sensitivity	0.1	Low	0	1	2	3	High
Importance of the products or services quality for the buyers	0.1	Unimportant	0	1	2	3	Important
Proportion of industry product purchase in buyers' expenditures structure	0.05	Low	0	1	2	3	High
Potential threat of backward integration	0.05	Low	0	1	2	3	High
Total	1						

Table 4 – Threat of substitutes evaluation

Criteria	Weight	Expert Estimate					
Number of substitutes	0.25	Few	0	1	2	3	Many
Obvious advantage of substitute	0.25	Unattractive	0	1	2	3	Attractive
Buyers' switching costs to the substitute	0.25	High	0	1	2	3	Low
Profitability level of industries offering substitutes	0.25	Low	0	1	2	3	High
Total	1						

Table 5 – Intensity of rivalry evaluation

Criteria	Weight	Expert Estimate					
Number of equal (in size and power) competitors	0.16	Few	0	1	2	3	Many
Industry growth	0.16	Low	0	1	2	3	High
Product differentiation	0.12	High	0	1	2	3	Low
Magnitude of capacity expansion required	0.12	Small	0	1	2	3	Large
Exit barriers	0.14	Low	0	1	2	3	High
Diversity of rivals	0.15	High	0	1	2	3	Low
Threat of horizontal integration	0.15	Low	0	1	2	3	High
Total	1						

Then Force Strength (Fs) is calculated as follows (see formula 1.1)

$$F_s = \sum_{i=1}^n \frac{E_i / l}{E_{max}} \times w_i, \quad (1.1)$$

where E_i – expert's estimate of an i^{th} criterion ($i = \overline{1, n}$) of the Force Strength, E_{max} – maximum possible value of the expert's appraisal ($E_{max} = 3$ points), l – quantity of the experts; w_i – weight of an i^{th} criterion.

The higher the value of FS the higher the intensity of competitive force and vice versa the lower the value of Fs the lower the intensity of competitive force.

In other words, the particular Force is very strong if $F_s \rightarrow 1$, and the particular Force is weak if $F_s \rightarrow 0$.

We can consider that Force Strength is weak when it is within the interval of [0;0.33], it is moderate, if the interval of its value is [0.34;0.66] and it is strong when the value is within the interval of [0.67;1].

After identifying the specific competitive pressures comprising each force and assessing if these competitive pressures constitute a strong or weak competitive force, strategist should evaluate the combined strength of the Five Forces, which in turn determines the level of Industry Attractiveness (A_{ind}) as presented in formula 1.2:

$$A_{ind} = m - \sum_{j=1}^m FS_j, \quad (1.2)$$

where j is the number of the Force, and $j = \overline{1, 5}$.

Value of A_{ind} varies from 0 to 5 points. Weights for criteria are assigned in such a way that intensity of rivalry is of the same importance by the value as the other Four Forces. Sometimes it is so, sometimes it's just an assumption.

Industry attractiveness is higher if the score of A_{ind} is higher ($A_{ind} \rightarrow max$ is favorable). We assume attractive industry – based on perception of perfection – as the industry that has few powerless players and many buyers, who have unsatisfied needs.

However, it is not enough just to measure A_{ind} in order to make adequate conclusions concerning the state of industry, its potential and attractiveness for running business. It is necessary to take into account that industry structure is not static, but very dynamic due to the changes of highly interdependent elements. Intensity of rivalry can be considered as a function of other Four Forces and, on the contrary, it significantly affects them (Grundy, 2006). At the same time, all Five Forces can influence each other and cause the general system changes.

To determine the direction of changes and predict the coming ones it is necessary to compose and analyze the chart of Five Forces relating to industry attractiveness, which plots the Five Forces estimates on the four-axis scale (please see Figure 1). We offer to construct two figures:

- (1) square, which area reflects the force strength provided by intensity of rivalry, and
- (2) quadrilateral, which area reflects the values of the other Four Forces (threats of entrants, bargaining power of suppliers, bargaining power of buyers and threat of substitutes).

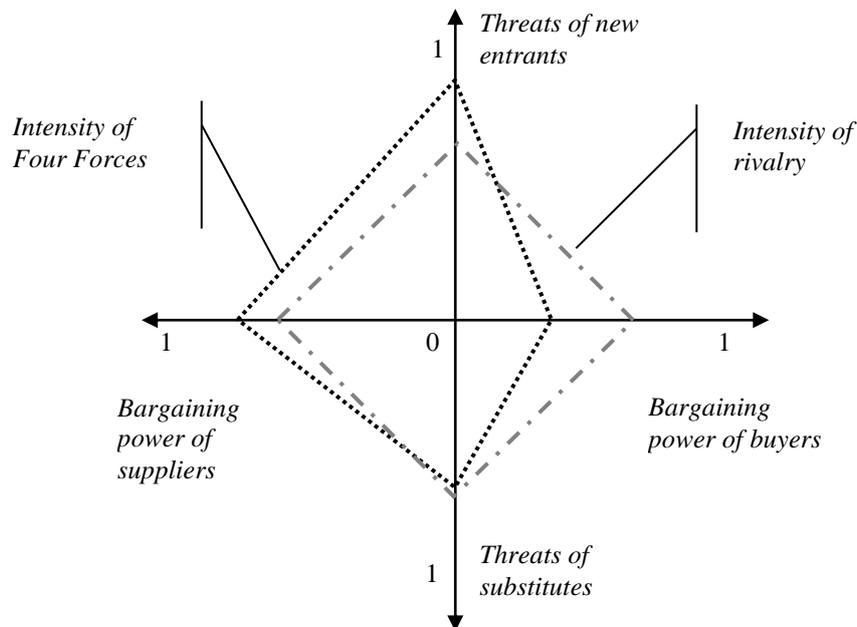


Figure 1 – Five Forces chart

It enables to compare the competitive forces strength and reveal the possible dynamics within industry structure. It is necessary to find out if there are considerable differences in the quadrilateral of Four Forces between threats of entrants, bargaining power of suppliers, bargaining power of buyers and threat of substitutes, since they are interdependent and can cause changes in each other. Then manager should analyze their interconnections and potential influences.

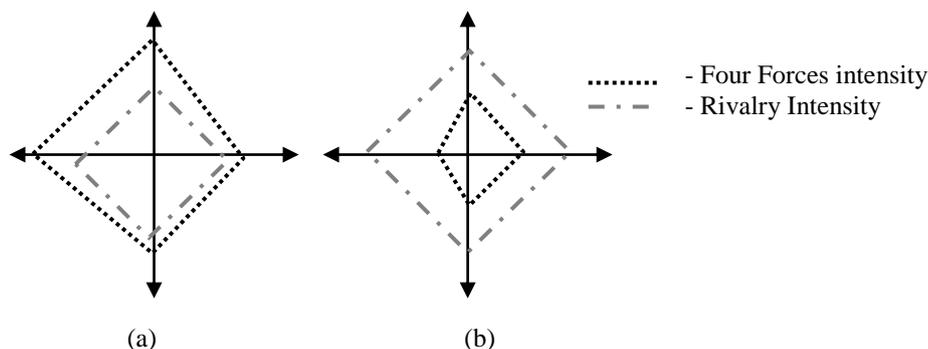


Figure 2 – Two extreme scenarios of Five Forces evaluation

In addition, strategist should compare the intensity of rivalry and other Four Forces. As for their comparison, there may be two extreme scenarios (please see Figure 2): (a) weak intensity of rivalry comparatively with strong other Four Forces (left side) and (b) strong intensity of rivalry and weak other Four Forces (right side).

Under these scenarios A_{ind} indicates the average level of industry attractiveness. However, the chart reveals extreme difference between the intensity of rivalry and all remaining forces. It suggests that current estimated results may be unreliable for long-term due to the potential influence of forces on each other that in turn will result in the industry attractiveness level. The intensity of rivalry and other Four Forces will probably tend to neutralize the existing huge gap that will lead to increase or decrease in some of the forces. Therefore, it is necessary to analyze how the forces will work out and the competitive structure of industry will change.

Step 3. Formulate strategies based on the conclusions

At this stage, managers should formulate strategies taking into account the knowledge about intensity and power of competitive forces, their current and potential future state.

In order to be more accurate in strategy choice and formulation, it is necessary to combine the results of Five Forces evaluation with other analyses. Generally, Porter's Five Forces framework works well in association with a SWOT-analysis and a PESTLE-analysis, which reveals political, economical, social, technological, legal and environmental drivers of industry transformation.

In addition, Quantitative Five Forces analysis, in comparison with conventional qualitative approach, has much more opportunities for integration with other strategic analysis models, e.g. SPACE (Strategic Position and Action Evaluation) Matrix. Results of the Five Forces evaluation can be applied to the external strategic position evaluation in SPACE Matrix. It is reasonable to identify the Industry Attractiveness axis by using Quantitative Five Forces analysis and Environmental Stability axis by using PEST (or PESTLE, STEEPLE) analysis.

CONCLUSIONS

The starting point for developing strategy is identification and understanding the essence of the forces that shape industry competition. Thus, the systematic analysis of forces (bargaining power of buyers, bargaining power of suppliers, threat of new entrants to the market, the threat of substitutes and

rivalry among existing firms) in the industry environment using Porter's Model is the perspective tool for managers to think strategically.

The offered Quantitative Five Forces Analysis provides an appropriate methodology for determining the attractiveness of industry in quantitative terms. So it serves not just as analytical technique for background investigation, but as the strategic decision-making tool.

Moreover, Quantitative Five Forces analysis has a lot of opportunities for integration with other strategic analysis models. The method designed for one particular need – to investigate the sense and dynamic of Five Forces – is flexible to include other meaningful factors into industry analysis. It is still technocratic, but gives the ground for further insight-decisions. If the results are suspicious to be failed, it is easy to step back in the assumptions and reconsider every single detailed characteristics of every Force and to recreate new vision of the industry. And of course, that method allows monitoring the changes in the interactions between forces and industry attractiveness as itself.

However, there are limitations that are unavoidable: subjectivity rises through the specification of the characteristics of the analysis; some assumptions presented in tables 1-5 are not applicable for some reason to every industry. Specific features of any industry bring strategist to create specific scale and vector of the influence independently. For example, in one industry the strength of the rivalry force is rising with increase of diversity, and for other industry there exists opposite situation. But all the above mentioned remarks hadn't diminished the importance of quantitative industry analysis in strategic management.

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