

Digital Technologies for Competitive Analysis and Evaluation of Competitive Capacity of a Business Entity



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Abstract: Along with examining the theory of competition and competitiveness, the economists have been showing great interest in the assessment of competitiveness in practice [1, 2, 3, 7, 11, 14]. Surely, there are certain achievements in product competitiveness evaluation, i.e. the availability of trusted methods to evaluate the competitive performance of identical products and services. However, this is not the case for business competitiveness. Despite many efforts made in this field, there is still no generally accepted and integrated method for assessing an entity's ability to compete.

The dynamic method of evaluation of competitive capacity is based on a clear and universally applicable understanding of business competitiveness and takes into account the competitive performance of both the company's products and the company's operations. The methodological framework of this approach is very simple and can be applied to both the current period and/or any previous periods, delivering time series of data to be further used for deep impact analysis and/or forecasting business competitiveness.

Index Terms: digital technologies, competitiveness, price policy, competitive analysis, competitiveness

I. INTRODUCTION

As the market evolved, the latent competition gradually transformed into obvious competition and became a decisive factor for any entity. Entities as economic agents started to compete with each other and with foreign companies.

Competitive analysis and evaluation of competitive capacity are especially relevant to Russian entities constrained by the current economic decline. To overcome such constraints and ensure further effective operation, Russian entities are forced to increase their competitive power.

This paper describes how to apply digital technology for conducting a comprehensive competitive analysis and assessing business competitiveness, and how to develop, implement and improve business strategy in a competitive environment.

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II. METHODS AND MATERIALS

A. GENERAL DESCRIPTION

The principal task of any evaluation of an entity's competitive capacity is to define the criteria, sources of and factors affecting such competitive capacity. According to the topic-specific economic literature, there are several approaches to solve this task [4, 5, 6, 16, 17, 18]. Next, we will examine the available methods for evaluating business competitiveness and generalize their advantages and disadvantages.

Speaking of the classification of the available methods, it should be noted that there are numerous methods proposed by scholars for evaluating the competitive performance of a business entity (think of several dozens) [8, 10, 13] and numerous ways to classify them, i.e. based on their theoretical background, manner of presentation of results, type of mathematical relation, etc. For the purposes hereof, the classic (comprehensive) method of evaluating business competitiveness is used. It should be noted that this paper only examines the basic (most common) approaches currently available. Thus, the basic methods for assessing the competitive performance of a business entity, that can be identified at the moment, are as follows.

B. ALGORITHM & FLOW CHART

Product-based methods. When dealing with a competitive analysis of a business entity, the first thing that comes in mind is that a competition between companies in a market environment is, in fact, a competition between their products. Therefore, a company's competitive capacity is a function of the competitive power of its goods. This idea has been proven true by the numerous examples of successful companies that are represented in the market by highly competitive products. Vice versa, it is hard to imagine that a company with unpopular products can be successful. In this approach, the interrelation between product competitiveness and company success is so strong that they practically mean the same [9, 20].

The product-based methods rely on the idea that the competitive performance of a business entity can be evaluated through the assessment of the competitive power of its products: the higher product competitiveness – the stronger the competitive capacity of the entity.

Different marketing and qualimetric methods can be used to evaluate product competitiveness, however, they are mostly based on the price/quality ratio that can be determined in many different ways.

Matrix methods. Matrix methods are the tools developed in the 1960s by consulting companies to assess the competitive performance of a business entity from the perspective of strategic management. They are called “matrix methods” because the findings of the competitive analysis are presented in a matrix form. Another distinctive feature of this group of methods is their focus on the marketing assessment of the entity’s operations so that a company is viewed as a complex of business units (product portfolio) [12].

Operation methods. Over time, the tools used by the matrix methods for strategic planning evolved into a separate group of operation methods for assessing the competitive performance of a business entity. According to operation methods, those companies that have better workflow management are the most successful in terms of their competitive performance (in literature, this group of methods is also called “effective competition methods”) [19].

Dynamic method. The dynamic method for assessing the competitive capacity of a business entity is based on the idea that the primary way to make a profit in the market economy is to sell goods with added value. Moreover, the economic resources used for the manufacture and marketing of such goods are limited. Therefore, in a market economy, profit is a function of the effective use of economic resources, i.e. the ratio between the result and the cost incurred to achieve such result. Hence, the bottom line of the market competition is to gain maximum profit by using economic resources in the most efficient way.

III. RESULTS AND DISCUSSION

The study of the competitive capacity of a business entity revealed two sources of competitive advantages, i.e. operational efficiency and strategic positioning. Therefore, the entity’s resource efficiency can be described by and reduced to the evaluation of the entity’s operational efficiency and strategic positioning. There is no doubt that such evaluation should be based on a comparison of specific parameters between the concerned business entity and its competitors. Such specific parameters include operational efficiency ratio and strategic positioning ratio to be further reduced to a single measure of the competitive capacity of the concerned entity:

$$K = K_r \cdot K_I \quad (1)$$

K – competitive capacity of the concerned entity;

K_r – operational efficiency ratio;

K_I – strategic positioning ratio.

The operational efficiency ratio is determined as follows. Operational efficiency implies that an entity is better than its competitors in certain operations resulting in a profit from added value sales. Profit is the main output and criterion of operational efficiency. However, it would be wrong to compare the actual profit values, since larger entities would always seem to be more competitive and could not be compared with smaller companies. Therefore, the

comparison should be based on the profitability of operations, and not on the actual profit.

Profitability can be measured as a profit margin calculated as a ratio of the sales profit to the total of the related production and marketing costs. However, operational efficiency evaluated on the basis of the profit margin is an alternating value that can distort the competitive capacity value (e.g. the operational efficiency ratio may be negative either if the entity concerned is loss-making but the sample is profitable, and if the entity is profitable but the sample is loss-making, even though the economic nature of this conditions is entirely different). In such conditions, the most comprehensive way to measure operational efficiency is to calculate the ratio of the revenue from the sales of products to the cost of production and marketing.

The mathematical representation of this ratio is as follows:

$$r = \frac{B}{3} \quad (2)$$

r – operational efficiency of the entity;

B – revenue from the sales of products calculated for the entity;

3 – cost of production and marketing calculated for the entity.

Operational efficiency of the sample is calculated as follows:

$$R = \frac{B^s}{3^s} \quad (3)$$

R – operational efficiency of the sample;

B_s – revenue from the sales of products calculated for the sample;

3_s – costs of production and marketing calculated for the sample.

It should be explained that a sample is understood as a selection of competitors as may be required and adequate for the comparison with the concerned business entity. The sample may include one competing entity to determine the specific competitive capacity of the concerned entity in comparison with the selected competitor; it may include several competing entities to determine the competitive capacity of the concerned entity in comparison with the group of selected competitors; or it may include all competing entities across the industry to determine the industry-specific competitive capacity of the concerned entity in comparison with all entities operating in the industry.

It should be noted that depending on the objectives of the analysis, the sample may include not only competitors within the same industry but virtually any business entities that may compete with the concerned entity. From the point of view of business efficiency, the sample may also include entities that are not in direct competition with the concerned entity. For the purposes of microeconomic analysis, the sample will be obviously limited by the type of products manufactured and marketed. Moreover, in some cases, the selection may be limited by the location and geographical presence of the compared entities. Apparently, the acceptable region of the measured value of operational efficiency lies on the positive side of the number line, i.e. it can’t be less than zero.

If the measured value of operational efficiency is less than one, it means that the costs exceed the revenue, i.e. the business is loss-making. Otherwise (if the operational efficiency is greater than one), the business is profitable.

To evaluate the operational efficiency of the entity, the value calculated for the concerned business entity must be compared with the value calculated for the sample:

$$K_r = \frac{r}{R} \quad (4)$$

K_r – operational efficiency ratio.

Thus, the operational efficiency of the concerned entity is evaluated.

Next, the strategic positioning ratio is determined. Here, the philosophy is similar to that used for the evaluation of operational efficiency.

Strategic positioning is understood as conducting business in such way as to create a unique value proposition, to establish and occupy an exclusive and advantageous market segment by doing things differently. Strategic positioning provides opportunities for added value sales by creating, maintaining and expanding sales markets. The main output and criterion of strategic positioning is the market share determined as the ratio of the sales revenue to the total market capacity.

However, it would be wrong to compare the actual market shares, since larger entities with larger shares would always seem to be more competitive and could not be compared with smaller companies. Strategic poisoning measured this way wouldn't be adequate. Therefore, the comparison should be based on the change in market share over time as compared with the previous period, rather than the actual market share. A market share held by the entity is determined using the following ratio:

$$D = \frac{B}{V} \quad (5)$$

D – the entity's market share;

B – sales revenue;

V – market capacity.

Market share for the sample is determined as follows:

$$D^s = \frac{B^s}{V} \quad (6)$$

D^s – market share calculated for the sample;

B^s – sales revenue calculated for the sample;

V – market capacity calculated for the sample.

Change in the entity's market share can be calculated using the following formula:

$$\Delta D = \frac{B}{V} \cdot \frac{V_0}{B_0} \quad (7)$$

ΔD – change in the entity's market share;

B_0 – sales revenue calculated for the entity in the previous period;

V_0 – market capacity in the previous period.

Change in the market share for the sample can be calculated using the following formula:

$$\Delta D^s = \frac{B^s}{V} \cdot \frac{V_0}{B_0^s} \quad (8)$$

ΔD^s – change in the market share calculated for the sample;

B_0^s – sales revenue calculated for the sample in the previous period;

V_0 – market capacity in the previous period.

To evaluate the entity's strategic positioning, the measure calculated for the entity (7) should be compared with the measure calculated for the sample (8) as follows:

$$\frac{\Delta D}{\Delta D^s} = \frac{B}{B_0} \cdot \frac{B_0^s}{B^s} \quad (9)$$

It should be noted, that the ratio of the revenue in the reviewed period to the revenue in the previous period is understood as the revenue growth rate. Therefore, the ratio between two strategic positioning values is equal to the ratio between the revenue growth rates.

However, sales revenue values are tended to greater fluctuations than the operational efficiency values, contributing to greater variability of the strategic positioning values. This explains why the measure of strategic positioning is the main factor in assessing the entity's competitive capacity. Meanwhile, operational efficiency and strategic positioning are originally meant to have equal strength. Thus, the influence of these measures on the entity's competitive capacity needs to be brought to equitable values. To do so, a square root of the ratio between the revenue growth rates needs to be found:

$$K_I = \sqrt{\frac{I}{I^s}} \quad (10)$$

K_I – strategic positioning ratio;

I – revenue growth rate calculated for the concerned entity;

I^s – revenue growth rate calculated for the sample.

Where:

$$I = \frac{B}{B_0} \quad (11)$$

$$I^s = \frac{B^s}{B_0^s} \quad (12)$$

Thus, the strategic positioning of the concerned entity is evaluated.

Now, the competitive capacity can be measured using the following formula:

$$K = K_r \cdot K_I$$

K – competitive capacity of the concerned entity;

K_r – operational efficiency ratio;

K_I – strategic positioning ratio.

$$K_r = \frac{r}{R}$$

K_r – operational efficiency ratio;
 r – operational efficiency calculated for the concerned entity;
 R – operational efficiency calculated for the sample.
 Operational efficiency r of the concerned entity is determined using the following formula:

$$r = \frac{B}{3}$$

r – operational efficiency of the entity;
 B – revenue from the sales of products calculated for the concerned entity;
 3 – costs of production and marketing calculated for the concerned entity.

Operational efficiency R for the sample is calculated as follows:

$$R = \frac{B^s}{3^s}$$

R – operational efficiency of the sample;
 B^s – revenue from the sales of products calculated for the sample;
 3^s – costs of production and marketing calculated for the sample.

$$K_I = \sqrt{\frac{I}{I^s}}$$

K_I – strategic positioning ratio;
 I – revenue growth rate calculated for the concerned entity;
 I^s – revenue growth rate calculated for the sample.

$$I = \frac{B}{B_0}$$

B_0 – sales revenue calculated for the concerned entity in the previous period;

$$I^s = \frac{B^s}{B_0^s}$$

B_0^s – sales revenue calculated for the sample in the previous period;

Next, based on the values determined according to formulae (4) and (10), the competitive capacity ratio is calculated:

$$K = \frac{r}{R} \cdot \sqrt{\frac{I}{I^s}} \quad (13)$$

The greater the K ratio, the larger the competitive capacity of the concerned entity as compared with the sample. It is obvious that $0 < K < \infty$. If $0 < K < 1$, the entity's competitive capacity is low as compared with the sample (the closer to zero, the lower the competitive capacity). If $K = 1$, the entity's competitive capacity is equal to that of the sample. If $K > 1$ the entity's competitive capacity is higher than that of the sample.

According to the dynamic method, the entity's competitive analysis to improve its competitive capacity can be performed as follows.

First of all, the entity's overall competitive capacity and its dynamics are determined, based on which a conclusion is made on the entity's competitive performance and its trends. Next, the operational efficiency and strategic positioning ratios are calculated for the purpose of formula (1) to make a conclusion on the impact of each factor on the entity's overall competitive capacity.

As for formula (13), the numerator in the ratio is represented by the measures of business efficiency calculated for the concerned entity, and the denominator is represented by the measures of business efficiency calculated for the sample. Indeed, as shown above, the entity's competitive capacity is understood as its resource efficiency as compared with its competitors. Therefore, the numerator and the denominator in formula (13) can be understood as measures of resource efficiency calculated for the concerned entity and for the sample respectively. Thus, the overall competitive capacity of the entity can be evaluated from the point of view of the compared parameters.

Let us assume that

$$K^0 = r \cdot \sqrt{I} \quad (14)$$

K^0 – business efficiency ratio of the of the concerned entity.

$$K^s = R \cdot \sqrt{I^s} \quad (15)$$

K^s – business efficiency ratio of the sample.

Then, the entity's competitive capacity can be measured as follows:

$$K = \frac{K^0}{K^s} \quad (16)$$

The business efficiency ratio cannot be limited by a specific range. However, considering that the value of each factor taken into account in calculating the ratio must be greater than one (to be recognized as "efficient"), it can be safely assumed that the required value of the business efficiency ratio must be greater than one as well.

By breaking down the entity's measured competitive capacity into comparable parameters and analyzing the dynamics of such parameters, the main factor of the established competitiveness can be determined, whether it is the high efficiency of the concerned entity, the low efficiency of the sample, or otherwise.

Thus, the competitive analysis of the entity as broken down into sources of competitive capacity and comparable parameters allows to determine the main factors contributing to the established competitive performance and, in turn, determine the basic means to improve the competitive capacity of the concerned business entity.

The next step in the competitive analysis of the entity is to break down the measured competitive capacity into types of activities or subdivisions (hereinafter – separate activity centers), either of which is considered an independent cost/revenue center within the entity. From the point of view of individual activity centers, the competitive analysis of the entity can be performed using the following algebraic manipulations.

Let us assume that an entity is engaged in k types of activities (or has k subdivisions), either of which is a revenue center within the entity. Then

$$B = \sum_{i=1}^k B_i \quad (17)$$

B_l – revenue of the l-numbered activity center within the entity.

And

$$Z = \sum_{i=1}^k Z_i \quad (18)$$

Z_l – costs of the l-numbered activity center within the entity. Subject to formulas (17) and (18), the operational efficiency ratio of the entity (2) can be determined as follows:

$$r = \frac{\sum_{i=1}^k B_i}{Z} = \sum_{i=1}^k \frac{B_i}{Z} \cdot \frac{Z_i}{Z_i} = \sum_{i=1}^k \frac{B_i}{Z_i} \cdot \frac{Z_i}{Z} = \sum_{i=1}^k \left(\frac{B_i}{Z_i} \cdot \frac{Z_i}{Z} \right) \quad (19)$$

r_l – operational efficiency of the l-numbered activity center within the entity;
d_l – share of the l-numbered activity in the entity’s total costs.

$$r_l = \frac{B_l}{Z_l} \quad (20)$$

$$d_l = \frac{Z_l}{Z} \quad (21)$$

Thus, the operational efficiency ratio (4) can be reformulated as follows:

$$K_r = \frac{\sum_{i=1}^k r_l \cdot d_l}{R} = \sum_{i=1}^k \frac{r_l}{R_l} \cdot \frac{R_l \cdot d_l}{R} = \sum_{i=1}^k \frac{r_l}{R_l} \quad (2)$$

R_l – operational efficiency of the l-numbered activity center within the sample;

R_l^s – operational efficiency ratio of the l-numbered activity center;

Y_l – weight ratio determining the impact of each separate activity center on the entity’s overall competitive capacity ratio.

$$R_l = \frac{B_l^s}{Z_l^s} \quad (23)$$

$$K_r^l = \frac{r_l}{R_l} \quad (24)$$

$$Y_l = \frac{R_l \cdot d_l}{R} \quad (25)$$

Thus, following such manipulations, the entity’s operational efficiency ratio can be understood as a sum of parallel factors representing separate activity centers (K_{rl}), adjusted for the applicable weight ratios (Y_l). This approach allows us to evaluate the impact of each activity center on the entity’s overall operational efficiency ratio. For this purpose, the strategic positioning ratio (10) can be broken down to components in the same manner.

For formulae (11) and (12), it should be noted that:

$$I = \frac{B_l}{\alpha_l} \cdot \frac{\alpha_{l0}}{B_{l0}} = I_l \cdot \frac{\alpha_{l0}}{\alpha_l} \quad (26)$$

α_l (α_{l0}) – share of the l-numbered activity center in the entity’s total revenue in the reviewed (previous) period;

I_l – revenue growth rate for the l-numbered activity center within the entity.

Therefore:

$$I^s = \frac{B_l^s}{\alpha_l^s} \cdot \frac{\alpha_{l0}^s}{B_{l0}^s} = I_l^s \cdot \frac{\alpha_{l0}^s}{\alpha_l^s} \quad (27)$$

Then:

$$K_I = \sqrt{\frac{I_l}{I_l^s}} \cdot \sqrt{\frac{\alpha_{l0} \cdot \alpha_l^s}{\alpha_l \cdot \alpha_{l0}^s}} = \sqrt{\frac{I_l}{I_l^s}} \cdot A_l = K_I^l \quad (28)$$

K_I^l – strategic positioning ratio of the l-numbered activity center;

A_l – weight ratio determining the impact of each separate activity center on the entity’s overall competitive capacity ratio.

$$A_l = \sqrt{\frac{\alpha_{l0} \cdot \alpha_l^s}{\alpha_l \cdot \alpha_{l0}^s}} \quad (29)$$

Thus, the entity’s competitive capacity can be determined as follows:

$$K = K_r \cdot K_I = \sum_{i=1}^k \frac{r_l}{R_l} \cdot \sqrt{\frac{I_l}{I_l^s}} \cdot Y_l \cdot A_l = \sum_{i=1}^k \left(\frac{r_l}{R_l} \cdot \sqrt{\frac{I_l}{I_l^s}} \cdot Y_l \cdot A_l \right) \quad (3)$$

K_l – competitive capacity of the l-numbered activity center within the entity.

If the number and the contents of the activity centers within the concerned entity differ from those within the sample, general operational efficiency and strategic positioning calculated for the sample must be used to determine the competitive capacity of activities that are not available in the sample. In practice, this means that an individual activity center within the entity must be compared with the average values for the competing entities. In such case:

$$Y_l = d_l \quad (31)$$

$$A_l = \sqrt{\frac{\alpha_{l0}}{\alpha_l}} \quad (32)$$

If the competitive capacity calculated for an activity center is greater than one, such activity center is deemed to increase the overall competitive capacity of the entity, and vice versa. It should be noted, that the proposed algebraic breakdown can also be applied to the specific competitive capacity of any activity center within the entity, to obtain a deeper understanding of the entity's competitive capacity by the types of activities. Indeed, let's assume that the l-numbered center of activity can be broken down to a certain number (tl) of elements, each of which is a separate source of the entity's revenue. Similar to the above manipulations, the following formula is developed:

$$K_l = \sum_{p=1}^{t_l} K_p \cdot Y_p \cdot A_p \quad (33)$$

K_p , Y_p , A_p – competitive capacity and weight ratios of the p-numbered element of the l-numbered center of activity. Then, the base competitive capacity of the entity can be calculated using the following formula.

$$K = \sum_{l=1}^k Y_l \cdot A_l \sum_{p=1}^{t_l} K_{lp} \cdot Y_{lp} \cdot A_{lp} \quad (34)$$

IV. CONCLUSION

Hence, the method of evaluation of the competitive capacity of a business entity, offered by the author, can be used for however deep analysis of the factors that affect the entity's competitive performance. Such analysis, in turn, allows to reveal the ways to improve the entity's competitiveness and develop measures to achieve its objectives. However, the evaluation categories discussed above only cover the parameters that are directly involved in the evaluation of the entity's competitive capacity and cannot be used for competitive analysis of other technical and economic parameters that can be used to improve the entity's competitive performance. Correlation and regression analysis can be applied to overcome this drawback. This method allows to determine the impact of each specific factor on the entity's competitive capacity and evaluate changes in the entity's competitive capacity as may be affected by any given technical and economic measures.

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