

Development of an Algorithm for Evaluating Ways of Efficient Enhancement of Competitiveness for Auto Repair Companies

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Abstract—This article considers the issues of improving the process of evaluating ways of efficient enhancement of competitiveness for auto repair companies in the region, using Sevastopol City as an example. An algorithm, created by the authors, is proposed, which makes it possible to identify the best way for developing competitive factors for auto repair companies, taking into account, among other things, the socio-economic factors of a specific region of the Russian Federation. The obtained result allows for maximizing the integrated competitiveness indicator of an auto repair company and can be used for planning the strategic development of such companies in a certain region.

Keywords: *auto repair company, efficiency, assessment, development, competitiveness, region*

I. INTRODUCTION

The market of services for repair and maintenance of vehicles at the present stage of economy development in the Russian Federation is characterized by a high level of competition. Despite significant growth in demand for this type of services, competition at the auto repair market is increasing. The growth rate of auto repair companies (ARC)

outstrips the growth rate of demand for services, which leads to the increase in additional customer expectations for quality and timeliness of repair work. Therefore, prompt and effective determination of competitiveness factors, common to auto repair companies, and the implementation of programs for their strategic development in the region are of particular importance for the participants in this market.

II. LITERATURE REVIEW AND RESEARCH METHODS

Issues of company competitiveness and algorithm development for their strategic planning are the research focus of various scientists, including Fathudinov R.A. [1], Nikiforova N. [2], Pasmurtseva N.N. [3], Leontiev N.A. [3], Karlik A.E. [5], Grant R. [6], Basovskiy L.E. [7] and others [8,9,10,11,12]. In these works, there is a number of methodological shortcomings in choosing the best set of methods for increasing the competitiveness level of auto repair companies and developing a strategy for their implementation.

In this work, we suggest that, during the strategic planning of competitiveness for auto repair companies, we need to simultaneously take into account the internal and economic

indicators of auto repair companies, the influence of socio-economic indicators of the development of the region, as well as assessments of competitiveness factors.

III. RESULTS

Analysis of the scientific literature [1-12] allows us to conclude that the process of assessing the effectiveness for enterprise competitiveness development is a process of step-by-step improvement of assessments for the competitiveness factors while solving the optimization problem.

During the course of the study, we identified unsatisfactory estimates of the enterprise competitiveness parameters, which should be improved in accordance with the rating estimate, inversely proportional to the degree of lag in the parameter estimates from the leading competitor and directly proportional to the weight of the parameter / factor in the overall competitiveness assessment. In order to do this, alternative development options / plans are formed for each of the factors being improved, so that the actual operational parameters of the investigated auto repair enterprise are comparable with the performance of a leading competitor in the region [13]. Next, an analysis of the obtained options / plans is carried out, taking into account the criteria of applicability to the conditions and technologies of an auto repair enterprise [9]. Selected options are considered as investment projects, for each we calculated relevant increase in revenues from services and sales of spare parts as well as relevant expenses. This allows for evaluation of their economic efficiency. The final choice is made taking into account a number of indicators: the current state of assessments of competitiveness factors, budget constraints of auto repair companies, economic indicators of the plans / projects under consideration, and their contribution to the company's future turnover and profits. To take into account all these parameters, a rating is calculated for each plan / project and, within the framework of budgetary constraints, several options / plans for the development of competitiveness are selected. During the implementation periodically and at the end of the planning period, a comparison of the assessments of the competitiveness factors of the studied enterprise and competing companies in the region takes place.

Thus, the following algorithm is formed to assess the effectiveness of the ways to develop the competitiveness of an auto repair company:

- 1) formation of a list of directions for the development of competitiveness;
- 2) consideration of alternative options for the development of these directions;
- 3) analysis of the obtained options, taking into account the criteria of applicability to the conditions and technologies of an auto repair enterprise in a particular region;
- 4) registration of the selected areas as investment projects;
- 5) calculation of standard indicators for evaluating investment projects;

6) formation of a summary table of indicators for investment projects - directions of development of the competitiveness factors for auto repair companies in the region;

7) the calculation of the rating score and selection of projects of the development of competitiveness.

IV. DISCUSSION

Now we will take a closer look at the methodological aspects and activities within the algorithm of this method proposed by the author.

1. The formation of a list of directions for the development of competitiveness. Factors / indicators to improve the overall competitiveness of the enterprise are identified. Unsatisfactory assessments of competitiveness parameters identified during the study should be improved in accordance with the rating score. The basis for planning development indicators is the forecast of demand for services and spare parts of a car repair enterprise, carried out according to the demand forecast method proposed in [9], based on external objective, quantitative information about the fleet of vehicles, their age and estimated mileage. This is especially true for servicing new models of previously selected brands and for models that the car repair company had not previously serviced. The same technique allows for stock planning of parts and service fluids.

2. Consideration of alternative options for the development of these directions. At this stage, a list of alternative options for the development of the identified directions is compiled, an analysis is carried out of how they will increase these indicators / competitiveness factors;

Consider a situation in which the owner of an auto repair company chooses between five projects to increase competitiveness by the following competitiveness factors: "Production capacities", "Number of serviced vehicle systems" and "Quality of spare parts in stock and their assortment" (see table I).

Option 1 is a change in the range and an increase in the stock of spare parts and service fluids [14].

Option 2 is a purchase and installation of three hydraulic lifts for vehicles in the current repair area, which will increase the throughput of the enterprise and improve the indicator "Production capacity".

Option 3 is an expansion of the area for an auto repair enterprise - creation of the 50 sq.m. extension and of two additional auto repair bays with lifts, which will also improve the indicator "Production capacity".

Option 4 is a purchase a universal scanner for the computer system of vehicles, which will allow diagnosing more parameters of various car systems thereby improving competitiveness ratings "Number of serviced systems of transport systems".

TABLE I. OPTIONS FOR THE DEVELOPMENT OF COMPETITIVENESS FACTORS

Name of competitiveness factor / parameter	Rating - development priority	Development option	Competitiveness Improvement Mechanism
The quality of spare parts in stock and their assortment	0.09	1. Increase in inventory: revision of brands of spare parts to improve quality, parts in stock and optimizing the assortment	1) reduce repair time due to parts availability. 2) suggest market prices with simultaneous profit increase due to surcharge of larger consignments. This will allow to surpass competitors.
Production capacity	0.14	2. Purchase of 3 hydraulic lifts	Increase the number of simultaneously repaired vehicles by 25% - an increase in auto repair company throughput. Allows to be equal in this indicator to the leading competitor.
		3. Extension of 2 car spaces	Increase the number of simultaneously repaired vehicles by 25%
Number of serviced vehicle systems	0.12	4. Purchase a vehicle scanner	The ability to diagnose more parameters of various vehicle systems. Allows you to catch up with the leading competitors.
		5. Throttle Service incl. buying new equipment	Maintenance of the new transport vehicle, relevant for used cars.
Cost of work	0.10	6. Price monitoring and price adjustment	Increase in auto repair company revenue. The lag behind the leading competitor is insignificant.

Option 5- Set of equipment for cleaning throttles that will improve the assessment of the competitiveness factor “Number of serviced vehicle systems.

It is important to note that options 2 and 3 are alternative, but not mutually exclusive for the development of the competitiveness indicator “Production capacities”, and options 4 and 5 are similar for the competitiveness indicator “Number of auto systems served”.

3. Analysis of the obtained options, taking into account the criteria of applicability to the conditions and technologies of the enterprise. The use of a group of criteria for feasibility / compatibility with the current state and organization of the auto repair company screen out projects with a high risk of loss of defect that are not feasible without major restructuring of the premises / expansion of the parking zone - i.e. specifics of repair services and technological limitations are taken into account.

4. Registration of the investment projects. It is an effective methodological solution — it allows you to comprehensively evaluate this area of development by quantitative parameters, to use developed tools to analyze business projects.

5. Calculation of standard indicators for evaluating investment projects. At this stage, each option is considered as a business project with a developed system of financial indicators for the investment project, calculated according to relevant income and expenses, which allows you to filter out / refine options that lack of profitability.

As part of the calculation of business projects in each of the directions, financial safety margin indicators and production leverage indicators are calculated, which serve as assessments of the sustainability of revenue and income in the areas of competitiveness factors under consideration.

As the next step after choosing a method for assessing the effectiveness of investments in the development of competitiveness factors as an investment project, it is worth paying attention to its main indicators. Any investment process has two components, this is the expense (outflow) of cash, and the inflow, i.e. obtaining a beneficial effect from investing [4, 8].

The basic economic parameters of the projects for developing the competitiveness factors of a car repair company are calculated - widely used indicators for evaluating the effectiveness of investment projects: payback period, NPV, IRR / MIRR.

To assess the effectiveness of the project, the following key indicators are used, which are calculated on the basis of the project’s cash flows: net income, net present value, return on investment and investment returns, need for additional financing, internal rate of return, payback period.

The internal rate of return is most often determined by iterative selection of the values of the discount rate when calculating such an indicator as NPV. We use it as a main indicator for comparing alternative options for the development of competitiveness factors of a car repair company. The calculated indicators for our projects for LLC “Bosh - Car Service” (Sevastopol) are shown in table II.

TABLE II. COMPARATIVE PARAMETERS OF DEVELOPMENT OPTIONS FOR THE COMPETITIVENESS FACTORS OF A AUTO REPAIR COMPANY

Indicator	Inventory increase	Buying 3 lifts	Extension of 2 car spaces	Purchase a vehicle scanner	Throttle Service
	Option 1	Option 2	Option 3	Option 4	Option 5
Required initial investments, EUR.	2233.00	5824.29	16457.14	3000.00	500.00
IRR	0.48	0.44	0.22	0.51	0.75
Project payback period, months	3	3	5	5	7
Factor Rating Weight (T) ^a	33%	33%	20%	20%	14%
Competitiveness indicator Weight (C) ^b	5.6%	10.1%	5.3%	5.1%	5.1%
Assessment of an indicator of a leading competitor (Z) ^c , %	65%	44%	73%	68%	68%
ARC assessment deficit to leader assessment (D) ^d	35%	56%	27%	32%	32%
Share in ARC revenue (V), %	13%	8%	8%	1%	0%
Share in ARC profits (P), %	27%	13%	17%	4%	0%

^a The shorter the term, the better the score =1/ payback period per month.
^b From analysis of competitiveness indicators.
^c Leading competitor assessment 100%, that is. deficit =100% - Z, %
^d after reaching the planned volumes, the ratio with the planned indicators of ARC per month

6. Formation of a summary table for indicators of investment projects - directions of competitiveness factors development.

At the final stage of selecting the directions for the development of competitiveness factors, a set of indicators provides a comprehensive account of the main parameters of the options for the development of competitiveness factors: the effectiveness of the directions themselves, individual business projects, and the estimates and weight of competitiveness indicators that they will strengthen, and in addition, the possible contribution of these areas in the future turnover and profits of the enterprise.

An assessment of their impact on the economic performance of an auto repair company as a whole is necessary, as the indicators of each project are individual, and a decision must be made taking into account the contribution of certain areas of the development of the production base to the general indicators of the economy and the competitiveness of the car repair company.

7. Calculation of the rating score and selection of projects, ways of competitiveness development. All factors-criteria for assessing the directions of development of the competitiveness of an auto repair company have been taken into account by calculating the correction coefficient K (see Eq. 1), reflecting their influence. Applying the coefficient to the main indicator of IRR, we obtain a rating score for each option of the competitiveness factors of the enterprise. In accordance with the value of this assessment and taking into account budgetary constraints, we begin to implement selected projects.

The formula for the correction coefficient of the project (K), formed by the indicators of table 3 is shown in Eq. (1).

$$K = (T + C + D + V + P) * M \quad (1)$$

Rating assessment of the options according to the formula is shown in Eq. (2).

$$R = IRR * K \quad (2)$$

The calculation results are summarized in table III.

In accordance with this table we obtain, with sufficient project efficiency (IRR), the highest rating for Options 1, 2, 4, and 5 improving indicators with sufficient weight C and the need to improve D (see Table 2), due to the possibility of implementation M = 100%, and Option 3 with a sufficiently high share in potential profit of 17% is not covered by the development budget of 12000 EUR, its indicator M is only 73%. Therefore, within the framework of the budget, Options 1, 2, 4, and 5 will be implemented, with a potential share in the planned turnover of the auto repair company -22%, and in profit 44%.

TABLE III. RATING ESTIMATES FOR THE CHOICE OF OPTIONS FOR THE DEVELOPMENT OF COMPETITIVENESS FACTORS LLC "BOSH - CAR SERVICE" (SEVASTOPOL)

Indicator	Inventory increase	Buying 3 lifts	Extension of 2 car spaces	Purchase a vehicle scanner	Throttle Service
	<i>Option 1</i>	<i>Option 2</i>	<i>Option 3</i>	<i>Option 4</i>	<i>Option 5</i>
Necessary initial investments, EUR.	2233.00	5824.29	16457.14	3000.00	500.00
Own sources of financing (M) ^a , %	100%	100%	73%	100%	100%
Project Correction Factor (K)	113%	121%	56%	62%	52%
Rating development direction (R)	0.54	0.53	0.12	0.31	0.39

^a = own funds + possible inflow of funds to the total amount of necessary investments.

V. CONCLUSION

The algorithm proposed by the authors for evaluating ways of efficient enhancement of competitiveness for auto repair companies in the region allows to consider the competitiveness estimates, their weight, economic parameters of the car repair company, development options / plans and the level of socio-economic development of the region. This ensures that an effective decision is made to invest in the development of competitiveness indicators [15,16,17]. Possible options for the development of competitiveness factors are screened out taking into account a number of logical, technological, and economic criteria applied in several stages [18,19,20]. The obtained directions and values of increase for the indicators of competitiveness factors can be used in the development of competitiveness for auto services as a part of the strategic plan for the development of a particular region.

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