Advances in Economics, Business and Management Research, volume 61

International Conference Economy in the Modern World (ICEMW 2018)

Modern Features of Strategic Planning for Highly-Technological Enterprises

Elena Lobova
Candidate of Economic Sciences,
Associate Professor of the Department
Perm National Research Polytechnic University
Perm, Russia

Vitalii Semkov
Student of the Department of Economics,
Major: International Business
Anhalt University of Applied Sciences
Bernburg (Saale), Germany

Anastasiia Semkova
Student of the Department of Economics,
Major: International Business
Anhalt University of Applied Sciences
Bernburg (Saale), Germany

***Abstractt*—In modern conditions of the economy existence, the competitiveness of high-tech enterprises largely depends on the level of development of the Total Quality Management system.**

Planning the implementation processes for an enterprise, Total Quality Management requires not only a clear understanding of the composition of its elements, the interrelations between them, but also the mechanisms for the development of the institutional environment of external and internal principles of interaction. This research allows us to supplement the principles of strategic enterprise planning by analyzing the basic model of the institutional Atlas of the development of a high-tech enterprise.

Solving the problem of evaluating the adequacy of existing policies expected changes is possible with the development of new assessment tools. We suggest using Atlas institutional development of a high-tech enterprise for this purpose. After the formation of the analysis tool, the researcher will have an opportunity to assess the institutional capacity of business strategies and predict the "problem" institutions for tactical intervention.

Keywords—total quality management; strategic planning; institutional Atlas; high-tech enterprise

I. INTRODUCTION

Nowadays the most serious task in the strategic planning for the highly-technological enterprises is adaptation of the firms' plans to main directions of the strategic development of the country. One of such directions is raising up the productivity of labour.

For the most highly-technological enterprises, the realization of the task to raise up production processes is based on the system of differently-solved principles of the firm planning of competitiveness by means of the TQM strategy.

So, principles of the strategic planning must include not only common models but also methods which allow one to estimate possibilities of the institutional environment of the enterprise or the institutional capacity.

By "Institutional Capacity" we shall basically understand the level of the correspondence of the institutional environment constitution and structure of the analyzed enterprise to the institutional Atlas of the industrial enterprise [1].

TQM strategy remains traditional for highly-technological enterprises. Total Quality Management is a structured system for satisfying internal and external customers and suppliers by integrating the business environment, continuous improvement, and breakthroughs with development, improvement, and maintenance cycles while changing organizational culture [8].

Our research is aimed at estimating the institutional capacity of the TQM strategy for the enterprise which is considered to be the leading one in the optic-mechanical field. To achieve this aim, the following tasks were solved:

1) the institutional Atlas of the development of the industrial plant is made in two levels – management functions and fields of work;
2) the structure of the expenses for the quality according to the basic TQM institutions is determined;
3) estimation of the economic effects of the realization of the institutional environmental capacity TQM has been made.

II. RESEARCH MODEL

A. Bibliography Review

There are a lot of examples how strategic planning models are made. The most popular are the Howard business school model based on the widely known SWOT-analysis procedure, I. Ansoff`s model made as a formalized process, G. Stainer`s model which reflects linkages of the short, middle and tactic strategic planning. But in fact all these models can`t fully

estimate the institutional capacity of the enterprise and are used mostly at the macro-level for the big system.

Development of the enterprise taking into account all variety of external and internal elements can be described via the mechanism of forming of its strategy. The problem of creation of the development strategy of the high-tech enterprise combines technological, economic, information, organizational exchanges.

On the being strategy represents the comprehensive plan for acceptance of management decisions determining borders of possible actions of the enterprise. The main task of strategy consists in bringing the entity from its this condition to future state wished by a management [10].

For the purposes of the institutional capacity monitoring techniques in the strategic planning at the highly-technological enterprise, let us perform the analysis of the primary approaches to strategic planning and their interconnection with the institutions formation mechanisms. In the works of the Russian researchers, addressing the issues of the institutional project planning, strategic planning is casted in the form of the reforms development and application [6].

For the modeling and analysis of the institutional composition, the tool "Institutional Atlas" was suggested [5].

In the context of the microeconomic level, the objects of strategic management (the production and marketing enterprise system) can be presented as the interconnected spheres of activity planning and the obtained result [4].

The experience of solving the problem of making the institutional capacity allows one to form an approach in which the institutional Atlas of the development strategy of the highly-technological enterprise will be connected with the quality expenses classification institutes [2].

The extent to how strong their impact on the production and marketing activities of enterprises should be depends on the selected institutions formation mechanism: a strictly selective effect on the branches and enterprises or less selective one, including integrated institutions developments, maintaining the innovative and infrastructural capacity [7]. The appraisal indicator of formal institutions is considered to be the institutions quality indicator [9].

Each enterprise can choose the principle of making the control system, but more often they choose the classical model of the expenses classification (British Standard BS 6143). We decided to use this model for our research with some changes (Figure 1).

The quality expense model suggested by TQM conception supposes forming not only the final results but also the system of ruling the processes. The production expenses are divided into two main categories: expenses for providing accordance to the demands, and expenses made by discrepancy.

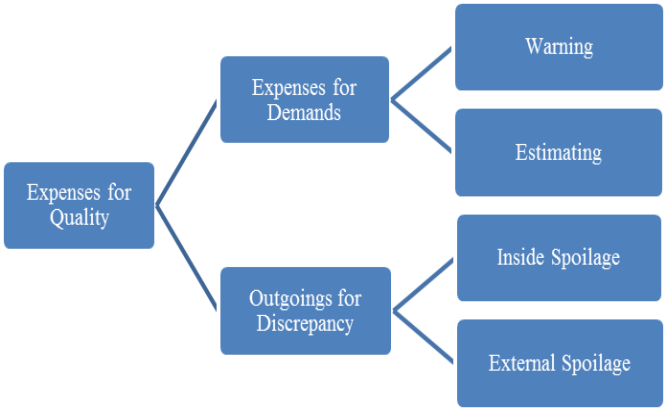

Fig.1. The structural scheme of formation of quality expenses for highly-technological enterprises.

This classification allows to get the model of economic institutes for any business-process of the enterprise on the base of the identification of the key jobs which must be controlled, and elements of expenses for each of them.

B. Research methods of TQM strategy institutional capacity of the highly-technological enterprises

For the highly-technological enterprises it`s quite typical to have the following set of the institutional Atlas: institutions of planning, organizing, stimulating and controlling. On the base of TQM we`ll make the atlas of the economic institutions of the development of the highly-technological enterprise in Chart 1, where in the low line we`ll show the number of the institutions of each subgroup being classified on the base of the institution divisions according to the management functions and fields. This procedure is described in detail in the article by E. Bykova «The Development of the Institutional Capacity Monitoring Tools in the Strategic Planning of the Industrial Enterprises» [1].

This instrument allows one to detect functions of management which have a low level of providing with institutes, correcting the TQM strategy. In our case the function of consumption is disadvantaged.

In particular, for the basic model of the institutional Atlas four groups of institutions were identified: the institutions of management, utilization of resources, cooperation, and spillover externality. The results of this stage of the analytical activity are the base for forming a list of basic institutions.

As a basis, we took the model of the meso-economic development institutions, described in Popov [5], and completed it with institutions, connected with the integration and hybrid forms of the industrial and marketing activities organization. The result of the cluster analysis of institutions is represented in Table I.

TABLE I. THE ENTERPRISE DEVELOPMENT OF ECONOMIC INSTITUTIONS OF THE BASIC INSTITUTIONAL ATLAS OF THE INDUSTRIAL ENTERPRISE

№	Name of institution	№	Name of institution
Institutions of management		***Institutions of utilization of resources***	
1	Institution of industrial policy	29	Institution of application of information resources
2	Institution of foreign economic activities	30	Institution of application of intangible assets
3	Institution of priority guidelines	31	Institution of application of tangible assets
4	Institution of self-government	32	Institution of application of labour resources
5	Institution of development program	33	Institution of application of financial resources
6	Institution of economic stability	34	Institution of licensing and certification
7	Institution of guarantees	***Institutions of cooperation***	
8	Institution of revenues	35	Institution of contractual relationship
9	Institution of management	36	Institution of government orders
10	Institution of liability	37	Institution of search of counterparts
11	Institution of industrial activities	38	Institution of communication activities
12	Institution of strategic planning	39	Institution of science and business integration
13	Institution of control operations	40	Institution of informal relationship
14	Institution of examination of development projects	41	Institution of transfer of goods
15	Institution of corporate planning	42	Institution of selection of structure of cooperation arrangements
16	Institution of organization of industrial activities	43	Institution of interfirm cooperation
17	Institution of organization of information activities	44	Institution of transportation and logistic system
18	Institution of material incentive of activities	***Institutions of spillover externality***	
19	Institution of moral encouragement of activities	46	Market institution
20	Institution of technologies	47	Institution of currency and export control
21	Institution of business consulting	48	Institution of taxation
22	Institution of research activities	49	Institution of property
23	Institution of engineering development	50	Institution of education
24	Institution of pilot-line production	51	Institution of technology transfer
25	Institution of postsale service	52	Institution of innovations diffusion
26	Institution of legal protection	53	Institution of added value formation
27	Institution of public good		
28	Institution of club goods		

Let us present the decomposition of the institutional Atlas of the highly-technological enterprise based on the business strategy (Figure 2). It reflects the pacing factors of the production and marketing activities: by places of their origin, institutions can form the decomposition in reference to the market weight of the product or business processes. The selection of the first principle of decomposition is formed depending on how fully the value chains are presented and which type of cooperation arrangements is presented by a particular business strategy [2].

The next level of decomposition is finding the institutions by the functions of management. Each function corresponds to a certain institutional amount of each scope of activities. Their quantitative representation enables us to judge of the composition in reference to each function [2].

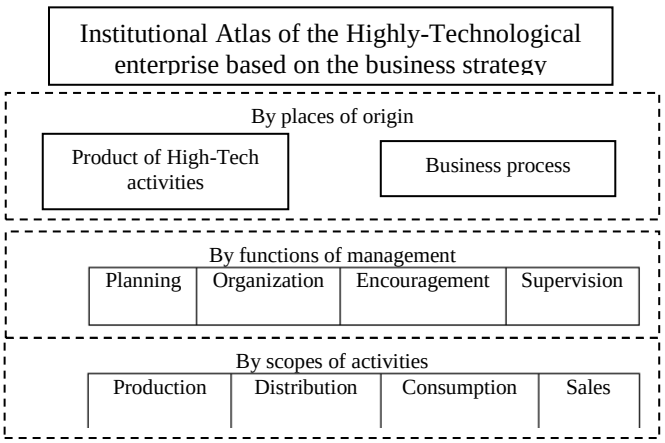

Fig.2. Institutional Atlas of the Highly-Technological enterprise based on the business strategy.

Let`s make Chart 2 of the two-level analysis according to the quantity of the development institutes. The results show that the greatest influence in management functions have the groups Institutes of planning, organizing and controlling (24.9%, 24.9%, 30.7% accordingly). The greatest influence in the fields of work belongs to the groups of the institutes of production and consumption (38.9% and 29.7% accordingly).

CHART I. BASIC INSTITUTIONAL ATLAS OF THE ECONOMIC INSTITUTES OF THE DEVELOPMENT OF THE HIGH-TECH ENTERPRISE MADE ON THE BASE OF TQM SYSTEM.

Economic Institutes of the Development of the High-Tech Enterprise															
Planning Institutes				Organizing Institutes				Stimulating Institutes				Controlling Institutes			
Production	Distribution	Marketing	Consumption	Production	Distribution	Marketing	Consumption	Production	Distribution	Marketing	Consumption	Production	Distribution	Marketing	Consumption
18	10	13	5	22	8	13	3	11	8	13	4	21	11	16	9

CHART II. QUANTITIVE COMPOSITION OF ECONOMIC INSTITUTES IN TWO LEVELS OF THE BASIC INSTITUTIONAL ATLAS OF THE DEVELOPMENT OF THE HIGH-TECHN ENTERPRISE

Institutes according to management functions	Number of institutes	Proportion of the total, %	Institutes according to areas of work	Number of institutes	Proportion of the total, %
Planning	46	24.9	production	72	38.9
Organizing	46	24.9	distribution	37	20
Stimulating	36	19.5	marketing	55	29.7
Controlling	57	30.7	consumption	21	11.4
TOTAL	185	100	TOTAL	185	100

The most interesting thing is the structural analysis of the distribution of the economic TQM institutes according to the areas of work (Figure 3) and management functions (Figure 4).

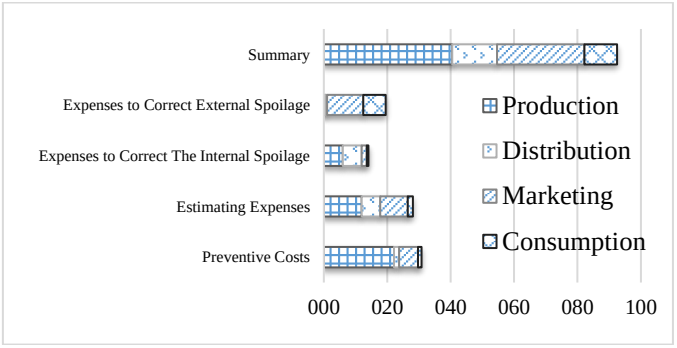

Fig.3. Structural Distribution of the Economic Institutions of the Highly-Technological Enterprise According to the Areas of Work (%).

This diagram (Figure 3) allows one to make a conclusion that estimating and preventive expenses are formed by all areas of work and only expenses for correcting internal and external spoilage correspond to relevant business-processes. Meanwhile in total expenses, the quality dominates in the production and marketing.

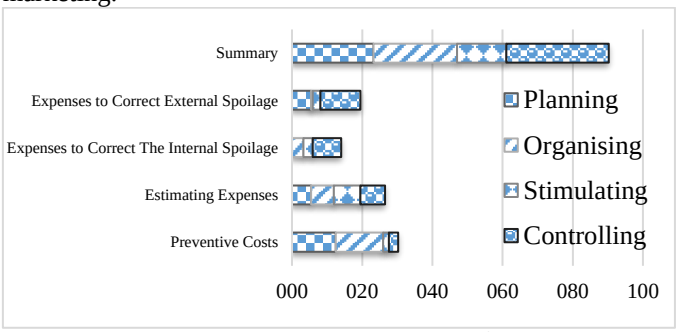

Fig.4. Structural Distribution Structural Distribution of Economic Institutes According to Functions of Management (%).

This diagram (Figure 4) about management functions allows one to judge about principles of governing of highly-technological enterprise:

1) preventive expenses are formed by all functions of management but according to ISO-9000 embodies the planning function for this type of expenses [3];

2) expenses for correcting the external spoilage for more than 50% are embodied at the controlling function;

3) it`s necessary to pay attention to the stimulating function which is the least in the structure of distribution.

So, this method of estimation of the capacity to fulfil and develop TQM, made on the base of the institutional Atlas of the development of the highly-technological enterprise, allows one to determine tendencies, effective ways to develop TQM.

The enterprise must stimulate the staff`s understanding the importance and significance of their duties and work for raising customers interest.

According to these results, for normalization of the TQM system work the enterprise must raise up proportion of the preventive expenses up to 50%. It can be achieved by decreasing expenses for correction of the internal and external spoilage.

CHART III. RESULTS OF THE EXPERT ESTIMATION TO CHANGING EXPENSES FOR THE QUALITY AFTER THE IMPLEMENTATION OF THE INVENTIVE ACTIVITIES

Experts	**Experts` estimation on the increasing preventive expenses**	**Experts` estimation on the decreasing expenses on discrepancy**
Technical control department	8%	- 18%
Planning and economic department	5.8%	- 12.5%
Leading engineer service	4.2%	- 8.5%
Technical department	3.5%	- 14.5%
Responsible for the quality	7.5%	- 20.5%
Financial and accounting department	3%	- 18%
Marketing service	2.1%	- 15.5%
Atomized governing systems bureau	1	- 8%
Logistics	0	- 18.5
Energy and mechanic service	7.5%	- 17.5
Average result of the expert estimation:	**+ 4.26%**	**- 15.15 %**

This model is used as an instrument for ruling expenses for the quality by means of the method of the expert estimation of decreasing expenses for the quality after the implementation of the following things (Chart III). Leaders of the subdivisions of the high-tech enterprise, closely connected with the forming TQM system, were chosen as experts.

III. RESULTS AND DISCUSSIONS

The model of the institutional Atlas of the development of the highly-technological enterprise is formed exactly according to the strategy, reflects individual features of the institutional environment, technologies, internal business-processes. While realizing the task of determining the institutional capacity of the enterprise which is directed to TQM strategy, the institutional Atlas allows one to make proper conclusions about the quantity and structure provided by the development institutes. The realized decomposition of the economic institutes determined the real structure of quality expenses.

Comparing these data about the structure of quality expenses with experts` data concerning the possibility of decreasing quality expenses made the scheme of redistribution of the funds for the exact realization of the ISO standards.

According to the experts` estimation it occurred that preventive expenses after the implementation of suggested activities would increase up to 4.26% on average. In 2017 preventive expenses were 50 745 693.64 Roubles. So, in 2018 the planned preventive expenses will be 52 907 460.19 Roubles.

According to the experts` estimation it turned out that expenses for discrepancy after the suggested activities will decrease up to 15.15% on average. In 2017 expenses for discrepancy were 31 694 101.88 Roubles, so, in 2018 the planned expenses for discrepancy will be 26 781 516.09 Roubles.

Thanks to increasing the amount of preventive activities and decreasing expenses for discrepancy, it`s possible to reduce total expenses for quality in 2018 up to 3.337%. The economy is 6 493 154.96 Roubles (Figure 5). The saved money can be used for preventive activities: increase preventive expenses and reduce expenses for discrepancy (internal and external spoilage).

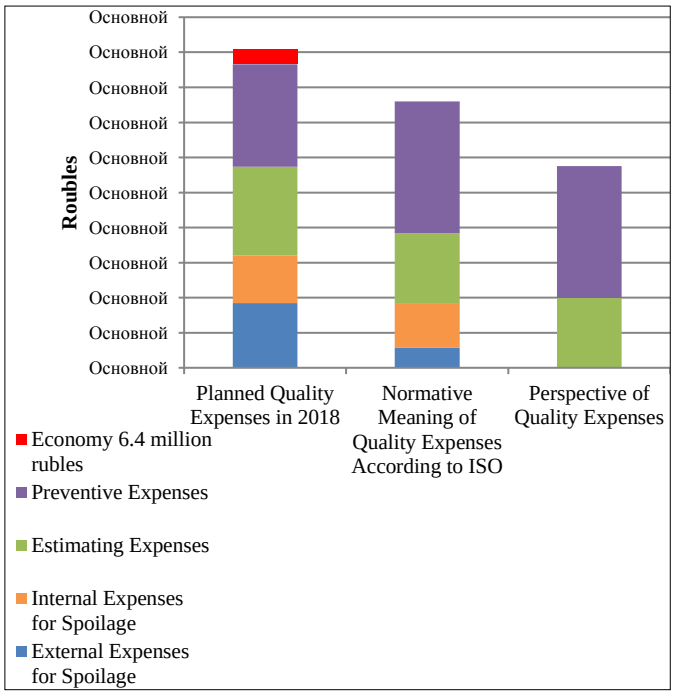

Fig.5. The Perspective of the Distribution of Quality Costs.

Now the economy is in the environment of tough competitive struggle, and the main problem for the enterprises is the problem of survival and ensuring development. With respect thereto the enterprise shall not only concentrate attention on internal state of affairs, but also develop long-term strategy of behavior which would allow it to keep up with the changes happening in its environment.

The analysis of the basic institutions of strategic planning allowed us to form a new approach to the strategic planning tools development. On the grounds of the basic institutional Atlas of the enterprise, it is possible to identify the institutional capacity of the forming business strategy of any highly-technological enterprise [2]. The higher the convergence of the basic institutional Atlas and the Atlas of the business strategy is, the higher the institutional capacity is. For a manager, taking decisions on the strategic activities continuation, it may indicate the high probability of the strategic targets and a low level of the risks connected with other market entities' influence on the strategy realization.

References

[1] E. Bykova, “The Development of the Institutional Capacity Monitoring Tools in the Strategic Planning of the Industrial Enterprises”, Innovation Management, Entrepreneurship and Corporate Sustainability, Proccedings of the 4th International Conference, Prague. Univ. of Economics in Prague, Web of Science, 26-27 May, 2016, p.77.

[2] E. Bykova and N. Shubina, “Features of Applying the Algorithm for Monitoring the Institutional Environment in the Strategic Planning of The Quality Management System”, Vestnik PNRPU (Bulletin of the Perm National Research Polytechnic University), Social and Economic Sciences, № 2, Higher Attestation Commission, 2016, pp.154-164.

[3] ISO (International Organization for Standardization) 9000-2011, Quality management systems. Fundamentals and vocabulary, 2013.

[4] G. Kleiner, “Strategy of enterprise”, Moscow, Delo, 2008, pp.36-38.

[5] E. Popov, “Transactions”, Ekaterinburg, Ural Branch of Russian Academy of Sciences, 2011, p.679.

[6] V. Polterovich and V. Popov, "An Evolutionary Theory of Economic Policy: Part I: The Experience of Fast Development", Voprosy Ekonomiki 7, Russia, 2006, pp.4–23.

[7] V. Polterovich, "Elements of reform theory", Economics, Moscow, 2007.

[8] Rai Technology University Campus, “Management & Marketing” E-books, Dhodballapur Nelmangala Road, SH -74, Off Highway 207, Dhodballapur Taluk, Bangalore - 561204, February 2018.

[9] E. Balatsky, "Fuzzy institutions, culture of people and institutional entropy", Public and Economy 2007: No.5-6, pp.37-53.

[10] E.Korotkov and I.Soldatova, “Management bases: Education guidance”, Moscow, 2013, p.87.