

# Implementation of the Innovation Development Process for the Certain Region in the Framework of Clusters

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**Abstract:** The given work contains theoretical and practical aspects of innovation development at the enterprise within the frames of a cluster. The research in the field of innovation activities was carried out by such scientific men as Igor H. Ansoff; J. Bailey, D. Bell, John Kenneth Galbraith, Peter Drucker; D. Swaim, N. Kelley, M. Porter, Douglass North, Oliver E. Williamson, etc. Innovation processes based on the staff's intellectual activity and utilization of intellectual resources do not only increase balance sheet value and market price of enterprise assets but appears to be a key innovation factor of its functioning performance. The innovational character of the business processes implicates transition to the following relevant level of development determining a new structure of the enterprise manufacturing costs, optimization of its productive activity, increase in sales receipts as a result of amelioration of consumptive qualities of easy-to-sell goods, works and services what implies the utilization of the enterprise intellectual capital.

**Key words:** *innovation, intellectual capital, composition and structure of intellectual capital, cluster.*

## I. INTRODUCTION

An important gap in the clusters literature is in its applicability to the experience of peripheral regions. Whilst the literature on the learning regions has suggested that the economies of less favoured regions can be revived through appropriate knowledge and innovation policies. [1] Technical know-how is in a great supply. This is referred to as hard skill. But engagement, participation, and the genuine desire to contribute rely on goodwill, a cooperative attitude, sincere interest, and a desire to be helpful. In most change programs, these are in short supply. This is the soft stuff. In today's work world, the soft stuff is the hard stuff. [8] Increasingly, companies are finding themselves enmeshed in "value webs" and "ecosystems" over which they have only partial control. As a result, competitive out comes are

becoming less the product of market power, and more the product of artful negotiation. De - verticalization, desintermediation, and outsourcing, along with of co-development projects and industry consortia, are leaving firms with less control over their own destinies... Plummeting communication costs and globalization are opening up industries to a horde of new, ultra - low - cost competitors. [5] Clustering is a localized phenomenon mainly taking place within the borders of functional urban regions. A functional (urban) region is characterized by its agglomeration of activities and by its intraregional transport infrastructure, facilitating a large mobility of people, products and inputs within its interaction borders. The basic characteristic of a functional region is the integrated labor market, in which intraregional commuting as well as intraregional job search and search for labor is much more intensive than the interregional counterparts are. Large urban regions in developed countries normally are concentrations of company headquarters, company R and D divisions, other advanced industries, research universities and high-income earners; they are concentrations of demanding customers with a strong willingness to pay for innovative products meeting their specific requirements. Thus, owing to their demand structure, these regions are excellent testing grounds for new products. In other words, these regions offer a home market where new innovative products can be tested and nurtured before, in the first phase of production, they are exported to other large urban regions and, in the second phase, more generally. [3] We could defined a different forms of clusters, but "all clusters share one commonality: each coprises a multitude of firms of different sizes belonging to one branch of industry. [4] At the same time according to the other authors "cluster activities can survive even in harsh environments with weak formal institutions and limited infrastructure".[9] Cluster could be seen like as an unit of adoption innovation. Lent defined innovation as "a complex multiphased activity, where an artefact

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moves from initiation to adoption and implementation within a unit of adoption". [2]

The Russian Federation's economy transition to innovation way of development is the main goal of the strategy up to the year of 2020. The research in the field of innovation activities was carried out by such scientific men as Igor H. Ansoff; J. Bailey, D. Bell, John Kenneth Galbraith, Peter Drucker; D. Swaim, N. Kelley, M. Porter, Douglass North, Oliver E. Williamson, etc.

According to P. Drucker, an innovation appears to be the task of enduing human and material resources with a new and more productive capacity of welfare gain [7]. Innovation processes based on the staff's intellectual activity and utilization of intellectual resources do not only increase balance sheet value and market price of enterprise assets but appears to be a key innovation factor of its functioning performance. (see Table 1).

TABLE I. SUBSTANCE AND SUBJECT MATTER OF INNOVATIONS IN A CLUSTER.

Characteristic	Subject matter
Functional elements	- marketing; - production; - financial.
Range of activity	- inter-firm; - inter-industry; - international.
Factors of synergetic effect from innovation activities in the cluster	- availability of investment resources for capital innovations implementation; - process cost depreciation (cost value) for products, goods, works and services; - lack of transaction expenses; - mitigating risks for innovation activities; - improving safety of the enterprises' industrial activities.
Research approaches	- systematic approach; - multifaceted approach.

## II. OBJECTIVES

The innovation process of the region development by means of cluster formation can comprise the following directions:

- rise in profitability of investments into human capital and technologies;

- globalization of the world's economy results in creation of globally distributed value chains involving ever more specialized character of production and managerial objectives within the frames of the region;

- implementing the economic entities' development strategy directed not to maximization of profit in a long-term period but rather to non-financial targets' role enhancement.

The industrial enterprises' competitive advantages existing in the present become more and more dependent not on capital resources level and material assets but rather on the managerial and working staff's capabilities of elaborating and implementing the innovations related to products, technologies and management what turns out to be the base for economic growth.

The Russian Federation strategy of innovation development up to the year manufacturing cost of 2020 comprises key performance indicators for enterprises and organizations: diminishment of output product manufacturing cost (works and services) by more than 0.1, amelioration of output product consumptive qualities (works and services) and increase in labour productivity by more than 0.5.

The main directions of innovation-technologic development in the economy of Russia appear to be oil and petrochemical industry, processing industries, machine building, agro-industrial complex, civil engineering, IT- technologies and nano-technologies sector.

The share of innovation product in the structure of Gross Regional Product (GRP) of the Russian Federation within the period of 2010-2013 is shown in Table 2.

TABLE II. THE SHARE OF INNOVATION PRODUCT IN THE STRUCTURE OF GROSS REGIONAL PRODUCT (GRP) OF THE RUSSIAN FEDERATION 2010-2013

Indicator	2010	2011	2012	2013
RF GRP volume, billion rubles	1001.6	1275.5	1415.1	1520.0
RF GRP rate of growth, %	104.3	105.7	105.5	102.0
RF GDP, %	104.5	104.3	103.4	101.3
Share of the Republic of Tatarstan's innovation produce in RF GRP, %	15,4	15,5	15,9	16

For illustrative purposes we can consider financing sources and structure of Kamsky territorial-production cluster and the Program of its Support for the period of 2013-2016 what is reflected in Table 3. [6]

TABLE III. AMOUNT AND SOURCE OF FINANCING IN KAMSKY INNOVATION TERRITORIAL-PRODUCTION CLUSTER, THOUSAND RUBLES.

Period	Federal budget	The Republic of Tatarstan budget	Municipal formations' budget
2013	3545191.48	2438395.98	893642
2014	295943.22	236314.22	596200
2015	272695.42	213566.42	59129
2016	14707.01	147070.1	0
Total:	4260900.22	3035346.72	1012400

The cluster comprises such enterprises and organizations as OJSC «Nizhnekamskneftekhim», OJSC «TAIF», residents of special economic zone SEZ «Alabuga», Kazan Federal Povolzhsky University, etc.

Implementation of the given strategies requires the enlargement of intellectual capital share (intangible assets) in the total amount of the enterprises and organizations' non-circulating assets. The distinct advantages of the given process are the following:

depreciating absolute value of payable tax on profits since intangible assets depreciation deductions are charged to manufacturing cost of output product, work and services. It should be noted that at present the share of intangible assets, research and development results in the structure of the enterprises' balance sheet is extremely low. So, the share of intangible assets, research and development results in the structure of non-circulating assets at the enterprise OJSC «Nizhnekamskneftekhim» for the period of 2010-2012 does not exceed 7 %, but after all, this indicator is too low for the enterprise pretending to acquire innovational character of development. At the same time, it is noteworthy to mention that the given indicator was formed without regard to authorization of the given enterprise's equity market capital. The accounting profit on one ordinary (equity) share makes 10.51 rubles while market value of an equity share is 29.336 rubles. In the present instance, capitalization rate in 2012 made 0.3383. The enterprise's assets market value in 2012 will reach into 14663.27 billion rubles. Considering manufacturing cost of the enterprise OJSC «Nizhnekamskneftekhim» it should be emphasized that energy expenditure percentage within cost structure is continuously declining what is shown in Table 4. [6]

TABLE IV. ENERGY EXPENDITURE PERCENTAGE WITHIN COST STRUCTURE (%)

Indicator, %	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Energy expenditures	23.001	20.101	17.702	17.501	17.602	17.501	20.71	19.502	14.101	13.101

As it is seen from Table 4 decline of energy expenditure percentage within cost structure in 2012 as against 2011 made 7.092 %, what forms a new structure of the enterprise manufacturing costs.

The innovational character of the business processes implicates transition to the following relevant level of development determining a new structure of the enterprise manufacturing costs, optimization of its productive activity, increase in sales receipts as a result of amelioration of consumptive qualities of easy-to-sell goods, works and services what implies the utilization of the enterprise intellectual capital.

The concept of «intellectual capital» was originally used by John Galbraith in the second half of the 19th century. The approaches to understanding of the essence and substance of this concept were elaborated by such scientists as T. Stewart, A.N. Kozyrev, V.L. Makarov, Alistair Wildman, I. Cuddy, Leif Edvinsson, A. Brooking, C. K. Prahalad, P. Sanchez, R. Roslender, R. Finchem. The term of «intellectual capital» comes from

the category of «human capital» introduced by A. Smith, James Mill, W. Petty who insisted upon the existence of human factor potential influence on economy performance. The original mention of human capital one can see in A. Smith's work «The Wealth of Nations» where human capital is identified with aggregative characteristic of quantity and quality of anthropic ability to work being the most important source of income and the factor of labor productivity growth.

Thereafter the theories of human capital were studied in the works of American economists T. Schultz and G. Becker. T. Schultz points out that human capital possesses all the signs of productive character and tends to be accumulated and reproduced on the renewable basis. G. Becker gives the following definition: human capital is understood as the means invested in an employee or a member of family training but not at all the human himself with his knowledge and skills; ...a functional element of productive process.

At a later stage the concept of human capital was elaborated by such scientists as Mark Blaug, W. Bowen, V. Weisbord, J. Kendrick, Y. Mentzer, I. Fisher, etc. According to A. Zuev investing into human capital should be regarded not as auxiliary investments maintaining production needs but rather as having the status of direct investments into fixed capital stock. In a broad sense, human capital is the social-economic type of the present-day quality of human potential on a scale of certain community. In a narrow sense, it is this part that is efficiently used by the entrepreneurship for profit extraction and bears the marks of wage capital stepped forth by Marx.

The structure of intellectual capital comprises such components as human capital, structural (organizational) capital and customer equity. In the meantime we know other intellectual capital constituents. So, L. Edvinsson emphasizes both human and structural elements within the intellectual capital structure (see Table 5).

TABLE V. INTELLECTUAL CAPITAL COMPONENTS.

Type of capital	Components
Intellectual capital	Human capital and structural capital
Structural capital	Customer equity and organizational capital
Organizational capital	Innovation capital and process capital

As is obvious from Table 5 intellectual capital consists of human capital, customer equity, innovation capital and process capital. According to K. Sveiby's model («The intangible assets monitor») intellectual capital comprises the employee's terms of reference, both inner and outer structure of the company.

### III. RESEARCH METHODOLOGY

Nowadays intellectual capital effective utilization is possible within the frames of innovative-industrial clusters. Clusters' industrial policy is directed to establishing and evolving the system of interrelationship between economic entities, institutional investors and bodies of power what in the long view implies the implementation of innovation projects with the national significance. According to Markov L.S., a key contribution into supplying the companies able to meet competition is made by their profitability which, in its turn, is more dependent on environmental conditions surrounding a knowledge-consumptive business. The given provisions to the fullest extent possible are

exposed in the cluster either on micro- and meso-levels or on macrolevel.

Coincidentally, to describe geographical agglomeration of firms, sectors of industry and processes associated with them, alongside with clusters the other terms identical to this concept are used:

- industrial areas;
- cross-industry networks;
- innovation systems.

The theory of industrial areas is based on the substantiation of specialization benefit set forward by A. Smith in 1776. «Industrial areas are the geographically determined systems being characterized by a large number of firms functioning at various stages and in different modes of homogeneous product manufacturing. The distinctive feature of industrial areas appears to be the fact that the majority of firms constituting them are of small and very small size ... various regions specialize in different products of diverse complexity and end users ... they are represented by the unique community, social and economic system... the fundamental part is played by various forms of cooperation among the firms – members of the community». The industrial areas are characterized by the following features:

- availability of flexible specialization, complete differentiation of labor between the companies and their further differentiation according to produce and processes;
- inter-firm cooperation interaction provided by the institutional system;
- geographic proximity enhancing informational interaction between the firms;
- consolidation of social capital's role by means of cooperative learning and resource sharing.

It is noteworthy that the theory of industrial areas primarily considers rather cooperation between enterprises than competitive relations between them. That is why, in Markov's opinion, the industrial areas should be regarded as the certain kind of clusters.

Innovation systems form a large base where the governments elaborate and use the policy of innovation processes affection. From the standpoint of innovation systems it has been affirmed that innovations are created through cumulative, recurrent interactive processes between various economic agents and factors. By means of innovation systems use becomes possible to carry out the research and analysis of social-economic structure of the region. This process lies in the analysis of the

existing agents: social institutions, clusters, universities, sectors of industry as well as their major competencies and interactions inside networks formed by them providing the bodies of power with the tool for determining the content of innovation policy implemented by them and directed to the region's competitive ability. Though the concepts of innovation systems and clusters are closely related, nevertheless, they are based on absolutely different ideas. If clusters are regarded as the certain industrial phenomenon then innovation systems are determined as vaster structures having effect on firms' innovational capabilities in various sectors. Id est, the concept of «innovation systems» comprises the notion «cluster» appearing for its component element. However, from the other side, innovativeness is one of the defining attributes of clusters which can be formed both in new technology intensive industries and in conventional sectors. That is why innovation systems and clusters are worth regarding as the «invested» concepts.

The next term being assimilated with the concept of «cluster» appears to be a cross-industry network or a regional production complex. The main distinctive features of regional production complexes and clusters are determined by the specific character of their evolutionary developmental patterns. The next term being assimilated with the notion «cluster» appears to be a cross-industry network or regional production complex. The main distinctive features of cross-industry networks and clusters are determined by the specific character of their evolutionary developmental patterns, in which case the key difference of clusters stands out the fact that all the processes take place in the context of top-bottom system of management. The same approach makes provisions for the other singularity of clusters: non-centrality of managerial decision making.

The primary distinction of clusters having provided the predominance of cluster theory over its alternatives

serves the availability of competitive relations promoting the competitive growth of the firms-cluster participants what becomes more significant under the conditions of market globalization ever gaining momentum.

#### IV. FINDINGS AND ANALYSIS.

Let us compare the enterprises- participants of the petrochemical cluster in the Republic of Tatarstan and the enterprises not participating the given cluster on the territory of Russian Federation by means of multiple comparative analysis. The taken analysis type is necessary for implementing a complex resumptive comparative evaluation of economic operators' business results. To carry out the analysis let us take multidimensional comparative procedure based on the method of Euclidean distance.

The pattern of multidimensional comparative analysis for the activity of the presented enterprises in chemical process industry is as follows:

1. The performance system to evaluate the results of the enterprises' business activity is substantiated and the data according to the indicators of this evaluation are gathered then the matrix of the original data is formed.
2. In each column of the original data table a maximal element is determined and is taken as a unity element. Then all the elements of this column are divided into that maximal element of the enterprise-reference. Consequently, the matrix of standardized coefficient rates is created.
3. The ranking scores of each enterprise are calculated with due regard to weighing coefficient established by expertise.
4. The received scores are ranked and the enterprises' rating is determined. (as shown in tables 6,7)

TABLE VI. THE INFORMATION ABOUT ENTERPRISES IN CHEMICAL INDUSTRY ON THE TERRITORY OF RUSSIAN FEDERATION (SYNTETIC RUBBER PRODUCTION) IN 2011 YEAR. [6]

The name of enterprises	Gross sales, million rubbles	The amount of sales export, million rubbles	The amount of sales in total, million rubbles	The amount of assets, million rubbles	The amount of the own capital, million rubbles	Net profit, million rubbles	The amount of intangible assets, million rubbles	The amount of fixed asset, million rubbles
OJSC "Krasnoyarsk syntetic rubber plant"	1180,2	896,8	758,7	423,31	23,85	0,99	585,48	
OJSC "Kazan syntetic rubber plant"	1560	577,2	2206,8	970,13	2,98	0,63	1500	

OJSC "Efremov syntenic rubber plant"	4226,5	2916	1987,99	1112,24	497,6	0,55	496,03
OJSC "Voronegsk syntenic rubber plant"	21571,5	12079	4040	2939,3	76,2	4	1441,84
OJSC "Nizhnekamskne ftekhim"	122699,8	78527	68410,84	48304,1	14413,6	194,67	40189,1

TABLE VII. THE FINAL INDICATORS

Number	The name of enterprises	The share of net profit in the gross sales	The share of sales in export	The return on assets (ROA)	The return on equity (ROE)	The share of nonmaterial assets in the fixed assets	Ranking scores of enterprises	The enterprises' rating
1	OJSC "Krasnoyrsk syntenic rubber plant"	0,02	0,76	0,03	0,056	0,002	1,52	3
2	OJSC "Kazan syntenic rubber plant"	0,002	0,37	0,0014	0,0031	0,00042	1,94	5
3	OJSC "Efremov syntenic rubber plant"	0,12	0,69	0,25	0,447	0,0013	0,74	2
4	OJSC "Voronegsk syntenic rubber plant"	0,004	0,56	0,019	0,026	0,0028	1,71	4
5	OJSC "Nizhnekams kneftekhim"	0,117	0,65	0,21	0,298	0,0048	0,4	1
	maximal element of the enterprises	0,12	0,76	0,25	0,447	0,0048		

$$R_1 = \sqrt{\left(1 - \frac{0,02}{0,12}\right)^2 + \left(1 - \frac{0,76}{0,76}\right)^2 + \left(1 - \frac{0,03}{0,25}\right)^2 + \left(1 - \frac{0,056}{0,447}\right)^2 + \left(1 - \frac{0,002}{0,0048}\right)^2} = 1.52$$

$$R_2 = \sqrt{\left(1 - \frac{0,002}{0,12}\right)^2 + \left(1 - \frac{0,37}{0,76}\right)^2 + \left(1 - \frac{0,0014}{0,25}\right)^2 + \left(1 - \frac{0,0031}{0,447}\right)^2 + \left(1 - \frac{0,00042}{0,0048}\right)^2} = 1.94$$

$$R_3 \sqrt{\left(1 \frac{0,12}{0,12}\right)^2 + \left(1 \frac{0,69}{0,76}\right)^2 + \left(1 \frac{0,25}{0,25}\right)^2 + \left(1 \frac{0,447}{0,447}\right)^2 + \left(1 \frac{0,0013}{0,0048}\right)^2} = 0.74$$

$$R_4 \sqrt{\left(1 \frac{0,004}{0,12}\right)^2 + \left(1 \frac{0,56}{0,76}\right)^2 + \left(1 \frac{0,019}{0,25}\right)^2 + \left(1 \frac{0,026}{0,447}\right)^2 + \left(1 \frac{0,0028}{0,0048}\right)^2} = 1.71$$

$$R_5 \sqrt{\left(1 \frac{0,117}{0,12}\right)^2 + \left(1 \frac{0,65}{0,76}\right)^2 + \left(1 \frac{0,21}{0,25}\right)^2 + \left(1 \frac{0,298}{0,447}\right)^2 + \left(1 \frac{0,0048}{0,0048}\right)^2} = 0.4$$

V. CONCLUSIONS

As we can see from the table 7 the primary distinction of clusters having provided the predominance of cluster theory over its alternatives serves the availability of competitive relations promoting the competitive growth of the firms-cluster participants what becomes more significant under the conditions of market globalization ever gaining

momentum. (see Tables 9, 10). So, OJSC “Nizhnekamskneftekhim” is on the first place according the ranking scores of chemical enterprises produced syntetic rubber. OJSC «Nizhnekamskneftekhim» position in petrochemical industry is characterized by the following variety of goods. The share of innovation products in the total amount of the gross sales is about 10 % according to the annual reports from the period 2010-2014. (see Table 8):

TABLE VIII. ASSORTMENT OF PRODUCTION MANUFACTURED BY OJSC «NIZHNEKAMSKNEFTEKHIM» [1]

The name of product	Industry sector for subsequent product use
The different type of syntetic rubber	Defense Industry, motor vehicle industry, tire industry
Propyl carbinol	Motor vehicle industry
Styrene, polystyrene resin	Latex manufacturing sector
Nanylphenol	Synthetic detergents manufacture
Ethylene glycol	Basic stuff for polyethylene production

TABLE IX. THE STRUCTURE OF THE PETROCHEMICAL CLUSTER IN THE REGION IN 2008.

Key enterprises	Service industries (scientific research institutes on the territory of region)			Infrastructure	Legal and regulatory framework	Relative enterprises
OJSC «Nizhnekamskneftekhim» (NNKh)	Kazan university	Federal	volga-region	SEZ Alabuga (special economic zone)	State authorities	OJSC “Chemical plant named Carpov L.Y.”
OJSC TAIF-NK (oil produced plant)	Kazan university	Chemical	technological	Technopolice Chimgrad		OJSC «Nizhnekamsk Plant of Technical Carbon» (NPTC)
OJSC KOS (HD polyethylene produced plant)						OJSC «Nizhnekamskshina» (HSH)
						OJSC «Kazan Plant of Synthetic Rubber» (KPSR)

TABLE X. THE STRUCTURE OF THE PETROCHEMICAL CLUSTER IN THE REGION IN 2015.

Key enterprises	Service industries (scientific research institutes on the territory of region)			Infrastructure	Legal and regulatory framework	Relative enterprises
OJSC «Nizhnekamskneftekhim» (NNKh)	Kazan university	Federal	volga-region	SEZ Alabuga (special economic zone)	State authorities	OJSC “Chemical plant named Carpov L.Y.”
OJSC TAIF-NK (oil produced plant)	Kazan university	Chemical	technological	Technopolice Chimgrad		OJSC «Nizhnekamsk Plant of Technical Carbon» (NPTC)
OJSC KOS (HD polyethylene produced plant)				The Industrial park “Kamsk’s glade”		OJSC «Nizhnekamskshina» (HSH)
				Technology park “Idea”		OJSC «Kazan Plant of Synthetic Rubber» (KPSR)
						OJSC “Polymatize”
						LLC “Polimercoldness technique”
						OJSC “Kamsk’s plant of polimer materials”
						LLC “Agricultural plant”
						LLC “Betar”
						LLC “Kamsk’s plastic”



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