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# Pareto-effective system of indicators for strategic development as the basis for the functioning of the digital industry environment in the region

Vitaly Melnikov <sup>1\*</sup>, Irina Shtapova <sup>1</sup>, Nadezhda Danchenko <sup>1</sup> and Akop Abelyan <sup>2</sup>

<sup>1</sup> North Caucasian Federal University, 40 let Oktyabrya ave., 56, Pyatigorsk, 357500, Russia

<sup>2</sup> North Caucasian Federal University, Pushkina str., 1, Stavropol, 355009, Russia

\* E-mail: witalik87@list.ru

**Abstract.** The article describes the technology for implementation of the information system into the process of strategic planning of industry development in the region, including a set of indicators, which is formed based on the analysis of existing documents for the strategic planning for regional industry development (using the example of the Stavropol Territory of the Russian Federation). All indicators proposed for the use are combined into a complete system according to the Pareto-efficiency principle, as well as using the Balanced Scorecard (BSC) technology. According to this technology, on the basis of the existing regional industry development mission, a strategic map is built, key performance indicators for achieving strategic goals are selected, the control procedure is described, and the conclusion is made in terms of its efficiency and capability to be implemented in the industry-level management practices.

## 1. Introduction

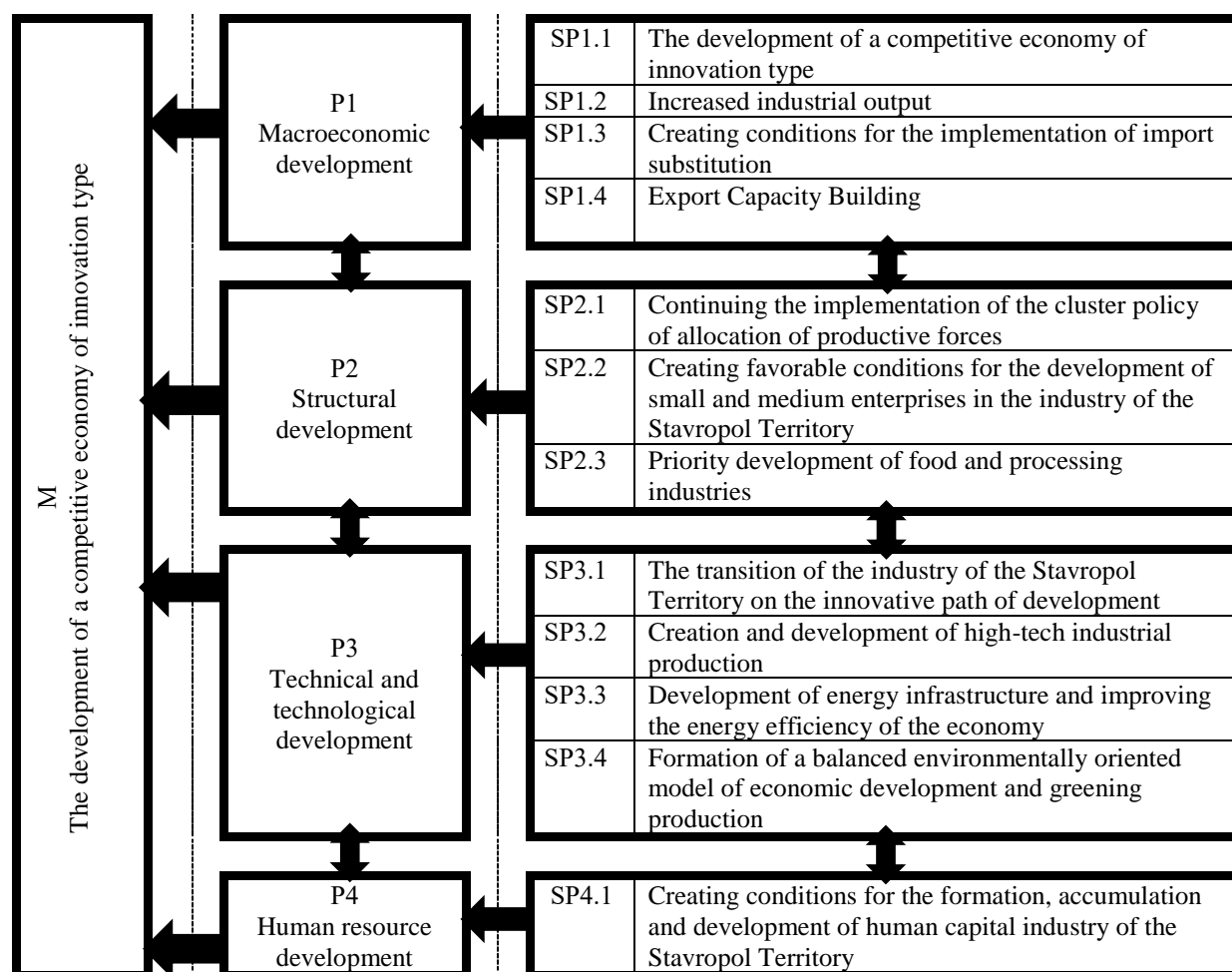
Under the digital economy development, not only the search and implementation of state-of-art software products in the field of management, but also their qualitative content is of high importance.

Currently, the problem of integrating strategies of various management levels is particularly acute. In particular, it is the various levels of country industrial complex management. In this regard, the article describes the proposed Pareto-effective system of key performance indicators (indicators) of strategic development of the regional industry, which can serve as a basis for creation of a unified information system integrating all the levels of strategic management of industry development - from the federal level to the organizational one. This system building is based on the BSC technology and performed by modifying its classical model.

## 2. Methodology

As a result of detailed analysis of the basic documents [1–11] regulating the strategy of industry development in the Stavropol Territory of the Russian Federation, the strategy chart was plotted (figure 1).





**Figure 1.** Map of strategic development goals of industry in the Stavropol Territory.

M — the mission of industrial development; P — the prospect of industrial development; SP — the strategic goal of industrial development.

Based on the strategy chart, a preliminary list of indicators was completed which reflect the state of industry development.

The selection was made according to the following criteria:

- availability of indicator data in open statistics;
- indicator applicability to assess one of the prospects or the strategic goal of industry development;
- possibility of assigning the target values for an indicator on the basis of the information contained in the official documents of the Stavropol Territory authorities;
- obligatory presence of financial and non-financial indicators [12].

The indicators between strategic objectives were distributed by means of an expert survey. When ranking objects, a measure of experts group opinions consistency was used — dispersion factor of concordance introduced by Kendal. According to the calculations made, the values of the concordance factor varied within the range of 0.852 to 0.903 that allows concluding that there is a high degree of consistency in the opinions of the experts surveyed. The relevant survey result was establishment of the indicators compliance with the stated strategic goals.

Further, on the basis of selected indicators of achieving the strategic goals of industry development in the Stavropol Territory, the final formulation of key performance indicators was carried out, and assignment of the relevant target and time parameters.

*Prospect P1 'Macroeconomic Development'*

The result of selecting KPI and their target values for the strategic goal SP1.1 'Formation and development of the investment potential of the Stavropol Territory industry' is presented in table 1.

**Table 1.** KPI for strategic goal SP1.1 'Formation and development of the investment potential of the Stavropol Territory industry'

Designation		KSP1.1.1		Description of the Investments in fixed assets for industrial selected indicator activities, million rubles			
Unit of measurement, mln rub.			KPI description		Increase of investment in fixed assets for industrial activities		
Target values							
2016	27000	2021	27000	2026	27000	2031	27000
2017	27000	2022	27000	2027	27000	2032	27000
2018	27000	2023	27000	2028	27000	2033	27000
2019	27000	2024	27000	2029	27000	2034	27000
2020	27000	2025	27000	2030	27000	2035	27000
Designation		KSP1.1.2		Description of the selected indicator		Index of physical amount of investments in fixed assets, percentage to previous year in comparable prices	
Unit of measurement, %			KPI description		Growth of physical amount index of investments in fixed assets		
Target values							
2016	104.0	2021	106.2	2026	108.6	2031	111.0
2017	104.0	2022	106.7	2027	109.1	2032	111.5
2018	104.0	2023	107.2	2028	109.6	2033	112.0
2019	104.9	2024	107.7	2029	110.1	2034	112.5
2020	105.7	2025	108.1	2030	110.5	2035	112.9
Basis for target values selection		The strategy of ST 2030 industry development [8]; ST 2030 Development Strategy Project [6].					

The KPI and their target values were selected for the remaining strategic objectives of P1 'Macroeconomic Development' projection in the same way: SP1.2 'Increase of industrial production volume' [8]; SP1.3 'Creation of the conditions for implementing the import substitution' [10], and SP1.4 'Increasing of export potential' [11].

*Prospect P2 'Structural Development'*

The result of selecting KPI and their target values for the strategic goal SP2.1 'Continuing the implementation of the cluster policy of productive forces allocation' is represented in table 2.

**Table 2.** KPI for strategic goal SP2.1 ‘Continuing the implementation of the cluster policy of productive forces allocation’.

Designation	KSP2.1.1	Description of the selected indicator	A number of the created local industrial zones, units
Unit of measurement	units	KPI description	Increasing a number of created local industrial zones
Target values			
2016	13	2021	–
2017	18	2022	–
2018	22	2023	–
2019	–	2024	–
2020	–	2025	–
2026	–	2031	–
2027	–	2032	–
2028	–	2033	–
2029	–	2034	–
2030	–	2035	–
Designation	KSP2.1.2	Description of the selected indicator	A number of the created industrial clusters, units
Unit of measurement	units	KPI description	Increasing a number of the created industrial clusters
Target values			
2016	1	2021	–
2017	2	2022	–
2018	3	2023	–
2019	–	2024	–
2020	–	2025	–
2026	–	2031	–
2027	–	2032	–
2028	–	2033	–
2029	–	2034	–
2030	–	2035	–
Basis for target values selection			
The strategy of ST 2020 industry development [7].			

The KPI and their target values were selected for the remaining strategic objectives of P2 ‘Structural Development’ projection in the same way: SP2.2 ‘Creation of favorable environment for the development of small and medium-sized entrepreneurship in the Stavropol Territory Industry’ [6, 7] and SP2.3 ‘Priority development of the food and processing industry’ [10]

*Prospect P3 ‘Technical and technological development*

The result of selecting KPI and their target values for the strategic goal SP3.1 ‘Transition of the Stavropol Territory industry to the innovative development path’ is presented in table 3.

**Table 3.** KPI for the strategic goal of SP3.1 ‘Transition of the Stavropol Territory industry to the innovative development path’.

Designation	KSP3.1.1	Description of the selected indicator	A share of innovative goods, works and services in the total volume of shipped goods of own production, work performed and services rendered by industry organizations, percentage					
Unit of measurement, %			KPI description			Increasing a share of innovative goods, works and services in the total volume of shipped goods of own production, work performed and services rendered by industry organizations		
Target values								
2016	100.5	2021	100.5	2026	100.5	2031	100.5	
2017	100.5	2022	100.5	2027	100.5	2032	100.5	
2018	100.5	2023	100.5	2028	100.5	2033	100.5	
2019	100.5	2024	100.5	2029	100.5	2034	100.5	
2020	100.5	2025	100.5	2030	100.5	2035	100.5	
Designation	KSP3.1.2	Description of the selected indicator	A share of organizations engaged in innovation activities, in the total number of the organizations examined					
			(percentage)					
Unit of measurement %			KPI description			Increasing a share of organizations engaged in innovation activities, in the total number of the organizations examined		
Target values								
2016	8.5	2021	–	2026	–	2031	–	
2017	–	2022	–	2027	–	2032	–	
2018	8.7	2023	–	2028	–	2033	–	
2019	–	2024	–	2029	–	2034	–	
2020	9.1	2025	10.1	2030	11.1	2035	12.1	
Basis for target values selection			ST 2030 Development Strategy Project [6].					

The KPI and their target values were selected for the remaining strategic objectives of P1 ‘Macroeconomic Development’ projection in the same way: SP3.2 ‘Creation and development of high-tech industrial production’ [10]; SP3.3 ‘Development of energy infrastructure and improvement of the energy efficiency of the economy’ [6, 10], and SP3.4 ‘Formation of balanced environmentally oriented model of economic development and production greening’ [12].

*Prospect P4 ‘Human resources development’*

The result of selecting KPI and their target values for the strategic goal SP4.1 ‘Creation of the conditions for formation, accumulation and development of human capital assets in the Stavropol Territory industry’ is presented in table 4.

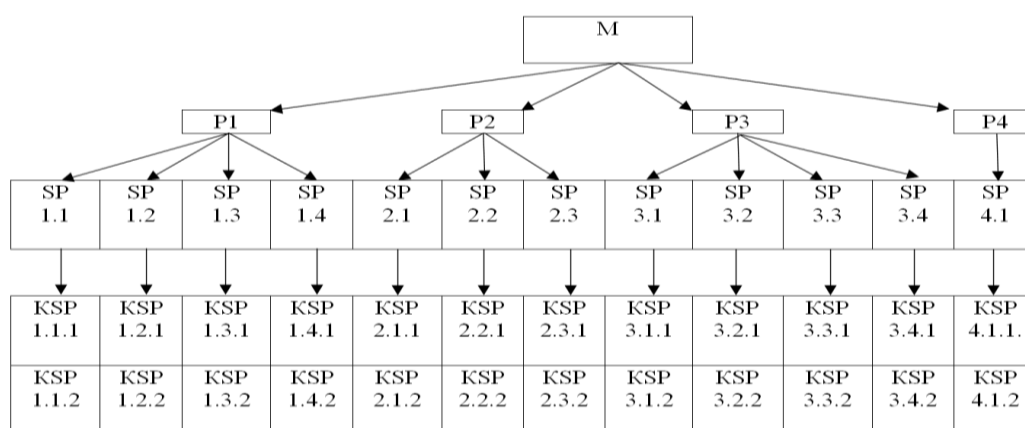
**Table 4.** KPI for strategic goal SP4.1 ‘Creation of the conditions for formation, accumulation and development of human capital assets in the industry’

Designation		KSP4.1.1		Description of the Labor productivity index, percentage selected indicator			
Unit of measurement, %			KPI description		Increase of labor productivity index		
Target values							
2016	103.8	2021	103.8	2026	103.8	2031	103.8
2017	103.8	2022	103.8	2027	103.8	2032	103.8
2018	103.8	2023	103.8	2028	103.8	2033	103.8
2019	103.8	2024	103.8	2029	103.8	2034	103.8
2020	103.8	2025	103.8	2030	103.8	2035	103.8

Designation		KSP4.1.2		Description of the Average wages in the industrial sector, rubles selected indicator			
Unit of measurement, %			KPI description		Increase of average wages in the industrial sector as a percentage over the previous year		
Target values							
2016	107.0	2021	107.0	2026	107.0	2031	107.0
2017	107.0	2022	107.0	2027	107.0	2032	107.0
2018	107.0	2023	107.0	2028	107.0	2033	107.0
2019	107.0	2024	107.0	2029	107.0	2034	107.0
2020	107.0	2025	107.0	2030	107.0	2035	107.0

Basis for target values selection	The strategy of ST 2030 industry development [8].
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Thus, a set of key performance indicators (indicators) was proposed during the study to assess a degree of achieving the strategic goals and prospects for development of the Stavropol Territory industry (figure 2).

**Figure 2.** Graphic representation of the system of indicators for development in the Stavropol Territory industry/

M — the mission of industrial development; R — the prospect of industrial development;  
 SP — the strategic goal of industrial development; CSP is a key indicator of the effectiveness of the strategic industry development goal.

It is possible to present the developed system of indicators in the form of an analytical software product integrated with similar systems at higher and lower management levels.

### 3. Conclusions

The proposed Pareto-effective system of indicators for the strategic development in the region industry to be built on the BSC technology, seems to be effective, firstly, by increasing the transparency of the strategic planning process for all stakeholders; secondly, establishing a clear logical interface between the goals of different management levels; thirdly, by structuring the selected targets among various groups — projections, thereby simplifying control over their implementation; fourthly, establishing a clear relation between the selected goals and key performance indicators of their achievement; fifth, assigning the specific goals and indicators to the specific departments and officials that increases the responsibility of the latter for their achievement.

These circumstances suggest that further research in this area is necessary and advisable [12].

### References

- [1] On Strategic Planning in the Russian Federation, <http://base.garant.ru/70684666/#ixzz4ZgBbom2y>
- [2] On the Fundamentals of Strategic Planning in the Russian Federation, <http://www.rg.ru/2009/05/19/strategia-dok.html>
- [3] Development of industry and increase of its competitiveness, <http://government.ru/programs/203/about>
- [4] The strategy of socio-economic development of the North Caucasus Federal District until 2025, <http://krskfo.ru/documents/10180/0/1485.doc>
- [5] Regulations on the Industry Council under the Government of the Stavropol Territory, <http://www.stavminprom.ru/upload/iblock/cae/cae954d60b53dc3dfae34fdad25856d3.pdf>
- [6] Draft strategy of social and economic development of the Stavropol Territory until 2030, [www.stavminprom.ru/download/StrategisheskoeRazvitie2014-2030.pdf](http://www.stavminprom.ru/download/StrategisheskoeRazvitie2014-2030.pdf)
- [7] Strategy of socio-economic development of the Stavropol Territory until 2020 and for the period up to 2025, <http://docs.cntd.ru/document/423836642>
- [8] Strategic development of economic sectors supervised by the Ministry of Energy, Industry and Communication of the Stavropol Territory for the period until 2030, [www.stavminprom.ru/download/StrategisheskoeRazvitie2014-2030.pdf](http://www.stavminprom.ru/download/StrategisheskoeRazvitie2014-2030.pdf)
- [9] Strategy for the development of the Stavropol Territory industry for the period until 2020, <http://www.consultant.ru/regbase/cgi/online.cgi?req=doc&base=RLAW077&n=71333&div=LAW&dst=1000000001%2C0&rnd=0.8845543211294821>
- [10] Development of energy, industry and communication for 2016–2021, <http://docs.cntd.ru/document/432832552>
- [11] Action plan to promote import substitution in the Stavropol Territory for 2016–2020, <http://docs.cntd.ru/document/453147707>
- [12] Melnikov V V 2018 *Economics and Entrepreneurship* **5** (94) 1058–65