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COMPANY INNOVATION:
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REGIONAL FORESIGHT FOR BRIDGING NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION WITH COMPANY INNOVATION: EXPERIENCES FROM RUSSIA

Whereas national and corporate Foresight are established instruments for anticipatory STI policy and innovation strategy respectively, regional Foresight is a rather new phenomena in this arena. Placed in between national and corporate Foresight regional Foresight can be considered to fulfill a bridging role between the two by taking advantage of corporate Foresight done at corporations which are based in the regions and by orienting on the broader national Foresight and the related challenges covered by these studies. In addition regional Foresight also involves stakeholders who might be engaged in national as well as corporate but presumably these stakeholders play a more important and prominent role in the regional Foresight. Also it is understood that regional networks are important for the successful implementation of the results. Also at the regional dimension it shows that stronger personal linkages exist than in national or corporate Foresight.

The article introduces and discusses two regional Foresight case studies in Russian regions, namely Bashkortostan and Samara. Regional Foresight in both case studies was designed to mirror the quadruple helix instead of focusing on the triple helix only as it is done in many other regional Foresight cases, e.g. the focus was extended beyond the science, government and industry stakeholders by including civil society as well. However the limitation of the case studies is the modest participation and representation of the innovative industries sectors which is also due to the common weakness of Russian industry overall. Still it is found that both cases created reasonable momentum for developing the regions in the STI dimension but also even broader in the economic and social welfare dimension.

JEL Classification: O11; O18; O32

Keywords: regional foresight; roadmapping; scenarios; BRICS

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Introduction

In recent decades, fast social, economic, and technical changes have established uncertain environment conditions for key drivers of a knowledge-based society. For this reason, public authorities had to set the political agenda about searching for new approaches to innovation policy implementation.

Innovation policy became also regional issue, and almost all regional development strategies include aspects relating to science, technology and innovation issues. Moreover, regional development strategies are based on regional foresight, which allow choosing appropriate approaches to develop regional strategy in cooperation with basic actors including representatives of research, educational and innovation spheres (Georghiou L., Keenan M., 2004).

Nowadays regional foresight has become a common instrument of regional policy. Regional foresight is defined as “a systematic, participatory, future intelligence gathering and medium-to-long term vision building process aimed at present-day decisions and mobilizing joint actions” (Gavigan J., Scapolo F., Keenan M., Miles I., Farhi F., Lecoq F., Capriati M., Bartolome T., 2001).

It is important to note, that regional foresight is not only developed economies’ phenomena, also developing countries use regional foresight for innovation policy forming. Literature review demonstrates research gaps in such a field as regional foresight implementation in developing economies and BRICS countries. In fact, there are some articles, which describe approaches to regional foresight implementation in BRICS countries, but these methodologies significantly differ from common approaches to regional foresight and focus generally on forecasting and strategy planning (Shashnov S., 2007).

The purpose of this article is identification of the basic features of approaches to regional foresight in BRICS countries and also development of regional foresight methodology for its diffusion in developing countries for using and implementation.

In the first part literature review is presented and the main features of regional foresight are evaluated in accordance with such aspects as adopted integration strategy, the methodology and the level of compliance with “Knowledge triangle”. The second part includes description of the methodology of regional foresight in the Russian Federation in terms of case studies. Therefore, in accordance with the description of case studies the main differences of the approaches are shown and some suggestion and hypothesis about the reasons of these differences are developed. For instance, such differences can be explained by low level development of innovation infrastructure like innovative clusters, technological platforms etc.

Research question

Regional foresight has been the first stage of the regional development strategies in many developed countries. This stage occurs the analyses of market perspectives (market pull) and (or) technologies perspectives (technology push) in a region, which the strategy is based on.

Approaches to regional foresight have already formed conceptually and in its methodology and algorithms. Consequently, in accordance with the meaning of this term regional foresight is understood as interactive instrument between the basic actors, such innovative business, research and educational sector, etc. However, the definition of regional foresight was formed in accordance with the best practices of developed countries and hence it may not work in developing countries, especially BRICS countries. We suppose that regional foresight can not be implemented in the same way as in developed countries due to not high enough level of institutes' development. In particular, we suppose that some key actors of knowledge triangle are not involved into regional foresight.

Thus, the authors prove following hypotheses: in developing economies representatives of innovative enterprises does not involve into regional foresight implementation as well as in the developed countries. The evidence of the hypotheses will become analysis of the basic differences of the methodology of regional foresight in developed and developing countries.

We suggest that low level of innovation infrastructure development like innovative clusters, technological platforms etc. can explain the differences between ecosystems of developed and developing countries. In addition, in developing countries there is no effective regulation of market and state failures.

Regional Foresight – Conceptual Considerations and Methodology

Foresight comes at different levels with a multitude of scopes. In principle we can make differences between national, regional and corporate Foresight. The main difference between these is considered in the role and influence of the initiator of Foresight, the respective ambitions and aims as well as the implementation of results. Foresight is considered to provide a solide basis for decisions which to diverging extend impact the future performance of countries, regions and corporations. This is partly due to the assumptions that Foresight will eventually lead to priority setting in the science, technology and innovation portfolios and infrastructures of countries (national Foresight), regions and corporations. The more aggregate the level of Foresight is the more likely this can be considered. However one needs to take into account the timer horizon which are affiliated with Foresight at the different levels. Also the implementation power of agents in the overall setup differs between Foresight levels. Having said so, it's obvious

that national Foresight by far is more challenging and difficult to implement since it focuses on a whole country and the established infrastructure which involves a large number of stakeholders who follow very own interest and strategies. Stakeholders at this level involve regions and related authorities as well as the industrial and scientific community but also society as a whole. At regional level the number of stakeholders is smaller still the divergence of their interests and strategies which is also true for the corporate level. However the pure number of stakeholders affected doesn't allow any conclusion about the implementation potential at the different levels. It seems even more plausible that the position and the ambition of the actual initiator together with a consequent implementation monitoring and case by case intervention by the original initiator is more relevant for the eventual impact. Table 1 compares national, regional and corporate Foresight along the dimensions motivation, responsibility, aim, methodology and time horizon.

Table 1. Comparison of regional, national and corporate foresight

Issue\scope	National	Regional	Corporate
Motivation	<ul style="list-style-type: none"> • focus on both technology and market perspectives • consideration of social features in national foresight • includes analysis of the technological implication of those features 	<ul style="list-style-type: none"> • focus on integrating technology and market factors with social factors • Innovation in regional foresight is seen as interlinking all types of factors and actors 	<ul style="list-style-type: none"> • focus on decision-making support tool, integration with business planning
Responsibility	<ul style="list-style-type: none"> • Generally sponsored by national governmental bodies and seldom by large firms 	<ul style="list-style-type: none"> • initiated and funded by the main potential users of results such as local research institutions, • public administrations and SMEs' association. 	<ul style="list-style-type: none"> • usually conducted and funded by large firms
Aim	<ul style="list-style-type: none"> • aims at outputs (for instance list of critical technologies) which can be used by public authorities or firms for their R&D policy planning and resource • allocation 	<ul style="list-style-type: none"> • aims at the process of creation of a network between the key actors of regional innovative system (mainly firms, research organizations, public institutions, financial companies and technology intermediaries) 	<ul style="list-style-type: none"> • aims at outputs like identification of new trends in society new customers, and novel technologies designed to support decision-making for achievement advantages over competitors

Methodology	<ul style="list-style-type: none"> • multiple methods: <ul style="list-style-type: none"> ○ Delphi ○ scenario writing, ○ experts panels ○ focus groups, etc. • methods are based on all possible sources of knowledge and information 	<ul style="list-style-type: none"> • panels and focus groups rather than on sophisticated and complex methods like Delphi • allows to concentrating on expertise within the region and rather specific problem relevant areas 	<ul style="list-style-type: none"> • scenario • expert panels • focus groups etc. • Combination of roadmapping and scenario analysis can help firms improving their planning of market strategies
Time horizon	<ul style="list-style-type: none"> • usually between 10-15 years or even more 	<ul style="list-style-type: none"> • commonly 10-15 years 	<ul style="list-style-type: none"> • commonly medium term 5-7 years

Source: Roveda, C., Vecchiato, R., Vercesi, P., 2004.; Vishnevskiy K., Karasev O., Meissner D., 2014

It becomes evident that regional Foresight can be considered to fulfill a “bridging role” between national and corporate Foresight. A “bridging role” is understood to combine the more aggregate national Foresight while also taking into account corporate Foresight. The latter being especially important in the light of regional Foresight because it’s considered to include and mirror at least partially corporations’ innovation strategies. In this regard innovation strategies refer to all activities which are affiliated with innovation activities. At the other end national Foresight serves as a framework for regional Foresight for orientation at the overarching national challenges and related responses.

It appears that different approaches have evolved for regional Foresight: e.g. market pull (Higdem U., 2014, Störmer E., Truffer B., Dominguez D., etc., 2009, Cuhls K., Kolz H., Hednagy C., 2012, Hanssen G., Johnstad T., Klausen J., 2009, Vecchiato R., Roveda C., 2014), technology push (Vecchiato R., Verganti R., Landoni P., 2007), and also mixed approaches, which represent both market pull and technology push (Roveda C., Vecchiato R. and Vercesi P., 2004, Koschatzky K., 2007, Heger T., Rohrbeck R., 2011). Market pull approaches mainly target at the structured analysis of markets and potential developments of given markets including scenarios describing the development of market actors and their respective strategies as well as structural changes in the markets which are caused by different sources (Brem and Voigt, 2009). The regional dimension of these Foresight studies is manifest in the initiators and interested parties of such Foresight, e.g. markets are usually defined according to the industrial structure of a region and the respective markets served by the regional actors. Hence markets refer to current and potential markets with relevance for the regional actors at global scale. Technology push based regional Foresight follows a similar approach by developing development paths of

technologies and technology fields in a broader sense which are characteristic for the region (Caetano and Amaral, 2011). Mixed approaches take into account the market pull and the technology push dimension thus aiming at analyzing the whole picture (Vishnevskiy et al, 2014). The basic shapes of regional Foresight are used in different developed countries. Table 2 shows the main features of the different types of regional foresight.

Table 2. Systematization of approaches to regional Foresight in the context of “Knowledge triangle”

Title	Adopted Integration Strategy			Description of methodology and application	compliance with “Knowledge triangle” ⁵	Comments
	Market pull	Technology push	Mixed			
Higdem U. (2014)	X			<ul style="list-style-type: none"> main stages: <ol style="list-style-type: none"> Status and challenges - refers to discussion with the regional advisors on regional foresight preparations Development of visions of the future - including interviews, surveys, statistics and analyses, scenario workshops, etc. Strategies and decisions - based on analyzing and reporting from each region; concentrated input into the country process 	✓✓✓	<ul style="list-style-type: none"> Participation with a forward view is a key concept foresight processes are occurs by working team between practitioners (the county council’s own expertise), that is, the planners, and the researchers was established. core team had seven to eight members, three planners, three researchers, one doctoral student (also a researcher), and one student in training
Vecchiato R., Roveda C., (2014)	X			<ul style="list-style-type: none"> framed in 4 phases: <ol style="list-style-type: none"> identification of innovative application areas (i.e. emerging relevant socio-economic needs of the local community of citizens and firms) which regional government could meet through innovative products and services; evaluation of application areas and selection of most relevant; design of R&D pilot projects intended to develop the emerging technologies required for 	✓✓✓	<ul style="list-style-type: none"> group of supporting experts previously defined by Steering Committee to provide a rough assessment of the feasibility of developing the new technologies inherent in such applications through the scientific and industrial resources of Lombardy width of investigation fields and the need to involve a large

⁵ The number of ticks in the column “compliance with “Knowledge triangle” shows the level of key actors cooperation:

- ✓✓✓ – means that all representatives of knowledge triangle (research, education and innovation) are involved into regional foresight processes;
- ✓✓ – means that one of the basic parts of knowledge triangle (research, education and innovation) absents;
- “uncertain” – means that there were not information to evaluate the level of compliance with “Knowledge triangle”.

				<p>the provision of selected application areas; 4) design of calls for implementing R&D pilot project and invitation of applicants</p>		<p>number of regional stakeholders beyond (but together with) the originally appointed experts group</p> <ul style="list-style-type: none"> representatives from public research sector (universities, scientific institutions, etc.) industry (large firms, trade associations, etc.) and sub-regional public bodies (municipalities, development agencies, etc.) Nominated through a spontaneous process of “passing the word” and reciprocal nomination
<p>Cuhls K., Kolz H., Hednagy C.M., (2012)</p>	X			<ul style="list-style-type: none"> based on four thematic complexes: <ol style="list-style-type: none"> demographic change as a challenge to the local authorities; demographic change as a challenge for the world of work; generations cooperating together in demographic change; new market opportunities in demographic change. The model calculation for population development of the Rhineland-Palatinate Statistical Office can not allow a small-scale prognosis under the level of a county due to no available data for the successful design of future development 	✓✓	<ul style="list-style-type: none"> focuses on inviting representatives from university research and teaching as well as from political and societal institutions to participate Representatives from operative units but not upper hierarchy levels
<p>Heger T., Rohrbeck R., (2011)</p>			X	<ul style="list-style-type: none"> Regional foresight includes 3 basic phases: <ol style="list-style-type: none"> Product properties <ol style="list-style-type: none"> value proposition relative product advantage 	✓✓✓	<ul style="list-style-type: none"> highly interactive approach fosters integration of cross-functional team members and calls for the involvement of

				<ul style="list-style-type: none"> c. product positioning d. targeted market segment e. strategic fit, customer expectations <p>2. Competitor analysis</p> <ul style="list-style-type: none"> a. up- and downstream partners b. Industry growth and profitability c. Competitors' strategies d. Rivalry, competitiveness and new competitors e. Power structures f. Convergences and divergence of interests <p>3. Market analysis (scenario analysis)</p> <ul style="list-style-type: none"> a. Environment conditions (political, regulatory, and sociological) b. Market and technology trends and drivers c. Future market configuration d. Financial analysis e. Production costs f. Customers' willingness to pay g. Sales estimates h. Revenue estimations i. Market potential 		external experts
Hanssen G., Johnstad T., Klausen J., (2009)	X			<ul style="list-style-type: none"> • Prediction is combined with the development of common visions and shared goals • Regional integration and development of networks are as important as the end product of the foresight process • Regional foresight is the effective instrument to enhance regional integration and development of interactive and network-building aspects. 	✓✓✓	<ul style="list-style-type: none"> • involvement of key experts, key actors and key sources of resources and knowledge emphasizes • domination of experts and other strong, resourceful participants might hinder a diversity of meanings in the deliberative processes thereby reducing the potential gain of knowledge exchange, new ideas and innovative solutions

Störmer E., Truffer B., Dominguez D., etc., (2009)	X			<p>3 stage approach</p> <ol style="list-style-type: none"> 1. Exploratory context scenarios <ul style="list-style-type: none"> • analyzing possible future framework conditions relevant for organizations, regions or communities 2. Assessment of strategic options <ul style="list-style-type: none"> • explorations of the ranges of consequences, outcomes and impacts of strategic decisions and corresponding actions 3. Value considerations. <ul style="list-style-type: none"> • outcome of an assessment of different scenarios depends on the assessment criteria applied • Criteria vary depending on interests of specific stakeholder groups' perspectives 	✓✓✓	<ul style="list-style-type: none"> • highly interactive approach: participants adopt roles of different future stakeholder groups <ul style="list-style-type: none"> • representing either future citizens or industry representatives • define their assumed preferences and rank each option on an ordinal scale ranging from “well suited” to “not desirable” • list of assessments developed for each option under each scenario and evaluated according to the preferences of each interest group
Koschatzky K., (2007)			X	<ul style="list-style-type: none"> • focuses on integrative instruments <ul style="list-style-type: none"> ○ the formation of a steering committee and a task force which supported the whole process of regional foresight ○ several round tables, workshops and a final conference discuss different steps and results of the foresight exercise • strengths and weaknesses analysis of the provincial research and innovation system based on quantitative and qualitative data • survey including 39 interviews, structured according to hypotheses developed on the basis of the strengths and weaknesses analysis • multiple objectives of foresight ranging from priority-setting in science and technology to vision-building and networking 	✓✓	<ul style="list-style-type: none"> • Business sector as one of the major sub-systems in the Trentinian economy is only linked to the provincial government (mainly for subsidies), but has no pronounced linkages to the research system (research institutes, university). • Triple Helix approach seems feasible
Vecchiato,		X		<ul style="list-style-type: none"> • overcomes many limits of the ‘key technologies 	uncertain	<ul style="list-style-type: none"> • Information about basic actors

R., Verganti, R., Landoni, P., (2007)				<p>list':</p> <ol style="list-style-type: none"> 1) makes use of a wide set of indicators in order to grasp the many diverse features of a complex socio-economic system 2) gathers, whenever possible, quantitative information, so that it is possible to compare the experts' evaluations 3) aggregates the first level indicators into a smaller set of parameters that can support the decision making process 4) correlates these indicators and so provides an easy and contextualized picture of attractiveness and feasibility of all the technologies 		absents
Roveda C., Vecchiato R., Vercesi P., (2004)			X	<ul style="list-style-type: none"> • Many methods available <ul style="list-style-type: none"> ○ Delphi ○ scenario writing ○ expert panels , • focus groups, etc. believe that “regional studies tend to rely more on panels and focus groups than on sophisticated and complex methods • given the usually rather limited base of expertise within the region and the concentration of the exercise on rather specific problem areas locally relevant” • methodologies involving mostly local actors (i.e. as small entrepreneurs and public administrators) confronting them with potential changes driving forces as emerging horizontal and pervasive technologies and globalization can induce into the well established cultural structures, rules and standards of the regional social system 	✓✓	<ul style="list-style-type: none"> • more process- oriented • one of the most important goals is the creation of a network between the social actors, mainly firms, research organizations, public institutions, financial companies and technology intermediaries • Foresight exercise aims at developing a proactive rather than a reactive attitude and capability towards technological, economic and social changes within SMEs

It is important to note that regional foresight in developed countries usually use of quantitative and qualitative data and information from available sources for market analysis, determining the environmental conditions in regional foresight process. (Koschatzky K., 2007, Heger T., Rohrbeck R., 2011). Moreover, some foresight methods which are commonly used at the national level, evolved replacing by more interactive, integrated methods. Thus regional studies nowadays include more panels and focus group than Delphi and scenario writing (Higdem U., 2014). In addition, some steering groups are formed to support the regional foresight. The basic target of such groups is consolidation of different interest groups to discuss and adjust the main stages of regional foresight.

The review also shows that in general regional foresight in developed countries suggests involving all drivers of knowledge-based economy, such as representatives of innovation-oriented business, universities and research institutes (Hanssen et al., 2009; Renn and Tomas, 2002). At regional level it often times appears that science representatives enjoy a high reputation holding influential positions in the regional context. Similarly industry representatives, especially high level industry representatives, possess remarkable influence on regional policy. Furthermore it can be assumed that the networking effect between the actors is strongest at the regional level, e.g. within the knowledge triangle. One possible explanation is that at this level the actors although having different interest and following diverse strategies are to some reasonable extend complementary. Moreover there is indication that the personal links between actors at regional level are stronger than at corporate or national level which can be explained by the hypothetically long lasting direct and personal relationships which are typically found in regional networks.

Russian regions' approach to regional Foresight

Regional Foresight is a rather new phenomena in Russian regional STI policy and regional development. Thus far there are two regions known to have undertaken such Foresight. Both approaches have evolved taking into account the earlier experiences of regions in developed countries' conditions, which are characterized by low level of institutes development, and lack of innovation infrastructure, etc. For this reason, the regional foresight in Russia has to consider the main disadvantages of developing economies.

Regional Foresight was done in the Bashkortostan and the Samara region.

Figure 1. Samara and Bashkortostan positioned in Russia

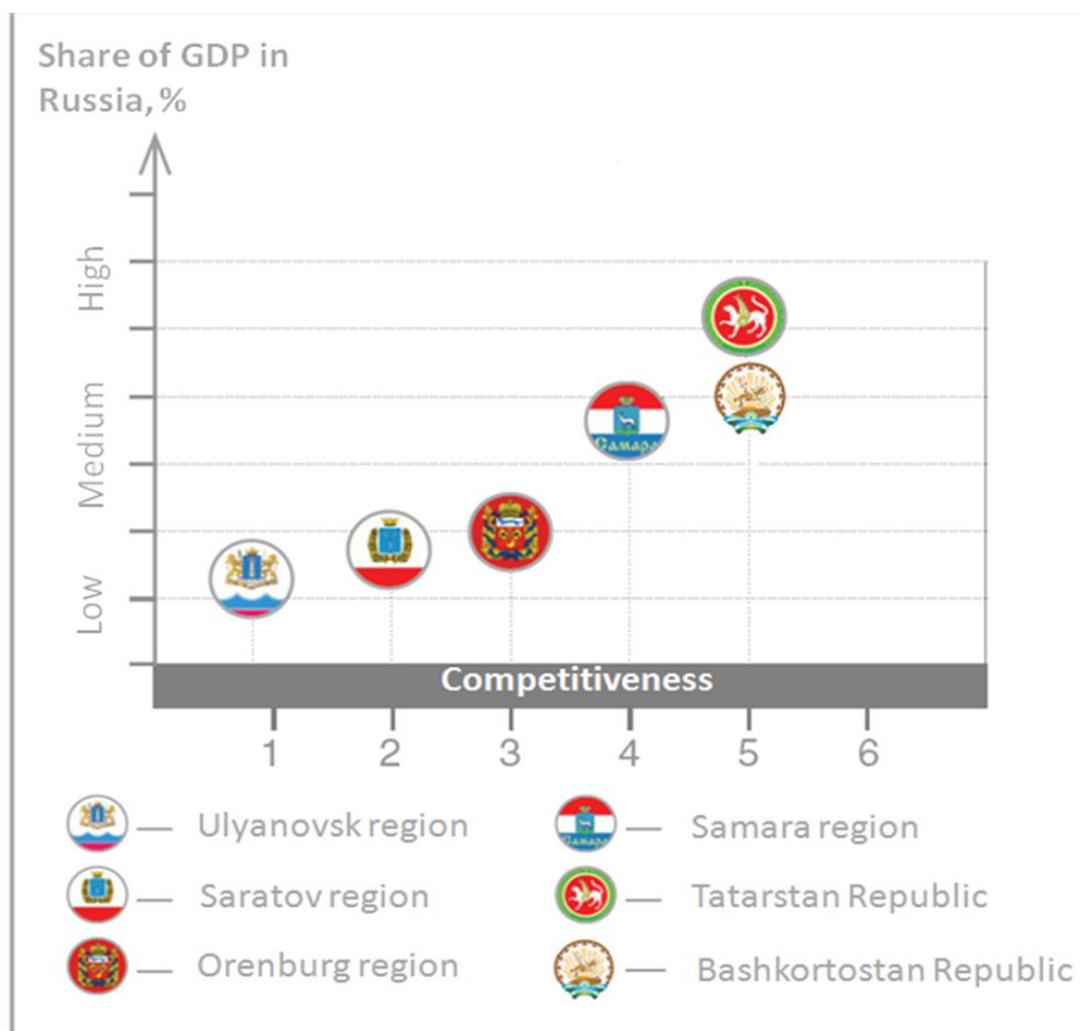


Source: Euromoney special report: Bashkortostan, 2013

The Bashkortostan is characterized by advanced industrial development. It's included in top five of major Russian regions in terms of industrial output and agricultural production. Now gross regional product (GRP) grew by an estimated 3.5%, more than double the national level of 1.5%, while industrial growth was also ahead of the average for Russia's regions at 2.3%. Extractive and manufacturing industries play the core role in GRP of the region and one of the major drivers of region's development is growth in the chemical and petrochemical industries. The Bashkortostan's key industries of oil refining and agriculture expanded by 4.5% and 17% respectively, while parts of the machine-building sector – notably in the aviation equipment sphere – showed growth of up to 50% (Euromoney special report: Bashkortostan, 2014).

The core industrial sector of the Samara region is mechanical engineering which is presented as system-forming branches: motor industry, aviation and space technology manufacture, and engines industry. Samara takes the second place after Moscow in total retail turnover volumes. Samara Region is one of the leading Russian regions in economic potential. It is among the top ten regions in terms of covering commitments with internal revenues and balancing the regional budget. The growth of GRP in 2012 was 5%. In this year, in the industrial structure of GRP compared with 2010, there is an obvious shares' growth of the construction industry, the mining sector, real estate and agriculture. (http://www.economy.samregion.ru/en/economy/industrial_potential/).

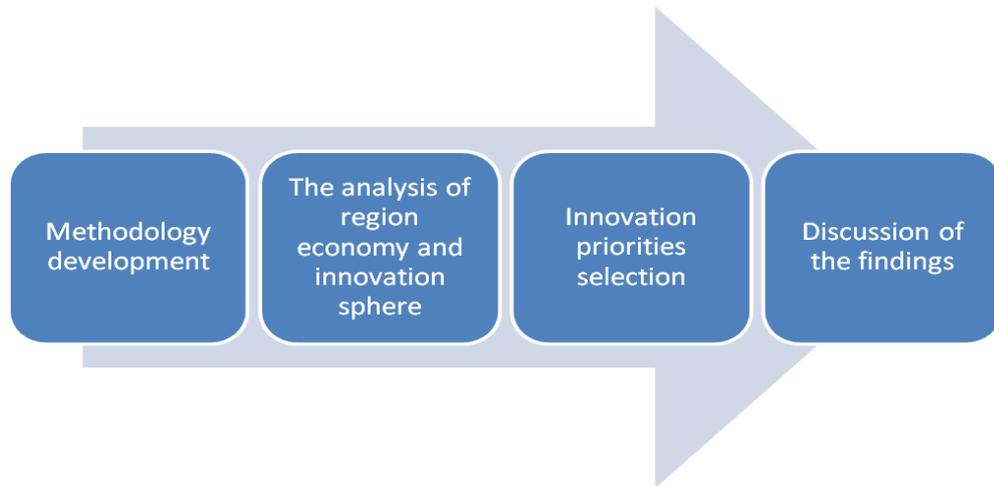
Figure 2. Comparison of Bashkortostan and Samara with neighbor regions



a) Bashkortostan

Bashkortostan republic government announced the necessity for a regional development strategy, and regional foresight emerged to become the first stage of the strategy development and then was reflected both in the strategy of socio-economical development and innovative development of the Republic (figure 1). The regional foresight was held to formulate regional innovation priorities, to better understand and specify the most important strategic competencies and priorities of the region future development.

Figure 3. Bashkortostan foresight process flow chart



However, at the first stage of regional foresight prior regional innovation priorities selection an analysis of economical and scientific technological potential of the region was done. This stage was based on quantitative methods, e.g. statistic data analysis. The next stage was regional innovation priorities selection based on the method of critical technologies used in conjunction with the SWOT-analysis, a survey of experts, focus groups, etc.

Regional innovation priorities selection requires broad involvement of key actors. The expert group was composed by managers and senior staff of the executive authorities, representatives of research centers, educational institutions, including institutes of the Academy of Sciences of the Republic of Bashkortostan and Ufa Scientific Center, Russian Academy of Sciences, Bashkir State University, Ufa State Aviation Technical University, enterprises and organizations of the region. Selection of experts was formed in such a way that all the thematic areas of priority areas were presented by several experts.

The regional innovation priorities selection process was organized as a multi-step approach which was attended by more than 100 experts from government, science, education, industry and business. The process involved the steps project expertise, pre-selection of priority areas and critical technologies, experts interviews, focus groups and finally summing up results

The methodology elaborated regional research and development relevant to the best Russian and international standards. The basis of the innovation priorities of Bashkortostan was put a list of priority areas of science, technology and critical technologies approved by the President of the Russian Federation in 2006.

As a result the initial formed list of technologies (206 technologies) was consistent with the Expert Council. Their selection was organized in such a way that all the thematic areas of priority areas were presented by several experts.

Then technologies were selected according to two criteria:

- The level of R&D in this area.
- The importance of technology for the republic economy development.

In accordance with analysis of questionnaires responses that included questions about the level of scientific and technological research and development, respective practical development critical to enhancing the competitiveness of enterprises, production conditions and other innovative products, the technologies list was analyzed. The respondents of the questionnaires were experts from different spheres such as science, business and regional authorities. The Experts were given the opportunity to improve the proposed list of technologies, add new technologies or exclude irrelevant one. Accordingly for each of the priority areas the lists of the most important innovative products and services, the production of which can be started in the next 10 years with domestic developments were concluded.

After this step, the final selection of critical technologies and their constituent technical solutions followed by intensive focus group interactions. The results of all the focus groups were summarized and presented in the form of a list of priorities, critical technologies, specific technologies within them, and the most important innovative product. Each critical technology is accompanied by a brief description, including its basic purpose, scope, innovation potential, the list of scientific organizations with the greatest theoretical groundwork in this area (Shashnov S., 2007).

Eventually the results of regional foresight were taken into consideration for developing the respective strategy. It showed that the proposed methodological solutions are universal and can be widely used in other regions for the selection of innovation priorities.

It should be noted that the applied methodology doesn't necessarily meet the requirements of regional Foresight basic principles. In particular representatives of innovative companies were not involved into regional foresight. In fact, in Russia only 10% of companies are innovation-oriented. At the same time, the share of small enterprises engaged in technological innovation and non-technological innovation of the total number of small enterprises account for only 0.477 and 0.262 respectively (Abdrahmanova G. I. et al., 2014).

b) Samara

Another case of regional Foresight is the Samara region. In this area regional Foresight was implemented for establishing of regional strategy for socio-economic development. However, in contrast to the Republic of Bashkortostan's regional Foresight, the Samara's exercise was based solely on market pullresulting in a roadmap which includes a visual

representation of the key provisions of the Strategy for Socio-Economic Development of the Samara region.

The roadmap is designed to organize and justify the main directions of innovative development of the Samara region, making possible to respond to the regional challenges and the achievement of the strategic objectives. The roadmap describes the factors that affect the construction of scenarios of regional development, clusters and areas in which changes may occur, as well as activities to promote socio-economic development of the Samara region in the long term, e.g. until 2030.

The roadmap is designed to achieve the following objectives:

- Implementation of integrated planning of the Samara region socio-economic development, including the formation of the development priorities and specific projects and activities;
- Comprehensive development of basic and advanced clusters in the region, as well as the social sphere development;
- Assessment of the expected effect of activities on the field of innovative development, their influence on socio-economic development of the region;
- Identification of regional targets whose achievement is based on the implementation of key activities.

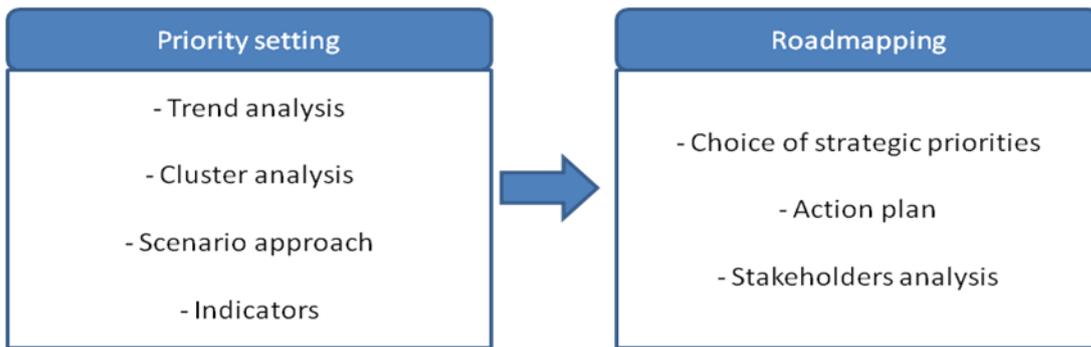
The development strategy of the Samara Region is represented on the map with details on major industrial clusters and areas of development of the social sphere. The roadmap is integrated in the formation of priorities and specific activities in the field of socio-economic development of the region, provides a clear presentation of the main points of this strategy.

Visual representation of the roadmap involves five aspects:

1. Development scenarios
2. Basic directions of social spheres development
3. Activities aimed at the development of the social sphere directions
4. Projects which oriented on aims achievement
5. Results which can be obtained in each of the clusters in the social sphere

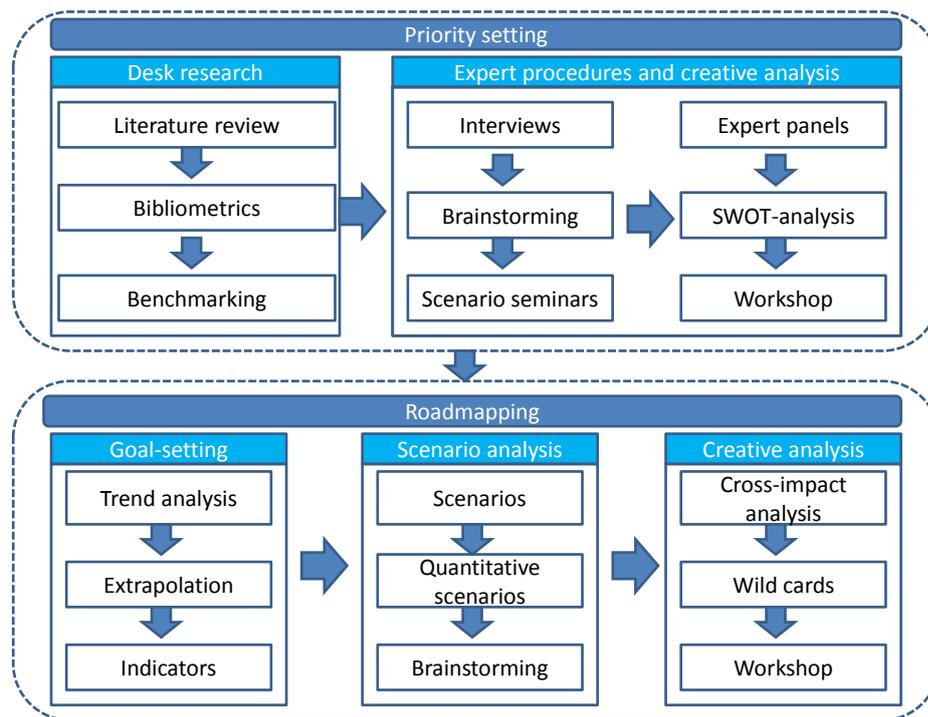
The first stage of Samara region's foresight was priority setting including a wide range of instruments and studies like trend analysis, cluster analysis, scenario approach and formation of indicators (figure 2). Then the results of the priority setting are used in decision support of strategic priorities choice, action plan establishing and stakeholder analyses.

Figure 4. Basic scheme of the Samara Foresight



Priority setting is based on qualitative and quantitative methods starting with desk research which includes preparatory analysis of literature, bibliometrics and statistical data. The next stage is benchmarking identifying strength and weaknesses of several socio-economical aspect of Samara region followed by priority setting based on expert procedures and creative analysis which includes interviews, brainstorming, scenario seminars, expert panels, SWOT-analysis and workshops. The roadmapping phase begins with goal setting which includes input analysis and expected results formation (figure 3).

Figure 5. Methodology of Foresight study for Samara region



The next phase is scenario development, which strongly stresses key stakeholders' participation. Moreover, this phase includes formation of quantitative scenario and brainstorm. After that cross-impact analysis, which is implemented by internal and external experts, allows linking all the layers of roadmaps, e.g. a series of workshops discussed and specified the results of cross-impact analysis.

It is important to note that regional foresight in Samara also does not fully involve all actors. In fact, the innovative entrepreneurs are separated and not all of them are considered during the regional Foresight. Nevertheless, the statistics shows that the indicators measuring the innovative activities in some Russian region are developed and hence it is predicted that innovative companies will be more integrated into regional foresight processes.

Conclusion and discussion

The work looked at the features of Foresight at national, regional and corporate level. It shows that there are numerous similar features at each of the levels, the motivation and aim is almost similar and that basically similar methodologies are applied although in different combinations. Thus the methodology mix used at the different Foresight levels varies according to the overarching aim and motivation. Accordingly the methodology mix is fine-tuned and targeted at the initial objective and scope of the respective Foresight but also taking into account experiences made with the methodology mix. In course of selecting methodologies special attention needs to be given to the mutual or unilateral dependency of methodologies. The different methodologies are per se not compatible with each other, in some cases similar or the same information sources are used, in some cases the output resulting from the use of a methodology aren't fully compatible for further processing and use with other methodologies. Combining the methodology mix hence requires experienced professionals who are familiar with the different methodologies from theoretical but also practical experience. In case of regional Foresight methodologies are typically used which don't necessarily aim at the quantifying the immediate monetary value of potential options as it is the case in corporate Foresight. National Foresight on the contrary is targeting more on the challenges the country is facing in the longer term which calls for softer indicators and criteria to be used in Foresight than the monetary value eventually. Possible solutions in such Foresight involve option theory approaches among others. In this regard regional Foresight can be placed in between the corporate and the national Foresight, assuming that it uses corporate as one input and serves as one input for national Foresight, thus fulfilling a bridging function.

To meet these ambitions regional Foresights need to be designed accordingly, e.g. the institutional set up and the selection of participants in different activities needs to mirror the regional stakeholder structure but also leaves room for potential future change and refinements. Hence the knowledge triangle thinking can be at least partially applied, still it's reasonable to expand the knowledge triangle approach by the civil society dimension towards the quadruple helix described by Carayannis and Campbell (2009).

Accordingly in order to define the scope of regional Foresight there is a need to elaborate the respective stakeholders' basic intentions prior actual Foresight work. Contrary to the knowledge triangle thinking this requires solid analysis of the civil societies' attitudes towards STI in different shapes, e.g. the public perception of STI. Involvement of the broader range of stakeholders is especially crucial in the final stages of regional Foresight, e.g. the closer it comes to actual implementation plans and roadmaps the more important becomes the involvement of the related stakeholders. In case of civil society involvement might refer to informing associations in a first step which showed to have strong potential in influencing public opinions towards STI. Secondly media campaigns are needed in selected STI fields to either lower the expectations and concerns which might arise in civil society about selected STI developments or to lower the expectations towards potentials and timing of STI solutions for civil society daily life.

The experience of the two Russian regions shows practical approaches to regional Foresight. The main disadvantage in both case is that only a modest share of innovation companies were represented in the regional Foresight. This might be expected to cause reasonable difficulties in implementing the Foresight and the resulting roadmaps at first sight. However the absence of innovation driven corporations in the regional Foresight in both cases is also due to the overall weakness of the Russian economy in STI related matters, e.g. the average share of innovation companies in the overall economy remains rather low. Hence roadmaps resulting from the regional Foresights in both cases involve the development of innovation companies more prominently than in other comparable regional Foresight activities. Moreover both regions are confronted with the challenge of building and developing a globally competitive science as well as research and development base whereas regions in developed countries aim at maintaining leadership or at least competitive positions. Accordingly the measures included in the respective roadmaps vary posing additional challenges to Foresight practitioners in these regions especially for the selection of methods and the composition of the methodologies' mix during the Foresight.

Finally it can be concluded that Foresight in the case study regions in the first instance leads to awareness creation among the stakeholders and especially the participants. Although the challenges the regions face are well know for a while already the regional Foresight was a tool which developed a certain momentum in the regions to develop measures and actions to meet these challenges proactively. Currently it can't be assessed if the respective measures have lead to significant impact still the momentum created in the regions seems to remain.

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