The future of Murmansk Oblast assessed by three Delphi panels

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This paper evaluates the development of the socio-spatial structures and geo-economic position of Murmansk Oblast up the year 2025. The study applies strong prospective trends and industrial cluster approaches in analysis and interpretation and it interprets the results in the context of regional development theories.

The Delphi method is applied for analysing the potential development paths of Murmansk Oblast. Two Delphi panels were set up in 2005. The panel data in this article consist of the answers of 77 persons including pilot interview. The experts in the Murmansk panel are from Murmansk Oblast, the ones in the Moscow panel are from Moscow and St. Petersburg, and those in the international panel come from Finland, Norway and Great Britain.

The clusters of transportation and energy will be the most probable growth sectors in Murmansk Oblast during 2005–25. According to the expert panels the three most important strong prospective main trends influencing socio-economic development in Murmansk Oblast constitute the potential of logistics and transport, the impacts of new technology and globalisation. From the viewpoint of development theories the development of Murmansk Oblast seems to rely very much on the argumentation of the resources and physical environment and supply-side theories.

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Background

After the collapse of the Soviet Union, the economic integration of Murmansk Oblast to the global market has created new opportunities not only in relation to the utilisation of natural resources in the region, but also regarding the development of knowledge-based industries, such as information technology, environmental business, tourism and logistical services. Developing of Murmansk Oblast for instance the transport and logistics infrastructure system in a rational manner requires an assessment of the future population development and economic conditions of the region. The futures studies approach provides methods to develop this assessment.

Murmansk Oblast belongs to the Northwest Russian governmental region. It is also a part of the Barents Euro-Arctic co-operation area. The population is concentrated to Murmansk as well as to some resource communities (Rautio & Andreev 2005) (Fig. 1). There are several military bases in the area. During recent years the economical growth has been slower than in the rest of Russia. Mining and the metal refining are the biggest branches of production. There has been fairly little new production in the area. However there has been an increase in services and lately also in the construction sector (Didyk et al. 2005). The opinions concerning the future of Murmansk Oblast have varied over the years. Very different opinions have been presented concerning the development of Murmansk Oblast seen either as regressing periphery, or as a junction of traffic and industry, as well as an export channel of the Northwest Russian oil to the world market (Kauppala 1998; Lausala & Valkonen 1999; Oldberg 2000; Filippov et al. 2003; Brunstad et al. 2004).

Murmansk Oblast has to be examined not only as a part of the Barents region and Northern Europe, but also as a part of a global system. Russia is integrated in global trade especially through the

Fig. 1. Population of Murmansk Oblast is concentrated in Murmansk, mining and industrial localities and localities nearby military bases. Data source of urban population: Murmansk region in figures 2004.

export of energy over recent years and this fact strengthens the role of the Barents Sea and Murmansk Oblast (Tykkyläinen 2003b: 172; Brunstad et al. 2004).

Objectives – evaluation of the needs of development of socio-economic development and logistics

The objective of this article is based on specialists' interviews to analyse the development of the Murmansk Oblast and factors that have an impact on the development during a period extending until the year 2025. The research is based on the utilisation of the methods used in futures studies as well as geographical theory. The aim is to create probable pictures of the future taking into consideration the changing factors possibly that make an impact on the development.

In this article the economical, social and logistical development of the future in Murmansk Oblast is outlined as part of the Russian geoeconomy and is based on the interview material of the specialists' panel consisting of actors in Murmansk Oblast and the previous analysis of the development of the area as well as on the interview material of the specialists' panel consisting of the actors in Moscow and St. Petersburg and the international panel, mainly consisting of Finns. The article gives an overall picture of the opinions of these three Delphi panels concerning the future development of Murmansk Oblast and creates starting points to build more exact scenarios for further investigations.

Taking these premises as starting points this research aims at evaluating the economic structure of the region, particularly in relation to the industrial structure, population, and logistics infrastructure. The point of the analysis is that appropriate planning for future infrastructure in regard to logistical needs is impossible without a well-grounded assessment of the region's future population structure and economic conditions.

Theory framework – strong prospective trends and clusters approach

The trend approach of the *strong prospective trends* (SPT) belonging to futures studies forms the most important theoretical viewpoint. Central to the concept of futures studies is that it is not possible to predict the future only on the basis of past

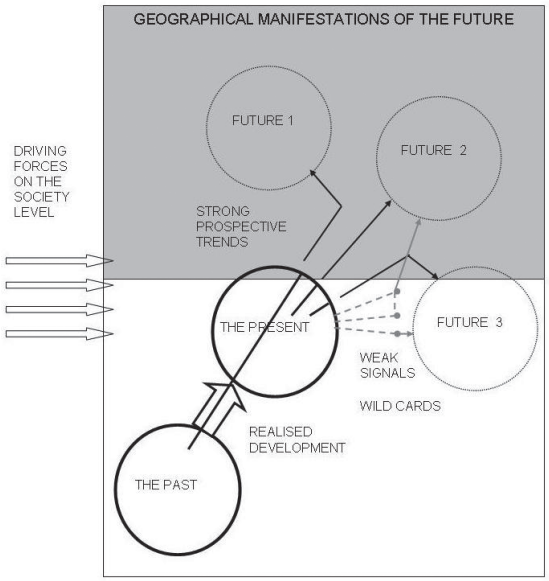

Fig. 2. Model of a strong prospective trend (Original source: Toivonen 2004: 10). Published with the permission of Marja Toivonen.

developments. A strong prospective trend is a future trend or way of development which is based on the fact that there is (e.g. statistical time series) showing the existence of a trend and that the experts who evaluate this trend agree that the trend will continue in the future. In practice, the SPT concept means the same as the commonly used mega trend concept, but is a more grounded scientific argumentation (Slaughter 1996; Toivonen 2004: 6–10).

Strong prospective trends may lead to different kind of futures (Fig. 2). Prospective trends can relate to phenomena that have a long history or they could be phenomena in which a certain direction of development has been detected only lately. Prospective trends can continue in the future along their current direction or the trend may break off and lead to a different kind of future from how it could be deduced from today's development (Toivonen 2004: 10). There are weak signals whose current appearances may be the reason for the discontinuation of the trend. Weak signals may with time become stronger, turn out to be significant phenomena and develop into even strong trends. A strong trend can also emerge when several weak signals combine with one another.

The most important objective aimed for is to recognise the key SPT trends in Murmansk Oblast because based on these it is possible to later on make other evaluations concerning the development in the area.

The trends influence the development of the clusters in the area. The word cluster normally means bunch. In this context it stands for a co-operation network consisting of companies and other actors such as research institutes and schools. There are companies in a cluster who produce their products for the market (e.g., Porter 1990). These "locomotive companies" commanding the market are normally big companies – but there may be significant differences between the lines of business activities. In particular the research and educational sector form an important group of actors because the success of the clusters depends more and more on know-how. The finance sector forms an important group of actors in the cluster. Clustering in the form described above is called vertical clustering. In horizontal clustering learning and creating of innovations form an important reason for enterprises and other activities to find their ways closer to each other (Malmberg & Maskell 2002: 438).

Especially the vertical clusters manifest themselves and materialise in geographical spaces, which require the analysis of transport infrastructure. In this research nine clusters have been selected to be more closely examined (Table 1). The objective has been to examine existing strong clusters and so called rising clusters. Data on the structure of the economics of the area as well as pilot interviews have been used as instruments.

It has been intentional to collect the clusters in sufficiently big groups of industry in order to make data handling and using the method of specialist interviews possible. Mining and metal refining, food stuffs, transportation and logistical services form the existing clusters most clearly. Particularly tourism, ICT clusters, environmental clusters, welfare clusters and partly also security clusters can all be considered as rising clusters. In the energy cluster there are existing activities (as electrical production) as well as rising activities (possibly e.g. gas production).

Finding key actors, who have a strong influence on the above-mentioned development of Murmansk Oblast, are the most important challenge. The interview data and a cluster-based approach are used to identify those actors with the greatest influence over the region's development.

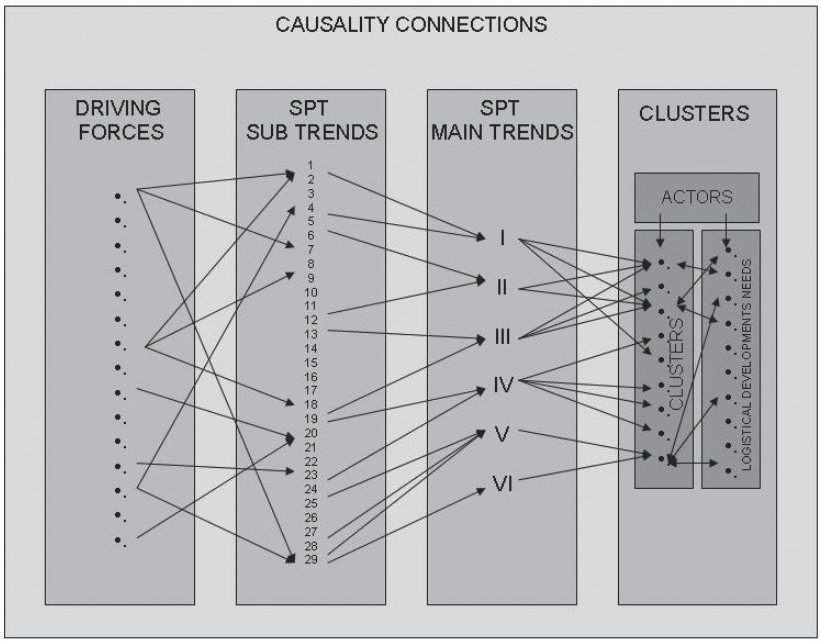

Fig. 3. Causality connections. Driving force actors have an impact on the creation of the SPT trends. The SPT trends may be grouped in main trends. SPT trends have an impact on the development of the clusters. The cluster appears in geographical space and the logistics play an important role in its development. The actors make the decisions in the development of the clusters and logistics on which the trends also make an impact.

The causality between economic and social futures as well as anticipating of the logistical development needs in Murmansk Oblast are outlined in Fig. 3. Behind the strong prospective trends (SPT sub trends and SPT main trends) there are driving forces, i.e. factors, which are making an impact on the development of Murmansk Oblast; for example the growth of the world economy, the growth of the world population, the unstable situation in the Middle East (especially the impact on the oil price), the transition process in Russia among others. Strong prospective trends have an impact on the clusters. For example the oil price gives a boost to a rising energy cluster based on oil in the area. The clusters on the other hand are geographical phenomena and hence logistical development actions are needed in order to have a favourable development of these. Both the development of the clusters and the development of their logistics require decision-making on different levels.

Methodology and data

The policy Delphi method

The Delphi-method is the most well-known method used in future research based on interviews with an expert panel. Typical features for the method is that there are two or more interview rounds, and in between them a feedback summary directed at the participators in the panel, as well as, anonymity (e.g., Sackman 1975: 9; Kuusi 1999: 74). By using this method opinions can be expressed without others being able to identify whose opinions they are. In this case the arguments in the answers will play a central role as the participators assess other participators' answers. This has proven to be the strength of the method. The structure of the material presented in this paper as well as the research is shown in Table 1.

The Delphi method is rather a form of a developed theme interview than an opinion survey (see e.g., Kuusi 1999: 77, 80). Therefore, the criteria concerning the amount of samples and statistical tests which are assumed for opinion research should not be required for this material and handling of it as assumed by Sackman (1975: 26). When analysing the material in the future the so called policy Delphi (Tyroff 1975) tradition should be emphasised, where the interest groups and the differences between their opinions and causes are recognised instead of trying to reach some common view for the whole panel or the panels in the conventional Delphi-application way.

Table 1. The grouping of specialists participating in the material of the article based on their competence and interest. Here 'competence' refers to special experience in clustering and 'interest' actors in clusters. Panels interview rounds and number of respondents: Murmansk panel consists of pilot interview (10 persons), Delphi-panel's 1st round (25 persons), Delphi-panel's 2nd round (19 respondents); Moscow-panel consists of Delphi-panel 2nd round interview (6 respondents) and international panel consists of Delphi-panel 2nd round interview (17 respondents).

INTEREST /Actors in cluster	Companies			Finance and other support service			Research and training			Administration			Other / Independent			Sum		
COMPETENCE	Murmansk	Moscow	International	Murmansk	Moscow	International	Murmansk	Moscow	International	Murmansk	Moscow	International	Murmansk	Moscow	International	Murmansk	Moscow	International
Energy/Cluster	3		1	2		2				3				2		8	2	3
Mining and metal processing	3		1	1		1	1			5						10		2
Transportation and logistical services	3		1	1		1			1	1		1		1		5	1	4
Food	5									1		1				6		1
Tourism	2		1							1		2				3		3
ICT	3		1	2		2	2									7		3
Environment	2												2	1		4	1	
Welfare	2						1		1	1			2			6		1
Safety													1			1		
Others													4	2		4	2	
Sum	23		5	6		6	4		2	12		4	9	6		54	6	17

The interviewees – the interest and competence of the participants of the panel have an impact on the opinions

In choosing the participants of the panel the competence and interest of the participants in the theme of the research must be recognised. For example Osmo Kuusi has stated that the opinions of the participants are bound to these two dimensions (Kuusi 1999: 193–205). In the research nine different clusters formed the competence alternatives of the participants of the panel (Table 1). Enterprise, financing and related supporting services, research, education and administration are points of interest. The so called group of independent forms an important group of their own. For example the representatives of the civic organisation belong to this group. The international group is in its entity independent of its interest because at this moment the income of the participants could not be considered depending on Murmansk Oblast. In the pilot interview the participants were asked to suggest participants from above interests of competence.

Scenarios

Strong prospective trends (SPT)

Based on pilot interviews in the 1st round of the Delphi-panel there were 75 different deductively derived strong future trends created as proto trends there. To the 2nd interview round 27 sub trends with strongest for support from the specialists were selected. Evaluated sub trends and their grouping into main trends I–V and a tentative driving forces analysis in the Delphi-panels 2nd interview round are shown in Table 2.

In this paper the results are handled on the main trend level. The respondents are grouped in different panels according to their viewpoint. There are three panels: the Murmansk panel, the Moscow panel, and the International panel. The Murmansk

Table 2. Evaluated sub trends and their grouping into main trends I–V and a tentative driving forces analysis in the Delphi panels 2nd interview round.

DRIVING FORCES		SPT SUB TRENDS	SPT MAIN TRENDS
Connections of the Murmansk Area	1	Development of transportation technology	
	2	Development of information and communication technology	I Technological Development
Deepening of co-operation with rest of Europe	3	Development of energy technology	
	4	Increase in number of small enterprises	
Degree of corruption and economic risks	5	Increase of information and communication flow	
	6	Increase of transportation in mining and metal industry	
Development of energy prices	7	Increase of oil transit	II Logistical flows
	8	Increase of gas transit	
Growth of world economy	9	Increase of coal transit	
	10	Increase of container traffic	
Historical factors / traditions of the Soviet Union and Transit process in Russia	11	Increase of capital and financing flows	
	12	The expansion of EU and deepening of the integration	
Natural resources of Murmansk and Barents Area	13	Increase of traffic and trafficability in the north-west Passage	
	14	Increase of domestic electricity price (liberation of energy markets)	III Globalisation
Old fashioned education / anticipation	15	Increase of the international oil market price	
	16	Increase of domestic price on oil and oil products	
Policy of small enterprises	17	Increase of Russian economy	
	18	Increase of political and economical co-operation	
Power politics in Russia (e.g. Oligarchs in Kremlin)	19	Increase and westernisation of individual values	
	20	Increase in openness	
Role of various forms of energy and EU's energy policy	21	Strengthening of environmental values	IV Value based development
	22	Increase of personal welfare	
Situation in the Middle East	23	Increased risk of environmental disaster (oil, nuclear)	
	24	Decrease of the population	
Time / corrosion / nuclear waste	25	Continuation of migration to economical centres	V Development of socio-economy of the population
	26	Change in the structure of population (ageing population)	
Threat of terrorism	27	Increase in income level	
	28	A positive development of world market price on metals and apatite	VI Other, what?
Word politics of USA and Russia and USA-Russia relations	29	Increase of importance of the geopolitical position in the Murmansk area	

panel is divided into three councils that represent existing, rising, and independent clusters. The basic assumption is that the information given by the participators of the panel depends on their interests (Kuusi 1999: 79, 193). Based on the panels and the councils different opinions about main factors influencing development can be created as they are presented in Table 3.

The most important SPT trends influencing in the beginning of the 21th century

Today the trends that make an impact on the economic development in Murmansk Oblast are somewhat varying between the respondent group (Table 3). The Murmansk panel as a whole emphasises in the first place the technological develop-

Table 3. The impact of the main trends on the economical development in the Murmansk Area in the beginning of 2000 and the strengthening of the trends until 2025. The numbers are the mean values of the scores given by the panel members.

Questions	Q 1.2 What is your opinion on the significance of the following trends especially in the economic development of Murmansk Oblast?[1] Q 1.3 How do you expect the trend to change by the year 2025?[2]											
SCENARIO	SCEN 1		SCEN 1 A		SCEN 1 B		SCEN 1 C		SCEN 2		SCEN 3	
PANEL /Council	Murmansk panel: all respondents		Murmansk panel, council 1., representatives of the existing clusters		Murmansk panel, council 2., representatives of the rising clusters		Murmansk panel, council 3., representatives of the independent clusters		Moscow panel		International panel	
MAIN TREND	average[3]		average		average		average		average		average	
	Q 1.2 2005	Q 1.3 2025	Q 1.2 2005	Q 1.3 2025	Q 1.2 2005	Q 1.3 2025	Q 1.2 2005	Q 1.3 2025	Q 1.2 2005	Q 1.3 2025	Q 1.2 2005	Q 1.3 2025
I Technological development	3.61	3.97	3.45	4.00	3.71	4.04	2.75	4.00	4.01	4.17	3.41	4.38
II Logistical flows	3.61	4.06	3.29	4.00	4.01	3.96	2.07	4.50	3.70	3.69	3.13	4.04
III Globalisation	3.47	4.36	3.19	5.00	3.73	4.28	3.21	4.14	3.79	3.85	3.27	4.16
IV Value based trends	3.03	3.35	3.13	3.00	2.96	3.25	3.20	3.80	2.90	3.00	3.09	4.00
V Socio-economical development of the population	3.39	3.34	3.48	3.75	3.39	3.60	3.13	2.50	3.44	3.42	3.42	3.61

[1] Scale for the questions 1.2: Impact value of trends 1 = very small, 2 = small, 3 = moderate, 4 = strong, 5 = very strong.
[2] Scale for the questions 1.3: 1 = decreases significantly, 2 = decreases slightly, 3 = remains unchanged, 4 = increases slightly, 5 = increases significantly.
[3] Note that average values should be considered with certain reservations as they are based on the answers of only a few sporadically chosen persons especially concerning the council of the Murmansk panel.

ment, then the logistical flows, and finally globalisation as the acting main trends. The international panel, which in this respect can be considered representing also an independent view, emphasises the socio-economic development of the population together with the technological development and the globalisation trend in the third place. There is a sub trend that belongs to the main trend of globalisation and that is the increase of the international oil market price, which has a big impact on economic development in the Murmansk region. According to the Murmansk Delphi panel this trend will continue and be strengthened in the future.

From the answers we can draw the conclusion that the different groups at this moment agree on the importance of the value-based trends and socio-economic development trends. However concerning the other trends the distribution is more widerly dispersed (Fig. 4). Similarly in the main trends the distribution is also seen in the so called sub trends of the main trends when comparing the responses from the various respondent groups. When interpreting these results one should bear in mind that the number of respondents in the various groups is small.

The development of SPT trends up to the year 2025

The panels and their councils share the same viewpoint concerning those three trends that are most likely to strengthen by the year 2025: globalisation, logistical flows and technological development are the most strengthening trends. However, there are some differences in how they rank the order of relative importance between these trends (Table 3). The average values should be considered with a certain reservation as the amount of re-

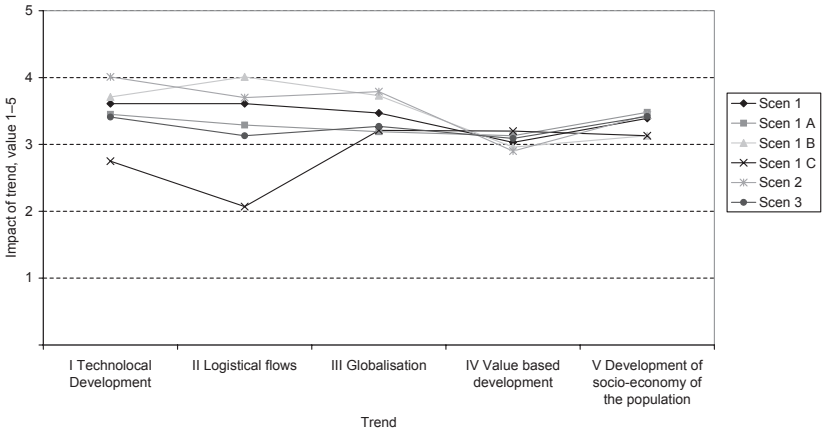

Fig. 4. Impact of the main trends on the development of the Murmansk Area as surveyed in 2005 per respondent groups / scenarios. (Scale 1 = very small, 2 = small, 3 = moderate, 4 = strong, 5 = very strong.)

spondents is very small. Most attention should be paid to the reasons given for the opinions.

In examining the strengthening of the trends by the year 2025 on the main trend level, it seems that the main trend of the technological development has the smallest distribution. Concerning globalisation, the opinions are very near to each other among the various respondent groups. The globalisation trend of scenario 1 A (representatives for the existing clusters in the Murmansk panel) is emphasised the most, but the response is based on a single response at this point. Concerning the main trend of socio-economic development the distribution also is narrow, the responses of the so called independent respondent group make an exception but for the aforementioned group the response is based on a single opinion. The impact on the future of the value-based trends clearly seems to have the widest variation.

The deviation of the sub trends mainly follows the distribution of the main trends (Fig. 5). The deviation can most clearly be seen in the responses by the representatives of the existing clusters in the Murmansk panel and in the responses of the independents in the Murmansk panel. However, the above mentioned responses are based on a single one or the responses of a very few which explains the distribution. In spite of this fact, in the analysis that will follow special attention will be paid to the argumentation of the responses from these groups.

The rise of the international oil market price is a central sub trend of the globalisation main trend which has an impact on the economical develop-

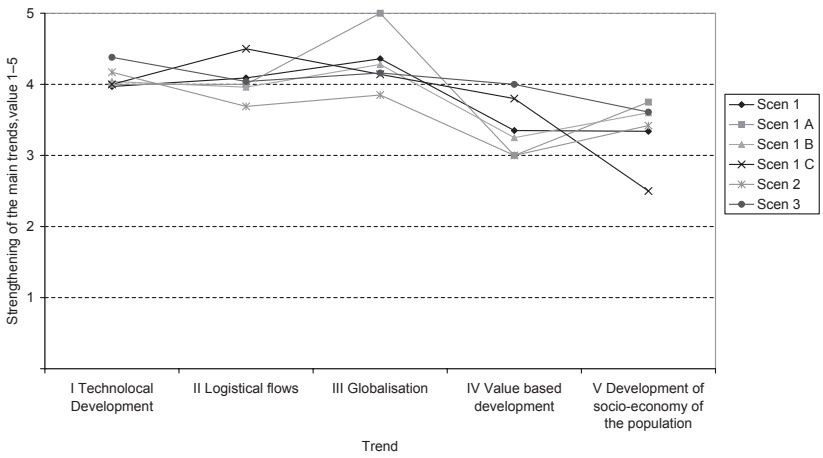

Fig. 5. Strengthening of the main trends that make an impact on the development of the Murmansk Area by the year 2025 per respondent group/scenario. (Scale 1 = decreases significantly, 2 = decreases slightly, 3 = remains unchanged, 4 = increases slightly, 5 = increases significantly.)

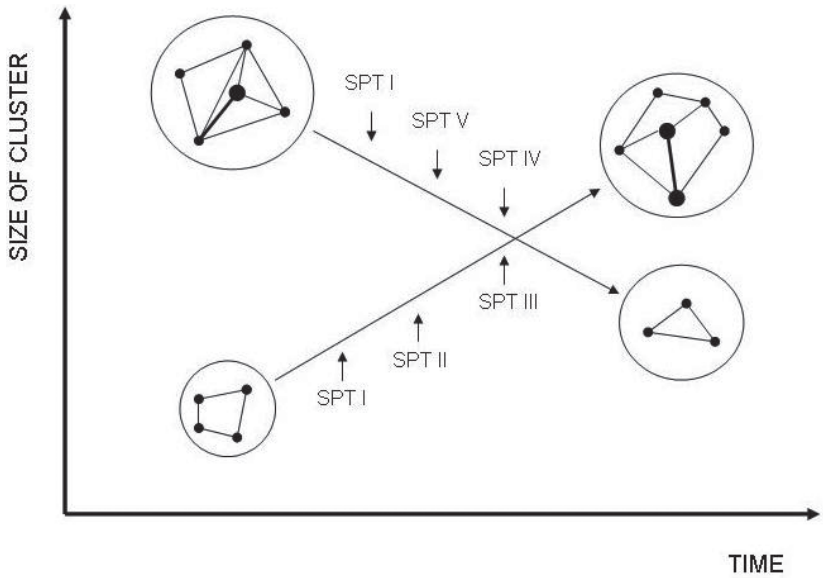

Fig. 6. The impact of SPT trends on the development of the cluster.

ment of Murmansk Oblast. The oil price has been rising steeply from the beginning of 2000 (British Petroleum 2005). Specialists explain that the reason is the growth in the world economy, in which China plays a central role, and the unstable situation in the Middle East.

The impact of trends on the development of clusters

The trends or actually the driving forces behind them make an impact on the development of the clusters according to the schematic model shown in Fig. 6. Certain trends have an impact on certain clusters. The impact of the trends can facilitate the development of the cluster, measured with the turnover of an enterprise or with employment. The development of some trends could be obstructing the development of certain clusters (e.g. the ageing of the population).

The figure is schematic and the SPT trends illustrate the acting SPT main trends. For example if we think that the transportation and logistical cluster forms a growing cluster, following main trends could be picked out which most clearly support the growth of the cluster: STP I = the development of technology (sub trend e.g. development of transportation technology). SPT II = logistical flows (e.g. the growth of oil transit), SPT III = globalisation (sub trend e.g. rise of oil price). Globalisation and development of value-based trends (SPT IV) or the socio-economic development of the population (SPT V) can have an decreasing effect on some other cluster or part of it. In practise there are trends which are supporting and counteracting the development of the same cluster. The total impact of the trends on the development of the clusters can vary between the groups of respondents. The differences could in this case be explained by the interest of the groups of respondents to emphasise certain driving force actors laying behind the trends.

In Table 4 the views of the participators in each panel are presented in order to describe how the various trends are making an impact on the different clusters. The analysis is based on the answers from the panelists. There the participators were asked to choose, as far as the main trends were concerned, which are the three most important clusters whose development the trends facilitate most.

Which clusters were then emphasised? When looking at this moment at the acting three main trends by respondent groups, one can make the following statement. According to the Murmansk panel the trends have the biggest impact on the clusters of transportation and logistical services as well as mining and metal processing.

According to the Moscow panel the trends acting at this moment give most support to the devel-

Table 4. The impact of the main trends on clusters per scenario or respondent group. The clusters which got most, second most and third most mentions are divided with semicolon (;) from each other. If the logistical development object has got only one mention it has been placed within brackets. Explanations: En = Energy, Min = Mining and metal processing, Log = Transportation and logistical services, Food = Food, Tou = Tourism, ICT = Information and communication technology, Wel = Welfare, Env = Environment, Saf = Safety.

Question 2.4	Which cluster development in Murmansk Oblast area is facilitated by the SPT trends the most? Choose for each trend the three most important clusters, the development of which are supported by the trend.					
SCENARIO	SCEN 1	SCEN 1 A	SCEN 1 B	SCEN 1 C	SCEN 2	SCEN 3
PANEL / Council	Murmansk panel, all respondents	Murmansk panel, council 1, representatives of the existing clusters	Murmansk panel, council 2, representatives of the rising clusters	Murmansk panel, council 3, independent respondents	Moscow panel	International panel
MAIN TREND /Sub trends	clusters	clusters	clusters	clusters	clusters	clusters
I Technological Development	Log;En,ICT; Min.	En,Min,Log;ICT;.	Log;ICT;En.	Log;.;.	En,Log;Min;.	En;Min,Log;ICT.
II Logistical flows	Log;Min;Wel.	(Min,Log,Env;.;.)	Log;Wel; (Min, ICT.)	(En,Min,Log;.;.)	En,Min,Log; (Wel;.)	En,Log;Min;.
III Globalisation	Tou;Min;Log.	Min;(En,Log, Tou;.)	Tou;Min;.	(Log,ICT;.;.)	Tou, Log;.	En;Log;Min.
IV Value based trends	Env;Tou;ICT, Wel.	(Tou,ICT,Wel;.;.)	Env;Tou;.	(Tou,ICT,Wel, Env;.;.)	Food,Env,Saf;.;.	ICT,Wel.;Env;.
V The socio-economical development of the population	En;Log,Wel; Min,Tou,Env, Saf.	Wel;(En,Log, Saf;.)	Tou;.;.	En;(Min,Log, Env;.)	En,Min,Log,Wel, Env,Saf;.;.	Wel;Food;Min, Log.
The decision-making in the clusters	Federal, Regional and International.	Regional and Federal.	Federal, Regional, Local.	Regional, Local, Federal.	Federal, Regional, Local, International.	

opment of the clusters of transportation and logistical services, then energy, and mining and metal processing. In the future the strengthening trends will also support the above clusters most clearly.

According to the international panel the trends that are making the biggest impact at this moment support the clusters of transportation and logistical services mining and metal processing as well as the development of the energy cluster. In the future the trends also support the same clusters most clearly.

As a conclusion, it can be stated that all panels and councils share the opinion that the existing and future trends will have the biggest impact on the clusters of transportation and logistical services. Also mining and the industry related to metal processing seem to form an important target for the impact of the trends with the exception of the council 3, i.e., the group of independents of the Murmansk panel. The impact of the trends on the energy clusters comes up, according to this analysis, most clearly in council 1 of the Murmansk panel, i.e., according to the opinion by representatives of the existing clusters, as well as, according to the opinion of the international panel and the Moscow panel. The representatives of the rising and independent clusters emphasise most clearly the impact on the ITC as being the object of the trends.

Level of decision making in the clusters

The members in the panels evaluated the importance of the various decision-making levels in the development of the clusters. The levels of decision making were the local level, the regional level, the federal level, and the international level. On each level there could be decision makers as well from

the public as the enterprise level, of which the most important ones were tried also to be recognised.

After all respondent groups and all nine clusters in the study were examined and compared, one could draw the conclusion that decision-making on the federal and regional level is emphasised in the development of the clusters. However, council 3 of the Murmansk panel (independent respondents) and the Moscow panel emphasise the importance of the local level to some extent in addition to these. If the comparison is made cluster by cluster it appears that on the federal level the decision-making is emphasised more strongly in energy than in any of the other levels compared. On the local level the development of especially the welfare cluster as well as the food cluster and security seem to make a big impact.

Logistical development needs

Members in the panels evaluate the most important logistical development objects in each cluster. There were all together ten logistical development objects: railway connection and traffic, harbours and harbour activities, roads and road transportation, oil pipe and maintenance services, gas pipe and maintenance services, electricity transfer lines, ICT networks and services, air traffic and services, and passenger traffic on road as well as border crossing services (Table 5).

When those main trends that also make the strongest impact are taken into consideration and the clusters supported by the main trends, i.e. transportation and logistical services cluster, mining and metal processing cluster, and the energy cluster, as a summary for the transportation and logistical services cluster, that the answers from various groups as a whole railway connections and traffic as well as the harbours got most of the mentions followed by road connections to develop.

In developing the transportation and logistical services clusters the Murmansk panel is of the opinion that the most important object will be railway connections and harbours, roads and the passenger traffic on the roads coming next. According to the Moscow panel the railway connections and ICT networks are the most important ones after the harbours. The international panel considers for the first the harbours and the railway connections and traffic, and for the second the roads and ICT networks as the most important objects of development.

In developing of the mining and metal processing clusters, as a summary of the most important logistical development projects in the various panels, the railway connections and harbours are the most emphasised ones and are among the two most important objects of logistical development in all respondent groups.

The most important oil and gas fields in Northwest Russia, present and planned oil and gas pipes as well as harbours are shown in the map (Fig. 7). In the map the role of Murmansk Oblast is seen in the energy transportation and export of the whole Northwest Russia. Murmansk being a not frozen Atlantic harbour which can be reached globally from the rest of Europe and USA will play a central role in the supply.

All panels emphasise an oil pipeline for the development of the energy cluster as belonging to the two most important projects and two panels out of three chose the construction of an electricity transfer net. According to the Murmansk panel the development of the electricity transfer network and the oil pipeline are the two most important projects for the development of the energy cluster.

The Moscow panel as well emphasises the electricity transfer network followed by railway connections and traffic and oil pipeline as the most important objects to be developed. The international panel considers the oil pipeline for the first, and then the harbours and gas pipe as the most important objects to be developed.

When it comes to the level of decision-making in logistics, the panels seem to share the same opinion about the development of the three chosen clusters supported by the main trends. They consider the federal level and the regional level to be the two most important levels of decision-making. The importance of the local and international level of decision-making in transportation and logistics is also stated in the Murmansk and the international panels' views.

Testing of explanatory theories

The material produced and analysed in the research can be contextualized with geographical theories according to Fig. 8 and at the same time evaluate how well the theories function in the light of the material. According to the figure the driving forces impact on the formation of the strong prospective trends, so called SPT trends (e.g. the growth of the world economy and the unstable

Table 5. Logistical development measures per cluster and per scenario and respondent group. The logistical objects of development which got most and second most mentions are divided with semicolon (;) from each other. If the logistical development object has got only one mention it has been placed within brackets.

Question 4.1	Which are the most important logistical development items in developing the clusters? Choose from each cluster the two most important logistical development items in order to create the cluster in such a way that you would prefer and consider possible.					
SCENARIO	SCEN 1	SCEN 1 A	SCEN 1 B	SCEN 1 C	SCEN 2	SCEN 3
PANEL /council	Murmansk-panel, all answers	Murmansk panel council1, representatives of the existing clusters	Murmansk panel council 2, representatives of the rising clusters	Murmansk panel council 3, independent respondents	Moscow panel	International panel
CLUSTER	Logistical development item[1]	Logistical development item	Logistical development item	Logistical development item	Logistical development item	Logistical development item
1 Energy	Electr.;Oil pipe; Railway,Ports, Gas pipe.	Oil pipe; (Roads,Electr.).	Electr.;Railway, Ports;Gas pipe.	(Oil pipe,Gas pipe,Electr.;.)	Electr.;Railway, Oil pipe.	Oil pipe; Ports,Gas pipe.
2 Mining and metal	Railway,Ports;.	Railway;(Ports,Oil pipe,Gas pipe).	Ports;Railway.	(Railway, Ports;.)	Railway;Ports, Electr..	Railway;Ports, Roads.
3 Transportation and logistical services	Railway,Ports; Roads,Pass traff..	Ports;(Railway).	Railway,Roads, Pass traff.;Ports.	(Railway, Ports;.)	Railway,ICT netw.;Ports.	Ports;Railway; Roads, ICT netw..
4 Food	(Railway,Ports, Roads,ICT netw., Border:.)	(ICT netw.).	Railway,Ports, Roads,Border;.	–	(Pass traff., Border;.)	Ports,Roads; Railway.
5 ICT	ICT netw.;Electr. Border.	(ICT netw.,Border;.)	ICT netw.;Ports.	(ICT netw., Border,.)	ICT netw.;Electr..	ICT netw.;Border; Electr..
6 Tourism	Air traffic; Roads,Pass traff..	(Roads;.)	Air traffic;Pass traff.;Roads.	–	Ports,Pass traff.; Railway,Air traffic.	Pass traff.,Border; Air traffic.
7 Welfare	Oil pipe;Ports.	(Railway;.)	Oil pipe;Ports.	(Ports,Oil pipe;.)	Railway,Ports, Roads;Oil pipe, Gas pipe, Air traffic, Pass traff..	Pass traff.;ICT netw..
8 Environment	Oil pipe;Gas pipe.	(Border;.)	Oil pipe;Gas pipe.	(Oil pipe;.)	Oil pipe,Gas pipe; Railway, Ports,ICT netw..	Oil pipe;Gas pipe.
9 Safety	Roads,Oil pipe, Border;.	(Border;.)	Roads;(Oil pipe, Gas pipe,Air traffic,Pass traff.,Border)	(Oil pipe;.)	Railway;Ports, Pass traff..	Pass traff.,Oil pipe; ICT netw.; Ports,Gas pipe.

[1] Logistical developments items: Alternative measures (10 pcs): Railway connection and traffic, Harbours and harbours activities, Roads and road transportation, Oil pipe and maintenance services, Gas pipe and maintenance service, Electricity transfer lines, ICT networks and services, Air traffic and services, Passenger traffic on road, Border crossing services.

situation in the Middle East increase the oil price). On the other hand strong trends create demand conditions and by reacting on these it is possible on various acting levels to create the most suitable conditions for the development of the clusters.

The most central regional theories have been collected by Hyttinen and Rautio (Tykkyläinen & Neil 1995; Hyttinen et al. 2002: 20–21; Rautio 2003: 60–61). Here I preliminarily discuss the applicability of the theories on the development of the Murmansk Oblast during 1992–2005. The objective is to find the most explanatory theories for a closer analyse. I make in my applicability evaluation special use of the Delphi panel evaluation of

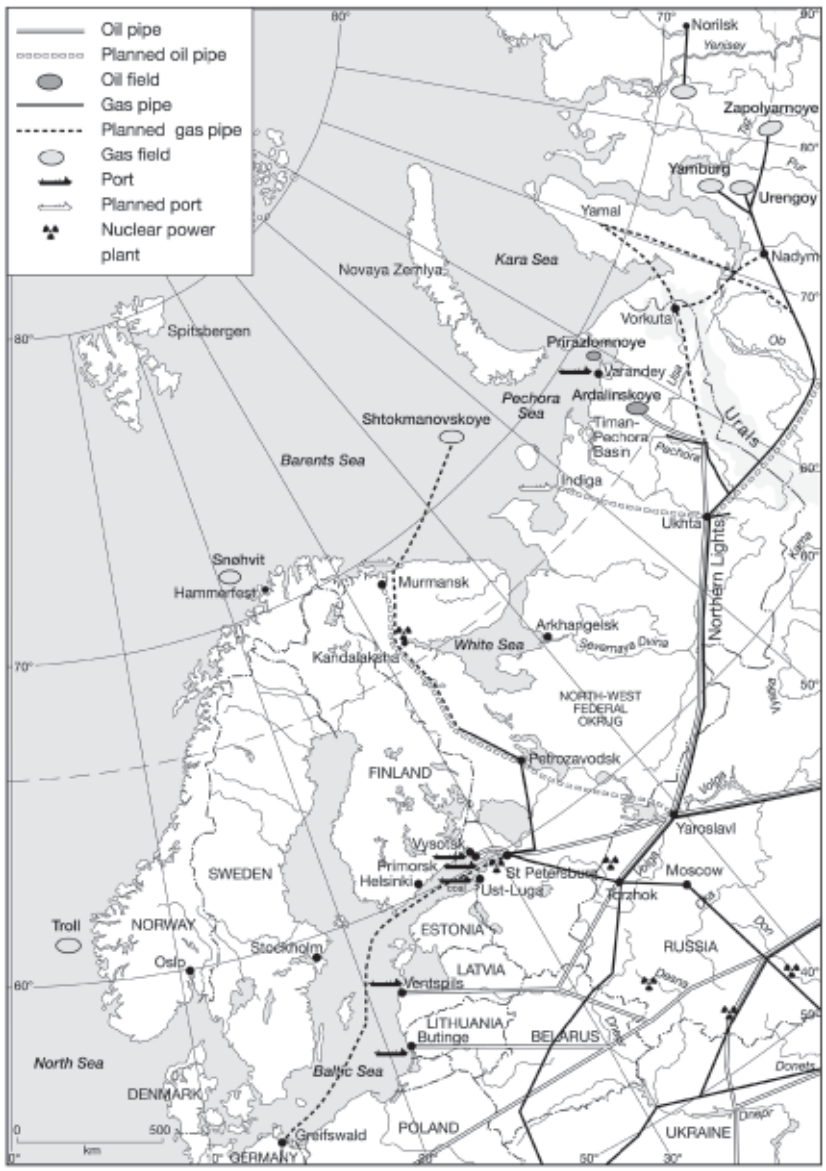

Fig. 7. The main oil and gas pipe in the North West Russia and plans brought up during the last years showing extension of the main pipe and development of the harbour network. Reprinted from Tykkyläinen (2003a) with permission.

which SPT trends at this moment have the strongest impact on the development of Murmansk Oblast.

As a conclusion of my tentative analysis and interpretation it can be stated that the following theories give support to the development of Murmansk Oblast during the last years moderately or much except the following theories: innovative milieu, regulationism, institutionalism and Keynesian application. The resources and physical environment and the supply policy theory may explain development best, which is only getting an "explains much" index. Equilibrium seeking, technology and innovation, global capitalism and transition, globalisation and product cycles also reach almost to the same explanatory level.

The number of the theories can change in the future. Based on the interview material of the Delphi panel it can be anticipated that the weight of the globalisation trend would rise the most. There-

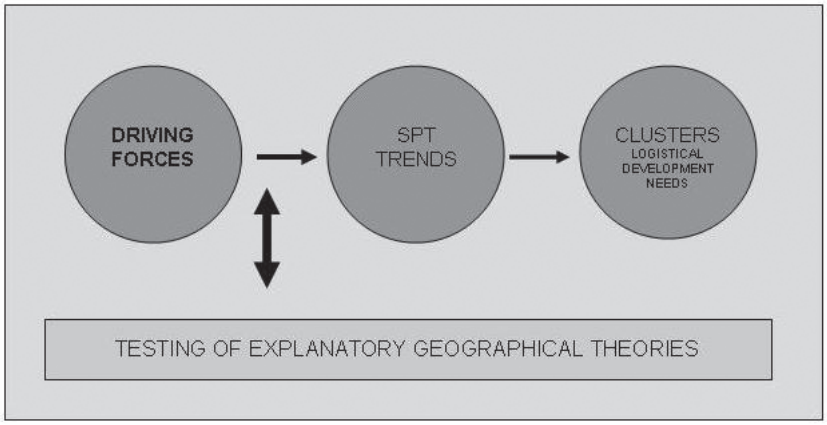

Fig. 8. The research material in the article has been modelled according to the above figure. Later on the explanation of various theories of area development should be tested on the modelled material.

fore those theories, where the explanatory element was based on the globalisation trend could explain the future development still better.

Conclusions

Strong prospective trends prepare the ground for the economic environment in Murmansk Oblast. The most important main trends prevailing at this moment are, according to the majority of the respondents, technological development, logistical flows, and globalisation. The respondents of the independent group of the Murmansk panel emphasise the globalisation trend, the value-based trends and trends of the socio-economical development of the population. The international panel again considers the trends of technological development, of globalisation, of the socio-economical development of the population as the most important trends at this moment.

These three most important trends seem according to the panels to most clearly support the need of the development of transportation and logistical services clusters. The mining and metal processing cluster seems to be the second in importance on the basis of the main trends according to all respondent groups except the group called the three independent persons. The energy cluster is emphasised in particular by the representatives of the existing clusters in the Murmansk panel, the International panel, and the Moscow panel. The independent respondents of the international panel and Murmansk panel also emphasise the development of ICT and tourism clusters.

Federal and regional levels are both important decision-making levels for the development of the clusters and logistics. Naturally it depends on the development objects of the clusters and logistics on which level the particular emphasis is placed on the decision-making. Based on the results the importance of the co-operation between the regional and the federal level, and to some extent also international co-operation, is emphasised.

The analysis gives some hints, how the trends are felt to be acting depends on the interest group that the respondent represents (Kuusi 1999: 193–206). In the future, the analysis scenarios should be created per respondent group by choosing those trends which each respondent group emphasises as their choice for starting point and evaluates the causal relations acting on the trends and on the development of the clusters in the context of regional development theory.

The explanation of the regional theories was evaluated based on the implemented development specially impacting the assessment of the specialists. The resources and physical environment and supply policy theories seems to be the most explanatory ones.

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