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TECHNOLOGY DEVELOPMENT OF TRANSPORT IN THE UPPER SILESIA REGION BASED ON FUNDS FROM THE EUROPEAN UNION

Summary. In the new budget of European Union for 2007 – 2013 year were foreseen to Poland about 60 mld €, for projects connected with development of infrastructure, modernization and restructuring of industry, agriculture, administration; financing from funds: structural, conjunction, education, researches, etc. For the Upper Silesia Province that is a problem not only to get most of the part of the total EU budget for Poland, but first of all creating, in the closest time, right for quality and quantity development projects, that make possible to reduce delay in the increase of Silesian economy, in the relation to other regions of the European Union.

ROZWÓJ NOWYCH TECHNOLOGII W TRANSPORCIE NA GÓRNYM ŚLĄSKU W OPARCIU O FUNDUSZE POMOCOWE UNII EUROPEJSKIEJ

Streszczenie. W nowym budżecie Unii Europejskiej na lata 2007 – 2013 przewidziano dla Polski prawie 60 mld € na projekty związane z rozwojem jej infrastruktury, modernizacją i restrukturyzacją przemysłu, rolnictwa, administracji, finansowane z funduszy: strukturalnych, spójności, edukacyjnych, badawczych itd. Dla województwa śląskiego problemem jest nie tylko uzyskanie jak największego udziału w ogólnopolskim budżecie unijnym, ale przede wszystkim wygenerowanie w najbliższym czasie odpowiednich co do jakości i ilości projektów rozwojowych, które pozwolą na niwelację opóźnień rozwoju gospodarczego Śląska w stosunku do innych regionów Unii Europejskiej.

1. INTRODUCTION

The issue of generating an appropriate number and quality of developmental subjects, which could be financed from the European Union funds are crucial problems for the development of a given region, such as Silesia. It is not an easy task. The problem of searching and selecting the right developmental matters for regions in the countries belonging to the European Union was formalized into projects (fund by EU) named *Foresight*. That project for Silesia started under the title: *Priority technologies for sustainable development of Silesian Province*, for years 2006 – 2008 and is being realized by these organizations:

- Silesian University of Technology,
- University of Economics in Katowice,
- Central Mining Institute,
- Silesian Marshal Office.

The regional *Foresight* makes capabilities for regional government of showing and proficient utilization of the regional potential. These works requires participation of all interested parties, which have an influence on the development of the region – equal self-governed institution, as well as representatives of industry and world of science. Silesian project has elaboration of script development of technology for task, also identification of key technology with strategic meaning for sustainable development of Silesian Province until the year 2020. In cooperation with self-governed authorities, industrial and research institutions and non-government organizations as a result of project realization, there will be middling and long-term trends of technological changes identified, helpful in determination of policy orientated on investment, development of science and education.

The project is being realized by the consortium, which consists of Silesian University of Technology as a leader, Central Mining Institute, University of Economics in Katowice and Silesian Marshal Office.

The project is being realized in three periods. First period includes analytical and preparatory tasks. The tasks realized during this period will verify hitherto existing directions of regions development and they will help to determine a scenario of technological development in Silesia. Together with the regional *foresights'* worldwide analysis these operations will enable verification of chosen thematic groups. This period is a preparatory part, a detailed determination of a starting point for Silesian technological *foresight*.

The second period includes tasks related with essential elaboration of scenario of technological development in individual thematic groups.

All of scenarios processed within the confines of this period will be a regional technological *mini-foresight*, created in local scale with destination for utilization by local actors, which create regional evolution. Based on preliminary research, as well as earliest elaboration related to Silesian Province development (Regional Innovation Strategy for years 2007-2013 and Silesian Province Development Strategy for years 2000-2020)[1], there were 6 thematic groups processed, chosen on base of documents mentioned above and a seventh group assigned for technological themes, which weren't chosen from preliminary research, but could show up as a result of the first period realization.

The final period includes elaboration of final report, its publication and generalization of its results. Near the end of this period's realization a conference will be organized, where projects results will be presented, as well indication of their monitoring and ways of verification.

2. TASKS FOR THE SILESIA FORESIGHT PROGRAMME: „PRIORITY TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT OF SILESIA PROVINCE”

Utilization of Silesian *foresights* results will increase the probability for the execution of proper decisions about choices of sponsorship of investigative programmes as well as technological projects and investment in Silesia, between others from EU structural funds [3].

Correct research priorities establishments will allow future adjustment to the existing technology supply market to requirements, together with real capabilities of their sponsorship taking into consideration. Project led as a collegiate process (group work, so called: panels) promotes cooperation conditions among R+D sector, industry (mainly SMEs sector) and other *foresight* process participants.

Besides, projects will enable conquest of new knowledge concerning area determination and scientifically – technical development priorities, according to requirements and social aspiration of the Silesian Region. This information is necessary for entities deciding about economic, social and technological region development for the most effective and arbitrated utilization of financial and objective stocks (personal and union) owned (Fig. 1).

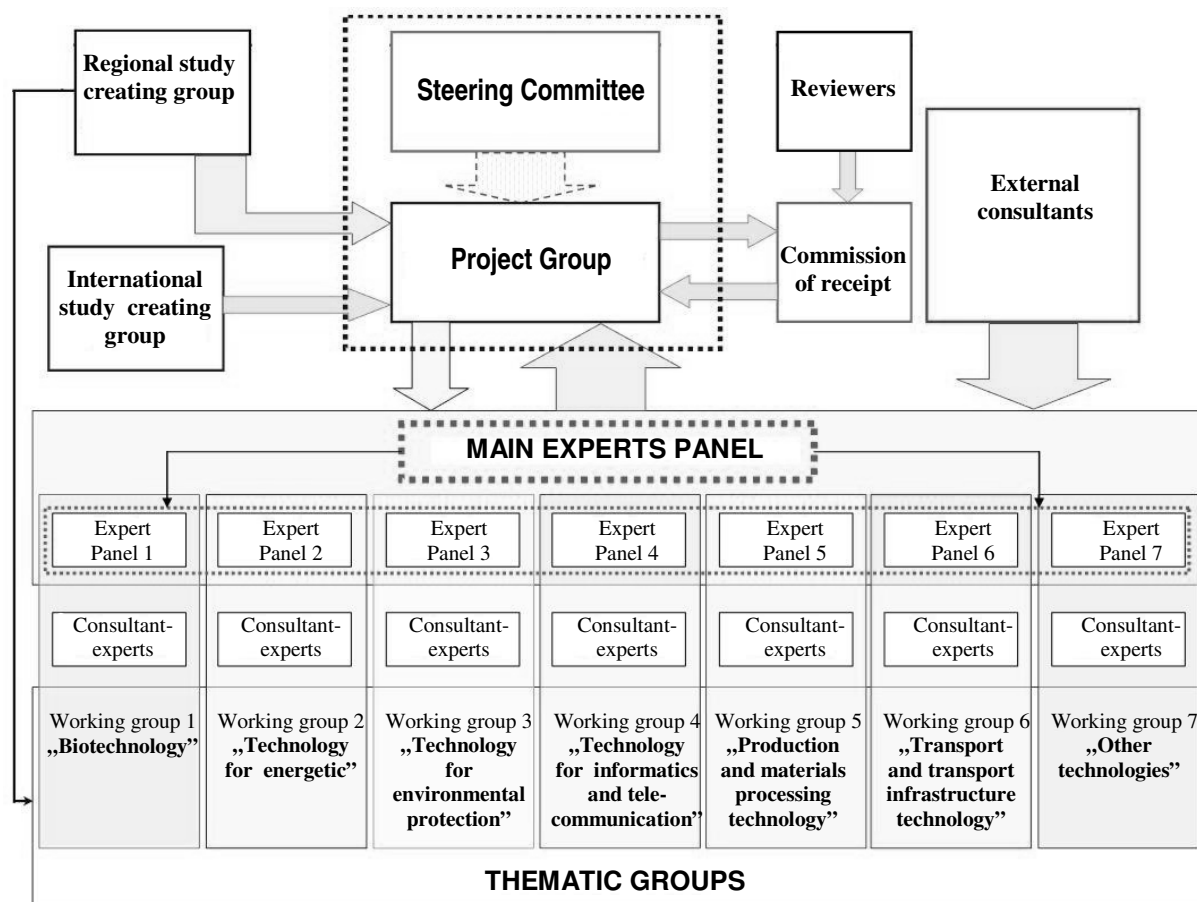


Fig. 1. Silesian technological foresight structure

Rys. 1. Struktura śląskiego *foresight'u* technologicznego

Realization of project will help to answer several key questions, from which the most important are:

1. which technologies will contribute to social, economic and eco-spatial development most effectively?
2. development of which technologies prognosticates the biggest increase of region competitive position and reduction of unemployment?
3. which education majors should be preferred in region, for the strengthening of intellectual capital of enterprise bracing absorption of new technologies?
4. which new products/service will arise thanks to priority technologies development?
5. in which direction should region infrastructure develop?

Answers to questions mentioned above will be a key component of strategic recommendation for technological development of the Silesian region policy.

The scope of the Silesian *foresight* project includes research in the following disciplines:

1. biotechnology,
2. technology for energy ,
3. technology for environmental protection,
4. informatics and telecommunication technology,
5. production and materials processing technology,
6. transport and transport infrastructure technology,
7. technology identified through results of those projects research.

Advisable thematic groups were chosen on the basis of analysis of the Silesia province strategic documents, whose authors recognized them as priorities for the region [1]. Thematic groups got a name: „panels”, where content-related work connected with the right developmental topics will be done (Fig. 2).

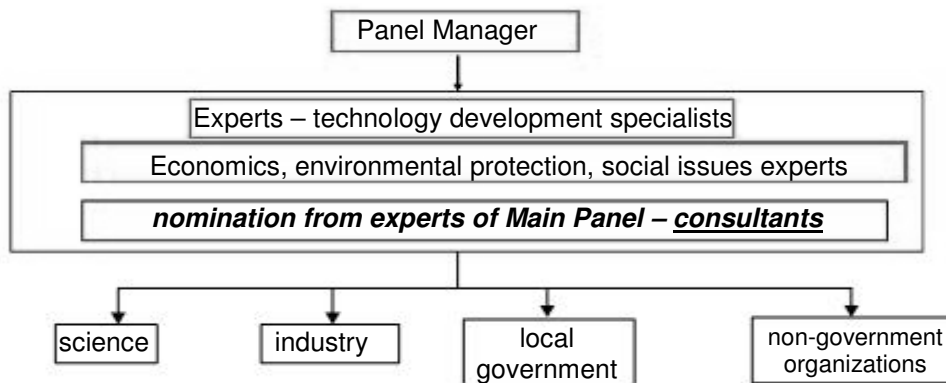


Fig. 2. Working panel organizational structure
Rys. 2. Struktura organizacyjna panelu roboczego

3. TASKS FOR PANEL No.6: "TRANSPORTATION AND TRANSPORT INFRASTRUCTURE"

Panel no. 6 has a key meaning for Silesian society, sense and worth of polish entrance to European Union, through capability of fulfilling improvement in the transport conditions (especially public transport) in the region. It's not yet a clear technological panel, but in a considerable measure concentrating on extension of agglomeration transport infrastructure, with the latest technology (means of transport) utilization.

Taking into consideration the perspective of technological development of Silesia till the year 2020, as well as the metropolitan tendencies of Upper-Silesian Agglomeration, it is possible to exchange thereon the following most important tasks of transportation development for these years:

1. Solution enlarging the integration of public transport:
 - a) integrated connection of cities of the Upper-Silesian Agglomeration with International Airport Katowice - Pyrzowice,
 - b) creating of changing knots in cities, so-called "Integrated Stations",
 - c) development of logistics solutions, in particular:
 - service of the Silesia Agglomeration zone by logistic centres, created according to European programmes: CIVITAS and TELLUS,
 - logistic subcentres conceptions situated inside Agglomeration,
 - logistic structures formation for service of heavy investments in Agglomeration, as well as mass goods supplies,
 - logistic structures formation operating in export of bulk cargo with utilization of rail transport and inland navigation from Agglomeration.
2. Development of new sustainable transport technologies:
 - a) technologies light / quick railway connections between potential metropolitan areas of the Silesian area,
 - b) development of rail transport, in this unconventional across introduction of quick railway connections systems in metropolitan areas of the Silesian province, the tram – railway model,

- c) the development of conventional and unconventional sources of drive, in this the hybrid drives as well as dual passenger transport systems,
 - d) new technologies in building and maintenance of the roads, counteracting of roads rutting as well as enlarging their adherence,
 - e) unconventional passenger transport road systems (so-called monorails),
 - f) pro-ecological transport solutions, e.g. use of alternative fuels.
3. Technologies enlarging the efficiency of cargo transport:
- a) multi - and intermodal cargo transport,
 - b) modern container terminals with industrial transport machines and environmental friendly,
 - c) development and attractiveness of inland water carriage.
4. Informatical telematics use (Intelligent Transport Systems):
- a) steering and traffic management centers and vehicle congestion,
 - b) passenger information in public transport, charging systems in transport (in this – the technologies of payments recruitment for "counting " the size of transports) and for infrastructure use, vehicle positioning systems,
 - c) public transport traffic monitoring, in this study of methodologies and technologies of computer demand forecasting on transports as well as identification of passenger flows.

Aims mentioned above that are there to achieve in the growth of transport services level in Silesia, even in perspective of 20 years, they are giant. Nevertheless, in continuation there's lack of rationally chosen priorities, on which there should be exerted pressure on so on one hand to satisfy social pressure on conditions of transport improvement as fast as possible (especially passenger) in Silesia, and on the other hand, so that the chosen aims for improvement of system and transport infrastructure in the Upper-Silesian Agglomeration, they could enter into the Regional Base of Innovation Strategy of Silesia Province Development [1] and become a basis for drawing up suitable number of investment applications with, possible to be refinanced from European Union structural funds. Such tasks were put on Silesian *Foresight* in panel No. 6.

However, if the problem of maximum acceleration in time, improvement of public transport conditions in Silesia would get priority, then the order of choices for realization aims can be decided by the origin of capital sources for their realization. In case of transport investments (especially with large capital intensity), the simplest way of type: idea – project – study of feasibility – EU refinancing application – ide realization, is long-lasting and burdensome, regarding Union procedures as well as permanent lack of council financial means. Doubtless, quicker path can be here, where local government of cities and districts are the minority shareholders of capital company realizing given transport investment, and decisive voice (and obviously capital) comes from private investor. This is however possible in cases of fast (max. 10 years) return invested capital. An example of such a way of investment could be realization of the following aim: "The integrated connection of the Upper-Silesian Agglomeration cities with International Airport Katowice – Pyrzowice", which under current *AirTrans* name [2], is presently being considered for realization: by Silesian Marshal Office and private consortium PKP- Infrastructure S.A.

4. METHODOLOGY OF WORK OF WORKING PANELS

Individual working panels possess comparatively considerable content – related independence, however, methodology of their work is standardized, hereinafter, so the results of their works could be comparable. Foreseen at choice of the selection and hierarchization aims (the subjects) it in panel be holds on the ground of the STEEP and SWOT analyses, accomplished for individual groups of external technology development factors. The aim of these analyses is the concoction and co – ordination of list of external factors conditioning future development of key technological innovations in the Silesian Province (every thematic group gets its point of reference in technological area). Recognition concerns existing trends and current important phenomenon for future development (Fig. 3) [3].

STEEP analysis is not a definite procedure, but only a qualification of object of given analysis. It is an acronym (**S**ocial, **T**echnological, **E**conomical, **E**cological, **P**olitically – legal) denominating groups of external factors of technological development. Such a division refers to five aspects of sustainable social development.

The final factors' list can be achieved for example through so-called: a steered discussion, or through "brainstorming" in a classical version or with utilization of "notice-board" etc. The only important thing is that people with expert knowledge could introduce this knowledge in short messages along comfortable circumstances.

Only technological area attributed to a given thematic group is included in SWOT analysis. A province (or a region) is being evaluated – both on the background of country and in international relations. The review of strong and weak sides are used on the basis of indications contained in the STEEP analysis. For individual areas there could be used other criterions notified by experts during workshop session (Fig. 4) [3].

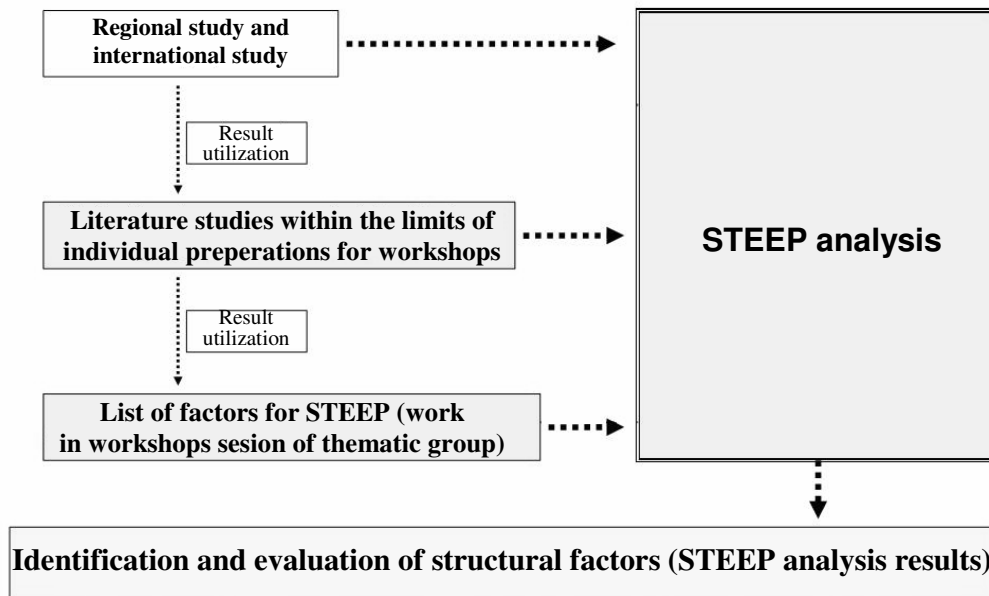


Fig. 3. The STEEP procedure for individual working panel

Rys. 3. Procedura STEEP dla poszczególnych paneli roboczych

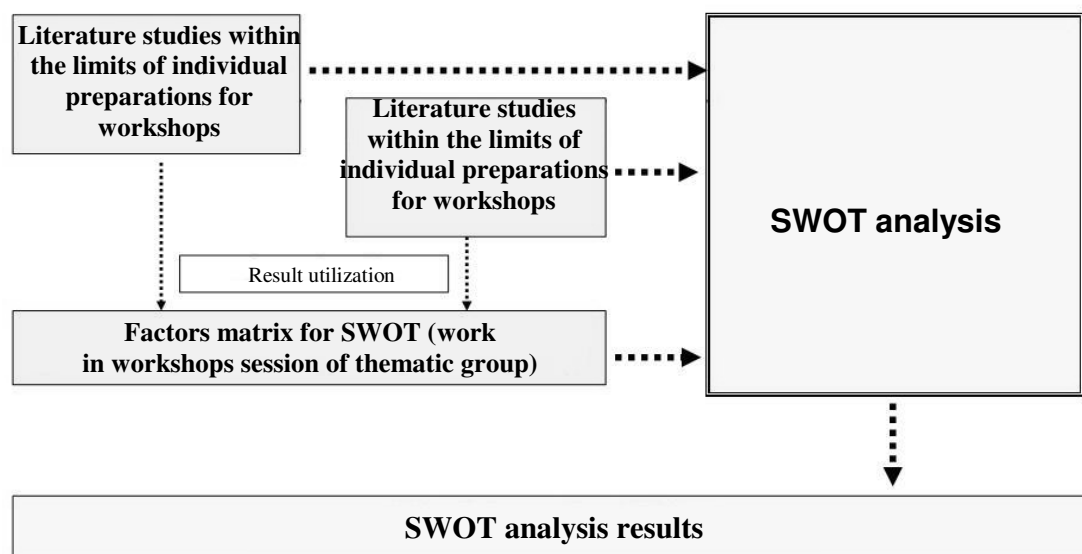


Fig. 4. The SWOT procedure for individual working panel

Rys. 4. Procedura STEEP dla poszczególnych paneli roboczych

During these sessions of working groups the key thesis' of influence on market and on development as well as competitiveness of province will be systematized. The analysis of key research areas investigations will permit on indication of areas which should be developed by and individual scientific higher universities for the most profitable support of the region development. The key issues and research areas will be analyzed by experts' panels in a systematized form in relation to validity. Then the document will be passed on to the experts-consultants in individual panels for verification.

The chances and threats in a development of transport technologies on the Upper Silesia, worked out on the ground of SWOT analyses in [2], is shown in table 1. The measure of meaning of a given strong side, is a degree of its connection to opportunities (O1, O2 etc. until On) and the threats (T1, T2 etc. until Tn). These connections were qualified according to the following punctual scale: 0 – the lack of connection; 1 – weak connection; 2 – average connection; 3 - strong connection.

The score helps to compose rankings reflecting the meaning of individual factors – separately for strong sides, weak sides, chances and threats. Getting position in ranking will be the basis of decision about regarding – or not - the given factor in a further analysis of given technology choice. In a similar way the evaluation is being realized on strong (S) and weak sides (W) for every opportunity (O) and threat (T) of individual aims in every thematic panel.

Table 1

Some SWOT analysis elements for transport systems on the Silesia

STRENGTHS (S)		average estimation from matrix
S1	Formation of integrated forwarding structure in Upper-Silesian Agglomeration	62,5
S2	Financing the development of transportation from national funds as well as European Union funds	53,5
S3	The demand on transport services, consequential from location of the enterprises and considerable number of population	50,5
S4	Expectation of region inhabitants on new generation solutions	49,5

cd. tab. 1

S5	Location in Provinces regarding economic institutions subjects interested in initiating new transport technologies	48
S6	Gradual beginning of innovative potential in region in the sector TFL (transportation – forwarding – logistics)	48
WEAKNESSES (W)		
W1	The decapitalization of fragments of infrastructure, especially in water carriage (inland) as well as rail	43
W2	Weak position of region in gaining national funds as well as EU	42
W3	Fragmentation of workings in the area of rail transport development in Upper-Silesian Agglomeration and lack of support of initiatives run by territorial council	40,5
W4	Decapitalization of passenger and rail transportation operators' property	39,5
W5	Research foundation from different sources, different decisive centers, lack of concentration of supplies on realization of undertakings	38
OPPORTUNITIES (O)		
O1	Expenses' increase on public transportation	68
O2	The development of new technologies in European and world transportation	67
O3	Energy-saving technologies in transportation, triggering off the technological breakthrough and changing the market: alternative fuel ,hybrid drives, hydrogen engines	65
O4	Expenditures on B + R, which will be effective in decreasing costs of transport systems formation and it's services	65
O5	Economic growth of region as well as population' incomes	63,5
THREATS (T)		
T1	The insufficient general level of expenditures on B + R area in provinces	56
T2	State bureaucratization leading to decreasing activity of public authorities in the transportation development area	51
T3	The insufficient co-ordination of council structures and administration government activities in region	50
T4	Capital-intensiveness of new transportation technologies	49
T5	The bureaucratic methods of B + R works financing	47,5

5. ANALYSIS AND SELECTION OF KEY TECHNOLOGIES

Basing on the conducted STEEP and SWOT analysis, after discussion conducted among experts in Panel No. 6 eight key technologies were chosen, which have the chance of initiation on the Upper-Silesian Agglomeration until 2020 (Table 2). Those chosen key technologies were estimated individually by every (six) member of Panel No. 6, with acceptance of the same technologies estimation criterions for everyone (Table 3). After applying appropriate ranks (from 1 to 5), for individual criterions of estimation and after solving these ranks' matrix, the distribution of these technologies' validity was given, in system: the validity and feasibility of given technology (Fig. 5). As it is shown on Fig. 5, the most viable, estimating by its significance for region and the possibility of realization: are technologies No. 2, 3, 4, 5 as well as 7. Technologies No.: 1, 6 and 8 possess statistically smaller chances of realization.

Table 2

Key technologies in Panel No 6

1	Technology of charge collection in public transportation and transport infrastructure utilization
2	Monitoring systems for traffic and information management for users and for traffic streams and transport demand identification
3	Tram-railway and light city railway technologies in the service for metropolitan areas
4	Technology of fast railway connection in regional traffic
5	Utilization of alternative fuel in means of transport
6	New solutions of means of transport drives (e.g. hybrid drive)
7	Intermodal technologies in mass load transportation
8	New generation of container terminal equipment and mechanical handling technical facilities

Table 3

Technologies estimation

Mature technology name	Technologies estimation criterions					
	importance				feasibility	
	economical importance	social importance	environmental importance	possibilities of new research trends and initiations creation	application potential	research and development potential
1. Technology of charge collection in public transportation and transport infrastructure utilization	2	5	1	1	3	2
2. Monitoring systems for traffic and information management for users and for traffic streams and transport demand identification	3	4	1	4	3	3
3. Tram-railway and light city railway technologies in the service for metropolitan areas	4	5	3	4	4	4
4. Technology of fast railway connection in regional traffic	4	4	2	4	4	4
5. Utilization of alternative fuel in means of transport	5	4	5	4	3	3
6. New solutions of means of transport drives (e.g. hybrid drive)	3	2	4	4	4	4
7. Intermodal technologies in mass load transportation	5	3	2	4	3	3
8. New generation of container terminal equipment and mechanical handling technical facilities	3	2	2	3	4	4

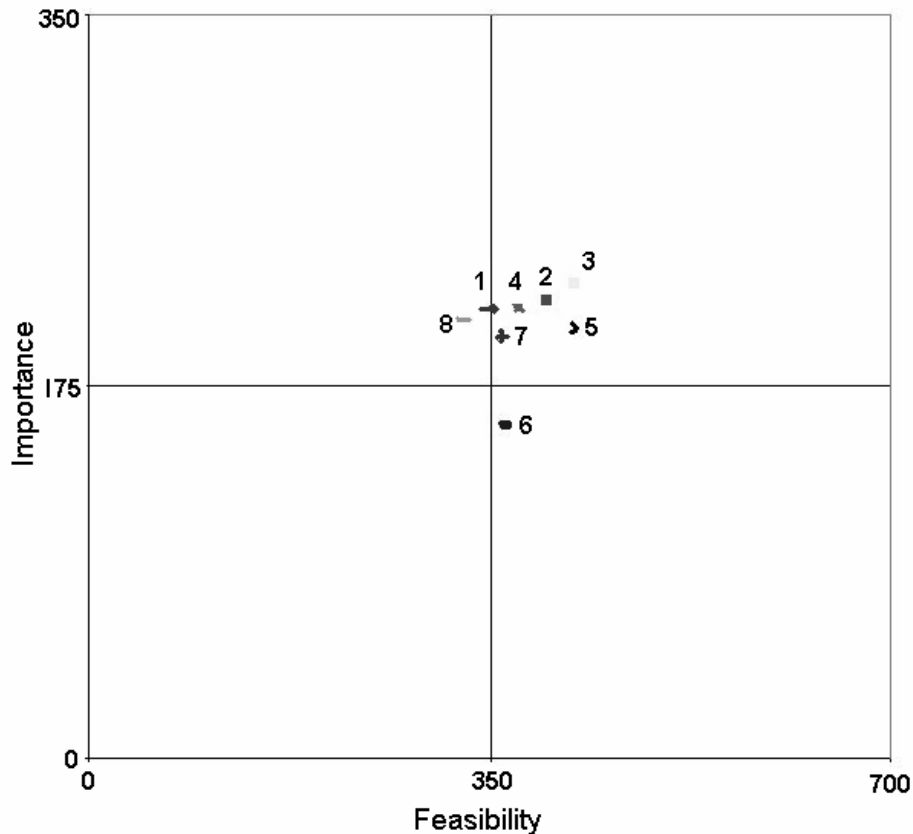


Fig. 5. Technologies ranking in Panel No. 6
Rys. 5. Ranking technologii dla Panelu nr 6

6. SUMMARY

The conclusions from so far executed work of Silesian *foresight* possess a general character as well as relating to the Panel no.6 “Transportation and transport infrastructure”.

The most important general conclusions [3]:

- there is a possibility of effective utilization of Silesian academical sector and scientifically - investigative for development of enterprises and in strengthening competitiveness,
- there will be defined, in every analyzed technological area, the strategic directions of research, in connection with current research of European Union and world,
- there will be defined priority technologies in region in perspective until year 2020, the most desirable for development of Silesian economy which will become preferential aims with the financial help from national budget and from European Union,
- the idea *foresight* will become popular for new research methodology in the area of technology transfer and innovation.

Conclusions from hitherto existing activities of Panel No. 6:

- increasing transport – needs in the Silesian Province cause public passenger transport can become a basis of a well functioning transport system,
- one of the basic transport task in the closest time, will be a rapid transport of the passengers from the main cities of the Upper-Silesian Agglomeration (Gliwice, Zabrze, Bytom, Katowice, Tychy, Chorzów etc.) to International Airport Katowice - Pyrzowice,

- panel No. 6 work has a key meaning for the society of Silesia, for understanding the sense and weight of accession to European Union, across possibility of feeling an improvement of polish transport conditions (especially passenger) in this region,
- expert discussions in Panel No. 6, based on STEEP and SWOT system analyses', has so far been enable to qualify the most important developmental technologies in Silesian Province which will be now confronted with questionnaire research relying on the DELPHI method.

Literature

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