



# **Formula of integrated territorial investments as an instrument to stimulate applications of intelligent transportation systems**

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## **ABSTRACT**

The paper discusses a new instrument for the implementation of territorial policies expected to be used in the EU financial perspective 2014-2020. This tool helps integrate activities in local government units from various subregions. ITS applications are in many cases considered as projects that require consistent and complementary activities in order to ensure that a common vision of development of local governments involved in a project is realized. The article identifies the areas of ITS which can be the subject of integrated territorial investments (ITI).

**KEYWORDS:** areas of ITS applications, implementation of ITS projects, ITI formula, ITI in relation to ITS projects

## **1. Introduction**

A number of previous analyses have demonstrated that the projects that use technologies of intelligent transportation systems (ITS) are losing in the competition for preparation, execution and implementation with the projects in the field of construction and modernization of particular components of transportation infrastructure. Despite the scale of quantitative and qualitative changes that have been observed for over a decade, one of the causes of increasing congestion in urban areas is insufficient condition of transportation infrastructure and the lack of modern systems of managing individual and public transport.

This unfavourable process is also magnified by additional phenomenon of limitations in the level of financial resources on functioning and development of public transportation system. This leads to insufficient qualitative and quantitative level of transportation services by this sector of urban transportation.

The above situation affects the interest in application of ITS technologies for using ITS technologies for solving the problems

identified, since decision-makers remain convinced of low effectiveness of such solutions. The necessity of cooperation of the entities of local governments with each other and with regional authorities to make ITS project complementary so that they do not have an island nature also discourage from starting ITS projects. Under these conditions, the opportunities for using integrated territorial investments formula represent a good instrument for elimination of the most of these drawbacks. This also helps meet a number of requirements for the process of implementation and execution of ITS projects.

## **2. ITS applications: present status and prospects in terms of the number and scope of projects**

The Strategy of Transport Development until 2020 (with perspective until 2030) adopted in 2013 assessed the present situation in terms of ITS applications and pointed to the following phenomena [1]:

- solutions that used the technologies of intelligent transportation systems are not commonly used in Poland,
- among the projects being implemented, the projects with greater spatial scale are substantially less numerous.

It is noticeable in the latter case that spatial ITS projects have island character, thus being mostly limited to the area of a particular local government unit. This character of the projects implemented is also demonstrated by the fact that the list of projects in management of urban transportation using ITS within the Operational Programme: Infrastructure and Environment for 2007-2013 concerns only three agglomerations: Upper Silesia metropolis, Tri-city area and Rybnik agglomeration. Furthermore, ITS projects implemented in ten big cities cover exclusively their area [2].

Technological and spatial aspects also concern the barrier caused for a long time by the lack of common ITS architecture. This situation considerably limits the development of complementary systems. Individual approach of the investors who implement ITS to develop architecture will undoubtedly make it difficult to extend and integrate ITS into a collective and interrelated system [2].

There is one more cause of the island character of ITS projects. It is noticeable that solving specific problems connected with broadly understood urban traffic is performed by different institutions which do not cooperate with each other during programming, designing and performance of initiatives in the field of ITS. This might lead in the future to e.g. difficulties with integration of the systems for management of traffic in individual and public transportation or traffic on the ring roads in agglomeration and cities implemented by the entities of the General Directorate for National Roads and Motorways in Poland and systems of traffic management in the cities, which are managed by suitable local governments.

Consequently, the actions are necessary to be taken in order to eliminate the above barriers to development of application of the technologies of intelligent transportation systems. It is also necessary to catch up for substantial delay with respect to many cities and regions across Europe. Therefore, the postulate of future investments in terms of ITS technologies is frequently proposed in the strategic documents prepared at different levels of transportation management. In development of ITS in Poland, one should notice the importance of:

- more effective, more economical and higher level of safety in utilization of current transportation infrastructure,
- more effective support and protection of transportation system users,
- reduction of the negative effect of transportation activities on the environment,
- further development of transportation with consideration for modern tendencies and higher utilization of information and communication technologies,

which are the main results of implementation of the technologies of intelligent transportation systems.

Application of telematics in transportation [3] should lead to:

- improvement in safety by ca. 30-40%,
- reduction in environmental pollution by ca. 10%,
- improving effectiveness of transportation activities by ca. 20%, which manifests in reduction in the costs of managing the road vehicle stock, maintaining and modernization of the road surface, fuel consumption etc.,

- improved utilization of current infrastructure, including e.g. traffic capacity for roads and streets by ca. 20 to 25%,
- acceleration of the processes of integration in urban and regional transportation,
- improvement in transport connections with other systems.

A good illustration of this direction of prospective programming is activities predicted for the years 2014-2020 in the Operational Programme: Infrastructure and Environment. The basic fields of investments, which extend utilization of ITS in the new financial perspective of the European Community, include the initiatives aimed at [based on 6]:

- traffic optimization,
- optimization of management of transportation infrastructure,
- better quality of information services,
- improved safety of traffic participants,
- limitation of the negative effect of transportation on the environment and climate,
- improved energy efficiency in transportation,
- limitation of the negative effects of climate change on transportation.

Achievement of the above aims requires varied activities, among which the most important should concern the two groups of problems [6]:

- facilitation of traffic processes in cities and agglomerations and non-urban roads,
- modernization of the processes of providing transportation services adjusted to identified, dynamically changing needs of transportation users and conditions of meeting this demand.

The first of the areas of activities includes the following initiatives [6]:

- quantitative and qualitative development of the systems of management and control of urban traffic, including development of electronic systems of toll collection,
- development of the systems of traffic management in non-urban roads,
- implementation of the systems that ensure higher road safety, including building and development of the systems of supervision over the road traffic and control and enforcing traffic regulations,
- development of an integrated system of accident management.

Applications of ITS technologies in the processes of transportation services will include e.g. [10]:

- extension and modernization of the solutions for acquisition and distribution of data about the status and utilization of transportation infrastructure,
- development of an integrated system of services for passengers,
- development of an integrated system of managing transport of cargo between individual points,
- providing innovative information services.

The effective achievement of the tasks presented will necessitate adjustment of the processes of programming, design and execution of concrete projects for particular requirements defined by the specific character of initiatives in terms of ITS technologies. Their specification is discussed in another point of this paper.

### 3. Requirements driven by the process of application of ITS technologies

Formulation of future requirements with respect to the processes of execution of investment initiatives in terms of ITS used a specification of the problems which emerged in the previous financial perspective of the EU connected with ITS technologies [11].

With respect for quantitative increase in the projects in 2014-2020 and essential extension of the scope of the transportation problems to be solved, the set of requirements included two principal groups:

- endogenous requirements, which reflect the needs and processes of changes in transportation systems,
- exogenous requirements, whose factors are allocated in the environment of transportation systems.

Table 1 illustrates the above groups of requirements.

**Table 1. The requirements connected with implementation of ITS projects in the perspective of current decade [2]**

Type of requirements	Determination of individual requirements	Expected positive aspects of the effect of individual requirement
1. Endogenous requirements	<ul style="list-style-type: none"> <li>• previous preparation of the transportation infrastructure for the projects in the field of ITS</li> </ul>	<ul style="list-style-type: none"> <li>• elimination of temporal and spatial collisions with other investments</li> </ul>
	<ul style="list-style-type: none"> <li>• priority approach to projects in the field of ITS by the decision-makers, managers in the entities that can implement and execute ITS projects, which confirms high competencies of these people,</li> </ul>	<ul style="list-style-type: none"> <li>• elimination of the approach to ITS implementations as secondary</li> <li>• better adjustment of the scope of projects to the transport needs of the users</li> <li>• higher value of projects</li> </ul>
	<ul style="list-style-type: none"> <li>• formation of suitable structures and the choice of effective methods to popularize positive effects of applications of ITS technologies among local societies</li> </ul>	<ul style="list-style-type: none"> <li>• better understanding of the importance of ITS technologies for:                             <ul style="list-style-type: none"> <li>• facilitation of organization of public transportation and, consequently, its popularization among vehicle users,</li> <li>• limitation of traffic congestion,</li> <li>• improved access to transportation infrastructure,</li> </ul> </li> <li>• acceptance of ITS project as an effective tool for improvement of the condition of the natural environment</li> </ul>
	<ul style="list-style-type: none"> <li>• utilization of current development potential in the transportation system which was previously characterized by low implementation activity in terms of ITS</li> </ul>	<ul style="list-style-type: none"> <li>• better following the fast development of ITS technologies</li> </ul>
	<ul style="list-style-type: none"> <li>• proper organization of the investment works</li> </ul>	<ul style="list-style-type: none"> <li>• limitation of difficulties for traffic participants in the areas of transportation networks which are of key importance to functioning of the system</li> </ul>
	<ul style="list-style-type: none"> <li>• achievement of the improvement in the quality of solutions proposed in ITS projects with pilot character</li> </ul>	<ul style="list-style-type: none"> <li>• development of the positive reception of the ITS projects by public opinion</li> </ul>
	<ul style="list-style-type: none"> <li>• development of uniform technical specifications and standards for designing, implementation and execution of ITS in Poland</li> </ul>	<ul style="list-style-type: none"> <li>• Creation of the basis for interoperability of the ITS projects executed by different investors</li> <li>• reduction in the risk of delay in execution and implementation of ITS projects</li> </ul>

2. Exogenous requirements	<ul style="list-style-type: none"> <li>• creation of public opinion and local authorities (transportation policy) into a positive leverage for development of ITS applications</li> </ul>	<ul style="list-style-type: none"> <li>• increased social awareness of benefits that can be derived through implementation of ITS projects</li> <li>• improved quality and conditions of living of inhabitants</li> </ul>
	<ul style="list-style-type: none"> <li>• development of tertiary education for experts in ITS, telematics and information and communication technologies</li> </ul>	<ul style="list-style-type: none"> <li>• increasing the number and improved competencies and skills of the ITS experts employed in the institutions which are investors in this field</li> </ul>
	<ul style="list-style-type: none"> <li>• adaptation of the level of financial outlays to the needs that result from the programmes adopted for development of applications of ITS technologies</li> </ul>	<ul style="list-style-type: none"> <li>• execution of complex and integrated ITS projects</li> <li>• generation of real economic benefits which are the effect of improved functioning of transportation systems</li> </ul>
	<ul style="list-style-type: none"> <li>• considering the ITS facilities and equipment as road safety equipment, which, according to current law, are not regarded as construction facilities and equipment</li> </ul>	<ul style="list-style-type: none"> <li>• improving the efficiency of the design process and execution of ITS projects</li> </ul>

Presentation of the requirements allows for determination of a catalogue of instruments and activities which might ensure their successful implementation in the future. Facing the new financial perspective, it is especially important to:

- improve coordination of execution of ITS projects with other investments carried out in the same area as well as integrate activities of different investors through limitation of e.g. island character of their projects,
- start execution of the initiatives that form common ITS infrastructure, thus gradually limiting and reducing the principal barrier of development of complementary systems based on ITS technologies in Poland.

Further part of this paper contains analysis of usefulness of the new instrument of regional policy: Integrated Territorial Investments (ITI).

### 4. Fundamental assumptions of the integrated territorial investments (ITI) as an instrument of cohesion policy for the years 2014-2020 [based on 7]

Integrated territorial investments is a new tool which allows for taking actions towards sustainable development of urban areas that connect initiatives financed by the European Regional Development Fund and the European Social Fund. ITI concern in particular voivodeship cities and the functionally connected areas. The size of these areas varies. In the case of Gorzów Wielkopolski, this means 4 neighbouring gminas (gmina is the principal unit of territorial division in Poland); in Zielona Góra - 5 entities of local government and in Katowice - 45 gminas. Depending on the decision of the voivodeship local government, ITI can be implemented in the cities of regional and subregional character and in the areas which are functionally connected with these cities. Resources for projects

programmed with this approach will be obtained from basic allocations of Regional Operational Programmes.

The aims of ITI application in Poland include:

- promoting development of cooperation and integration in functional areas of the biggest Polish cities, including the areas where the scale of problems connected with the lack of cooperation and complementariness of activities of different administrative entities is the biggest
- promoting partnership model of cooperation between different administrative entities in urban functional areas
- execution of integration projects that meet, in a comprehensive manner, the needs of cities and their functional areas,
- increasing the effect of the cities and the related functional areas tailored to the method of performing activities supported in their area within cohesion policy.

Achievement of the aims of ITIs should be supported by the strengths of this new instrument, such as: [8]:

- stimulation of thinking in local governments in categories of the city and its functional environment, which offers the opportunities for “instilling” the territorial approach in practice. This will cause that partnerships of urban gminas and the functionally connected neighbouring gminas can identify bottom-up needs for the implementation of ITI
- promoting communication between local governments beyond political divisions (also with participation of socio-economic partners) which might bring additional benefits for these entities e.g. through introduction of locally developed systematic solutions,
- creation of the efficient system of ITI implementation might contribute to improved effectiveness of development policy. This means integration of different instruments managed at national and regional level in the functional area of a particular city, which will consequently lead to improved coordination and execution of concrete projects. It also leads to improved responsibility of the cities for planning and utilization (according to the specific needs) of public resources (e.g. those from the EU budget) and development of the tools for cities to coordinate governmental programmes, including those supported with EU funds, located in urban areas.

The thematic scope of ITI contains, apart from the strongly accentuated area-integrated interventions, the activities which are integrated both thematically and finances (within different funds). Therefore, the ITI concept predicts execution of the packages of projects that differ thematically but mutually interrelated and complementary. Fig. 1 illustrates a set of directions of intervention to be performed within ITI.

It can be observed that one of the key fields of activities is transportation in the area of a big city and in its functional area. The effect of this approach is development of the transportation system which is environmentally-friendly, with such essential elements as low-emission public transportation, common for the whole selected area.

Achievement of the above goal requires specific initiatives concerning:

- integrated urban cards,

- facilities for urban multimodal travelling and workers' mobility, including park and ride systems, bicycle parking spaces etc.,
- innovative systems of transportation information,
- modern systems of traffic management,
- solutions which ensure limitation and slowing the vehicle traffic in the city centres
- building the network of roads and bicycle roads used for e.g. commuting to work,
- development of the infrastructure that promotes ecological goals.

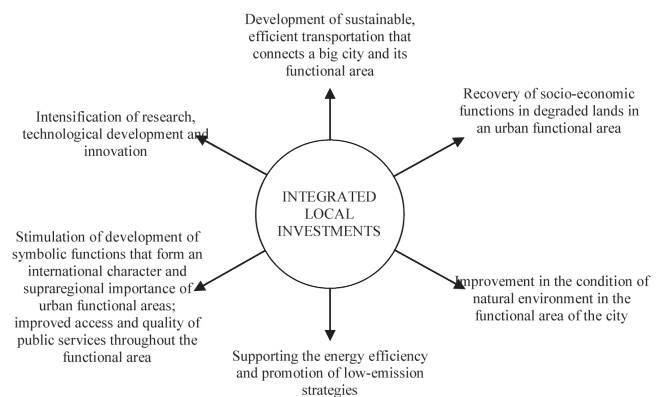


Fig. 1. Thematic scope of ITI [based on 7]

The synthetic description of integrated territorial investments reveals that this instrument should develop and, in the future, its function will be focused not only on construction of an institutional system of spending European funds in the area of voivodeship cities and their functional areas. ITI can be also a valuable tool for national urban policy. It is possible within ITI strategies to effectively and efficiently distribute national resources from state budget allocated for execution of the programmed initiatives adopted by appropriate voivodeship local governments described in ITI strategy [8]. Additionally, the projects that result from ITI strategy, with the character which is complementary to those supported by Regional Operating Programmes in ITI formula, might be supported by the national operating programmes, mainly the Operational Programme: Infrastructure and Environment for 2007-2013 and the Operational Programme: Eastern Poland.

The projects that concern application of ITS technologies are consistent with the activities supported within ITI both by EU funds and territorial contract.

## 5. ITS projects and the formula of integrated territorial investments

Considering the technologies of intelligent transportation system in the postulated areas of ITI intervention and integrated character and complementariness as a criteria that determine

execution of the ITI projects represent a good response to the requirements driven by the process of ITS applications.

The establishment of the institutionalized form of partnership in many entities of local government should be regarded as a proper starting point for activities in the field of ITS technologies which e.g.:

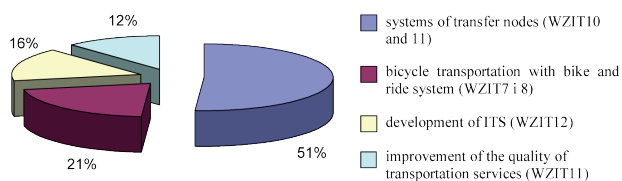
- execute complementary and integrated projects,
- are free, in the investment process, of temporal and spatial collision and treatment of ITS implementation as secondary,
- adapt ITS projects better to the needs in the areas greater than one local government unit and to the needs of transportation users in these areas,
- stimulate better understanding of the importance of ITS technologies,
- catch up with the fast development of ITS technologies,
- create the fundamentals of interoperability of ITS projects.

Further investigations in the study discuss the utilization of the opportunities offered by ITI formula in the Central Subregion of the Silesian Voivodeship [8].

With respect to the transportation system in the Subregion, which includes Upper Silesia metropolis, the local government entities presented eighty proposals of different initiatives in the process of construction of the ITI strategy. They were combined into 6 threads ZIT (WZIT7 – WZIT12) [9] that concerned [9]:

- development of bike and ride system around local development centres (WZIT7),
- increasing bicycle access to public communication with agglomeration importance (WZIT8),
- increasing the quality of services for tram lines, trolleybus lines and bus lines with modernization of necessary infrastructure (WZIT9),
- creation of the system of park and ride nodes in the borders of Upper Silesia metropolis (WZIT10),
- creation of the system of transfer nodes in Upper Silesia metropolis (WZIT11),
- development of intelligent transportation systems (WZIT12).

The thematic structure of transportation projects in ITI formula is presented in Fig. 2.



**Fig. 2.** Share of individual thematic areas in the projects proposed for implementation in ITI formula in years 2014-2020 by local government units [own study]

Of 13 projects that concerns application of ITS technologies, 7 initiatives (54%) are complementary solutions and are characterized by spatial allocation in more than one gmina. Table 2 are characterized by these project.

It should be noted that, despite a relatively low interest of local government entities in application of ITS technologies (only 16% of overall number of transportation projects), the beneficiaries

used the opportunities offered by ITI formula in almost half of the projects, since it was necessary in the initiatives proposed to break the barriers of cooperation between gminas and take partnership-based actions.

**Table 2.** Overall characterization of projects in terms of ITS technologies with complementary character and over-gmina allocation [9]

Name of initiative	Project beneficiary	Planned period of project implementation	Estimated value of project [in million zlotys]
Development of intelligent transportation systems: extension of the project of Silesian Public Services Card with urban communication organized by MZK Tychy (municipal communication public enterprise)	The city of Tychy (MZK Tychy) KZK GOP in Katowice	2015-2016	42
Creation of a dynamic system of passenger information in gminas in correlation with the system of Tychy subregion (4 projects)	gminas: Łaziska Górne, Ornontowice, Orzesze and Wry The city of Tychy (MZK Tychy)	2015-2020	19
Dynamic system of passenger information in Pszczyna Poviat	Pszczyna Poviat gminas: Goczałkowice Zdrój, Kobiór, Miedźna, Pawłowice, Pszczyna and Suszec	2017-2019	5,8
Establishment of Intelligent Centre for Traffic Management in Pszczyna Poviat			4,5

## 6. Conclusion

In light of the analysis of the problem, the following conclusions can be drawn:

1. The formula of integrated territorial investments is a new and useful instrument of cohesion policy in the aspect of both EU and urban policies at national levels.
2. The tendencies in the Central Subregion of Silesian voivodeship point to a relatively low interest of beneficiaries in projects that are based on ITS technologies. There is also lack of solutions integrated thematically, such as e.g. projects of systems of transfer nodes and systems of passenger information.
3. Self-government entities which proposed solutions that used ITS technologies were able to utilize the activities that resulted from ITI formula based on partnership of the local governments involved in the initiatives.
4. ITS projects implemented according to ITI formula exhibit, at the stage of concept and design, the character of complementary solutions and over-gmina allocation if these requirements are imposed on a specific project.
5. The mechanisms of ITI formula should be extended over the

initiatives in the ITS area financed from the state budget which were indicated in e.g. ITI Strategy and were accepted by local governments in voivodeships and the related governmental entities.

## Bibliography

- [1] Strategia Rozwoju Transportu do 2020 roku (z perspektywą do 2030 roku), Ministerstwo Transportu, budownictwa i Gospodarki Morskiej, Warsaw (2013)
- [2] RUDOLF A., PIJANOWSKI P., et al.: Raport końcowy. Ocena najważniejszych problemów występujących w projektach z zakresu inteligentnych systemów transportowych w ramach działania 8.3 POIiŚ, Agrotec Polska Sp. z o. o., Warsaw (2012)
- [3] JANECKI R., KRAWIEC S.: The Influence of Telematics on the Utility Value of the Public Transportation, in J. Mikulski (ed.): CCIS vol. 104, Springer Heidelberg (2010)
- [4] JANECKI R.: Intelligent Transportation Systems in Transportation Policy of the Cities, in J. Mikulski (ed.): CCIS vol. 239, Springer Heidelberg (2011)
- [5] WYDRO K.: Koncepcja rozwoju inteligentnych systemów transportowych I sposób ich ujęcia w opracowywanej strategii rozwoju transportu, Ekspertyza dla Ministerstwa Infrastruktury, Warszawa (2010)
- [6] Program Operacyjny Infrastruktura i Środowisko 2014-2020 (Projekt), Ministerstwo Infrastruktury i Rozwoju, Warszawa (2014)
- [7] Zasady realizacji Zintegrowanych Inwestycji Terytorialnych w Polsce, Ministerstwo Rozwoju Regionalnego, Warszawa (2013)
- [8] BALIŃSKI D.: Podejście do realizacji Zintegrowanych Inwestycji Terytorialnych w Polsce – instrument polityki miejskiej czy narzędzie zaspokajania potrzeb lokalnych?, Śląskie Studia Regionalne nr 4 (I) (2013)
- [9] TOMANEK R., et. al.: Strategia Rozwoju Subregionu Centralnego województwa śląskiego na lata 2014-2020 z perspektywą do 2030 r., ze szczególnym uwzględnieniem zagadnień rozwoju transportu miejskiego, wraz ze strategią dla Zintegrowanych Inwestycji Terytorialnych (ZIT), Centrum Badań i Ekspertyz Uniwersytet Ekonomiczny w Katowicach, Katowice (2013)