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ROAD INFRASTRUCTURE FINANCING MODELS

ABSTRACT

Already in its early phase, starting with initial general needs of people to survive and find food, traffic and traffic service turned into a modern system which increased the complexity and interdependence within the traffic system, and then with the environment as well. The financing problem is especially expressed during the creation of new roads and road networks and achieving of better transport service. High investment means required for the road construction require also systemic forecasting of financial sources. Financing of road infrastructure construction opens up the basic dilemma: whether to transfer the costs directly to the state budget and the current generation or to transfer this burden to the future generations. These considerations require also a certain organizational approach. High investments in road infrastructure require a rational selection before the decision itself on the selection of the traffic system. Such selection has to be done based on adequate traffic plans, which assumes classification of all the needs regarding their level so that every investment would be rationally allocated.

KEY WORDS

traffic planning, road financing models, financial investment projections, state budget, concessions

1. INTRODUCTION

Already in the early period of men and humankind development, traffic acquired the characteristics that are to exceed the basic needs for the survival and search for food. The development of the humankind necessarily improves also the development of traffic services. Traffic becomes one of the essential human functions, and with its task and feature of overcoming spatial distances exceeds the boundaries of plain activity and becomes one of the basic components in the human way of living. The traffic infrastructure system becomes thus one of the important factors that mutu-

ally and multiply affect the economic, social and spatial development of individual regions, including states. Modern development of this system increases the complexity of relations and strengthens the interdependence within the traffic system, and this in turn with the systems in the environment. Such development stipulates that the plans of constructing new roads or establishing new parts of the traffic system, are necessarily considered as part of an integral traffic system, and the traffic system as a part of the economic, social and wider system of spatial organization. Traffic planning is becoming the necessity both in the developed and in the underdeveloped economies.

The requirements of global restructuring of the industrial and economic development in the European Union countries, set through the development of multimodal transport, additionally sets the traffic planning as the priority for optimal selection of the traffic system and its integration into the West-European traffic standards. Since traffic infrastructure requires high investments, and the available funds are usually insufficient to satisfy all the needs related to the construction of the entire traffic system, before making the decision itself about the system, it is necessary to make a rational selection. Such selection is done on the basis of adequate traffic plans, which assumes classification of all the needs according to their level, so that every investment would be rationally allocated.

Modern development of traffic and traffic infrastructure is subjected to the requirements of the traffic service users regarding safety, speed and timeliness of transport. In road traffic, in order to meet the set requirements, the construction of high-speed roads and motorways is an imperative. Since this requires allocation of the biggest financial means, the financing model of constructing such roads should be primarily stimulated through the industrial and economic justifi-

fication. Only proper evaluation of the selected road route will have great influence on the definition of the financing source as one of the most important elements in the construction. The construction and maintenance of the road system and its adaptation to the needs of advanced transport and the users' needs, is the crucial issue for any country. Searching for the best financing models in the construction of the road traffic system, results in a whole series of technical and traffic and financial problems

2. PRINCIPLES OF ROAD INFRASTRUCTURE FINANCING SYSTEM

Financing of the road infrastructure construction is one of the key elements in realizing the set road infrastructure development plans. Compared to the previous time period, not so long ago, when development of single parts of the traffic system could be planned separately with no risk of any major errors, modern traffic development has increased the complexity of relations and it has strengthened the interdependence within the traffic system, and this in turn with the systems in its environment. This requires the plans on the construction of new roads or on establishing of new parts of the traffic systems to be considered as part of an integral traffic system, and the traffic system itself as a part of a wider economic and social system and an even wider system of spatial organization. High investments into road construction require systemic forecasting of financial sources in different variants, regarding the set plan task, the requirement of the speed of construction of the new traffic route, as well as the very financial sources. Such plans need to be based on traffic planning. Financing of the construction and road and road infrastructure management can be done in several ways, and according to theoretical knowledge and practical methods it is performed by:

- financing from the taxes,
- financing from road service users charging,
- financing from the means of tax payers and charging the services of road users (combined method),
- financing from credits of foreign and national banks,
- financing through government bonds – public loan,
- financing through fees for road land usage and performance of secondary activities along the road,
- financing from annual fee for vehicle registration,
- financing from the means for using road land,
- financing from the fee for performing secondary activities,
- financing through concessions.

The financing of the road infrastructure construction illustratively shows the complexity of the dilemma whether to transfer the costs directly to the state bud-

get and today's generation or to transfer this burden gradually to the future generations. These considerations require also a certain organizational approach. Historically looking, namely, until "yesterday" in the countries of Eastern Europe, that is, the countries of socialist orientation, the exclusive models of financing the road construction had been based on the means from the budget. In the countries of Western Europe the financing model from the budget (tax payers) was and has been applied in case of state road network, and since the thirties of the twentieth century also through direct charging of services from the motorway users. Today the ASECAP member countries (Austria, France, Greece, Croatia, Italy, Norway, Portugal, Slovenia, Spain) manage the constructed motorway network, about 16,000km, through concessions.

Investments into road infrastructure require long-term planning regarding relatively low rate of financial profitability. The construction and activation of infrastructure objects into full exploitation function also requires a certain time period. Therefore, recognizing first of all the advantages of road system on the one hand, and big investments over a longer period of time with relatively low rate of direct financial profitability on the other hand, it is necessary to carry out proper evaluation of investments into such a system. There are several methods for the assessment of feasibility i. e. definition of investments profitability into traffic infrastructure, starting from traditional methods in which the assessment procedure has been significantly simplified and based on "arbitration rules", to modern methods that include all the relevant factors necessary for complex and objective assessment of feasibility and priorities of the construction of major infrastructure facilities. The analysts usually apply three basic measures in determining the priorities in assessing the feasibility of traffic system construction:

1. net value percentage (NVP)
2. internal rate of return (IRR)
3. benefit/cost coefficient (B/C)

All the mentioned measures are based on the cost-benefit analysis which is part of the feasibility study, i. e. need to be recognised when determining the priorities of the construction of every traffic system. The World Bank and many other financial institutions use the internal rate of return as a very useful measure of assessing the traffic system construction project.

However, in determining the priorities of construction there are certain exceptions. The exceptions consist in e. g. development and/or strategic projects. Development projects are those that refer to the development of underdeveloped regions. Strategic projects are mainly projects of special significance for the safety of the country i. e. its economic prosperity. For such projects the decision-maker does not have to search for economic or financial effect in all the seg-

ments. Rather, they can contain also the safety component for the country, i. e. a component of certain economic effect which is not represented at the given moment in the assessment of the results of implemented methods.

2.1 Model of road financing from the budget

Financing of road and road infrastructure construction from the tax payers, i. e. the state budget, requires in the program realization and realization of the objective, special burdens that can be handled by the budgets of the countries with high national revenues. The same such model of financing the road network construction has to be applicable also in the underdeveloped countries, that have low traffic volumes and low national revenues, and where the development of modern road network has just started (some countries in Asia, Africa and South America). The problem is the greater, since the requirements for road network construction are high, and at the same time important for the development of economy, not only of the developed but also of the underdeveloped countries. However, the justification of motivating this method of road infrastructure financing lies in the fact that this construction results in the creation of road network that will ensure general economic prosperity of a county, and a continuity of big international road routes, thus alleviating the isolation of certain regions. In order to satisfy all the mentioned social and economic needs, financial means from the budget need to be rationally and purposefully allocated. These means should be used primarily for the maintenance of the current network and for the modernization of the county and local roads. Only one part of the financial means from the budget should be allocated to the motorway construction, first of all for the preparatory activities (research work, land projects, etc.) and support in realization of certain road sections in order to make them profitable for the investors.

2.2 Financing methods of high-serviceability roads

As an object, road is an important factor which mutually and multiply affects the economic, social and spatial development of a region, even the country. Since the Republic of Croatia belongs to the group of transition countries, and its economic development is oriented towards European economy, road and road infrastructure development plays here a special significance. Establishment of modern and competitive economic resources, compatible with European standards, is a tendency which can be established only with well organized and modern traffic system. In order to achieve this, the basic priority in the development of

roads and road infrastructure is the construction of high-serviceability roads. The problem, set as crucial, is ensuring the financial means that will be sufficient to meet all the requirements required by the construction of such a system. According to the past models of financing the road and road infrastructure construction it is well known, both in the world and in Croatia, it was mainly done from the means collected from the tax payers. This form of financing the construction of motorways and high serviceability roads, however, generates also a series of drawbacks. The state budget is accepted for the period of one year, whereas the construction works take several years. Frequent fluctuations of financial means significantly complicate long-term planning and construction dynamics which in turn affects the integral development of both economic and traffic system.

In order to avoid such uncertainty, it is necessary to allocate just a part of the means from the budget to the construction of motorways and high serviceability roads, first of all for the preparatory and initial works as support to the realization of certain motorway sections. This procedure would make the project profitable for the investors, and it could be at the same time, in principle, one of priority criteria in road construction.

The main financing source for high-serviceability roads should be through toll charging. Financing through charging the services provided to the users transfers gradually the burden of investments to future generations as well, which is reasonable regarding the service life of the facility – road, and this burden is transferred mainly to all the users, national and foreign ones which is very important for Croatia regarding her geo-traffic position (transit) as well as the share and structure of the tourist economy. The selection of toll charging should be part of the global road policy, which is not a short-term, but rather a long-term one. The selection of such a financing method reduces the burden on the budget, i. e. total budget means for the construction of road network, thus enabling that the major share of the means is allocated to modernization and construction of the remaining road network. On the other hand, such financing attracts a much wider circle of potential investors, both national and foreign ones.

Financing the motorway construction through concessions is another of the possible forms of motorway construction which is a novelty in the world. In the 19th century already, in the USA there were more than 2,000 private corporations managing toll motorways (so-called turn pikes), and in Great Britain there are still several minor bridges where toll has been charged since the 17th century. In Croatia, at the beginning of 19th century, the Rijeka – Karlovac roadway (Lujzijana) was built by merging national and foreign capi-

tal. The company that operated based on the concession got the contract for the period of 50 years. One of the main reasons for applying such a financing model is that the budget deficit forces the authority to gradually pull out from the activities where their presence is not necessary.

The fee for the usage of road land and performance of the secondary activities along the motorways, national and foreign credits with usual or delayed ("in fine") return are still some forms of financing the motorway construction i. e. insuring financial balance of the project. The best known financing model of the motorway construction i. e. insuring the project financial balance is the model known as BOT (build-own-transfer), and according to some sources this model was first implemented by the Turkish Prime Minister, Turguet Ozal.

2.3 Models of financing county and local roads

The economic development of the County depends, among other things, also on well organized and developed traffic system. Roads in this system have a special significance. Their level of development, harmonized first of all on the traffic planning principles, is the basic precondition for the industrial, economic, political, cultural and comprehensive development of micro-regional areas. Investments in development and maintenance of the road system must be the priority of every County.

The financing source of county roads should be as a rule the means from the budget and some other financing sources such as:

- fees from fuel,
- annual fee for using public roads from the registration of motor and trailer vehicles,
- fee for over-usage of public roads,
- fee for the transport of special cargo,
- fee for excessive road load,
- allocations from the customs for the import of vehicles and automobile spare parts,
- allocations from general taxes on traffic and sales of automobiles,
- allocations from tourist taxes,
- County budget,
- fees for using road land.

The mentioned financial means should be, first of all, allocated for the maintenance of the already existing road system, and only a part of the means to the construction of new roads based on traffic planning, so that the network of county and local roads could insure the best possible internal connections and connections of individual urban agglomerations within the country.

2.4 Models of financing road infrastructure maintenance

Maintenance of the already constructed road system has high significance. Insufficient investment into road maintenance reduces its serviceability, i. e. usage value. Absence of road maintenance has multiple consequences that are manifested by endangering the safety of traffic participants, reduction of economic efficiency and potential investment into the development of new economic branches, weakening of the general interest of all the other subjects in the general development of individual regions to the need to allocate increasing financial means for the renewal of the entire road network.

In the last ten years Croatia has seen mainly financing of the construction of new roads (motorways and high-speed roads), which prevented assurance of the necessary financial means for the maintenance of the existing networks of public roads. Since the already constructed road system is of immense national value, the future development should see the allocation of the major percentage of financial means for maintenance.

The most common models of allocating financial means for the maintenance of road systems both in the world and in Croatia are the means from the tax payers. The means from the tax payers are collected from:

- road fees from the fuel,
- fees for overloading of roads,
- tolls,
- fees for motor vehicles when registering the vehicles,
- fees for foreign vehicles,
- other types of fees.

The distribution of financial means from the road fees shall be adjusted to the result of classifying the road categories, and these means should be first of all intended for assuring the quality standard of road maintenance. Practice has shown that the extent to which a certain area will make use of all the possibilities and potentials depends precisely on the financing model of high-quality road maintenance at regional and local levels.

2.5 Possibilities of developing the model of financing roads by private capital

More recently, for the construction of roads, regarding the high initial investments and the fact that the return rate even in case of above-average profitable projects takes long, which in turn contributes to greater uncertainty regarding the movement of parameters that determine future revenues and expenditures, there is an increasing implementation of the financing model through private capital. The financing

method through private capital means engagement of one's own capital as a rule between 10 - 20% of one's own investment value of the projects in concession (equity). Collection of capital up to the total value of the necessary means is possible in various forms such as:

- bonds (with several modalities),
- credits with usual return,
- credits with delayed return,
- credits with different - variable interest rate,
- funding sources from the sales of real estate,
- other sources.

The input of private capital will be obtained by projects that have the highest return rate, and they will support it up to the extent to which the project is financially attractive. Therefore, only proper evaluation of road system within single regional centres and investment into industrial branches that contribute to the economic profit can attract private capital for financing of road construction. Traffic planning, precisely in such cases proves its full justification.

3. FINANCIAL BASES FOR ROAD CONSTRUCTION

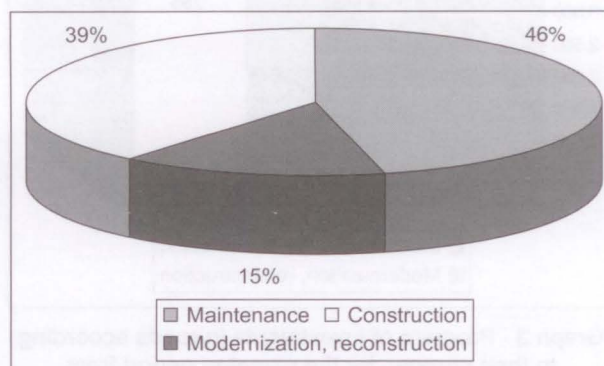
Investing into road infrastructure is a long-term process and has strategic significance for the development of every country. Therefore, it is especially important to define both the road and its infrastructure financing model and the volume of investing financial means within a certain planned period of time. According to recommendations given by financial consultants about 2% of gross social product has to be allocated for the construction of roads. Such road investment volume allows creation of the balance between maintaining of the existing road networks and faster construction of new high-serviceability roads.

Based on such a projection of financial investments, it is primarily necessary to realize the full standard of maintenance of all types of roads in order to upgrade them to a satisfactory level compared to the traffic demand. The priority here is the need for gradual solving of the most critical sections of roads and objects, especially in the suburban areas, and the construction of the basic road networks for higher levels of the traffic service.

Based on such recommendation of financial investments into road construction, the following model has been proposed in the Republic of Croatia:

- a) for maintenance (all types of roads) 46% of total investments,
- b) for modernization and reconstruction (of all types of roads) 15% of total investments,
- c) for construction of motorways and high-speed roads 39% of total investments.

According to the mentioned structure of investing into the road network development, special emphasis is on the maintenance and upgrading of traffic and technical characteristics of the existing road network 46% + 15% or 61% of total investments (Graph 1).

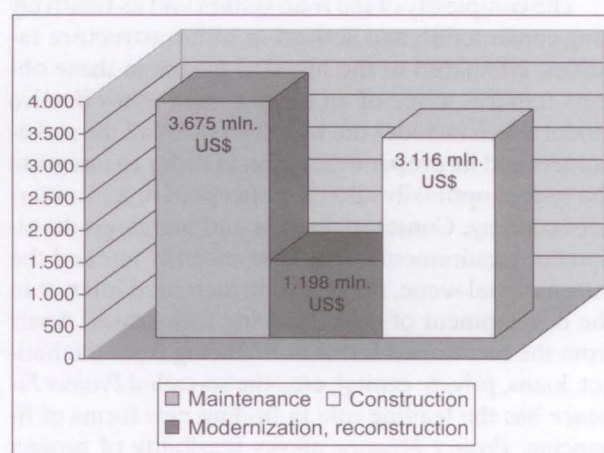


Graph 1 - Program of financial investments into roads according to their purpose for the planning period from 2000 - 2019 expressed in percentages

Source: Traffic development strategy of the Republic of Croatia, Official gazette, No. 139, Zagreb, 16 Dec. 1999, ISSN 0027-7932

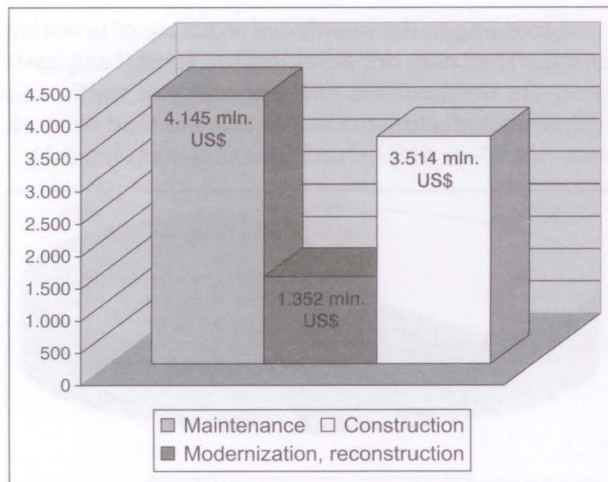
Support to such investment model is expressed also by the experts of the World Bank for Reconstruction and Development which follows financially the realization of such programs. Besides, the proposed model of financial investments converts unrealistic ambitions related to the construction of motorways and high-serviceability roads to realistic frames. Such investment enables gradual construction of motorways and high-serviceability roads that are going to be constructed based on the realistic traffic plans.

Concretely, according to the proposed model, total allocation for the roads in the period from 2000 to 2011 in the Republic of Croatia would amount to



Graph 2 - Program of financial investments in roads according to their purpose for the planning period from 2000 - 2011 expressed in nominal values in millions of US\$

Source: Traffic development strategy of the Republic of Croatia, Official Gazette, No. 139, Zagreb, 16 Dec. 1999, ISSN 0027-7932



Graph 3 - Program of investments in roads according to their purpose for the planning period from 2012 – 2019, expressed in nominal values in millions of US\$

Source: Traffic development strategy of the Republic of Croatia, Official gazette, No. 139, Zagreb, 16 Dec. 1999, ISSN 0027-7932

US\$7.989 million (Graph 2), and from 2012 to 2019 it would amount to US\$9.011 million (Graph 3), or a total within the mentioned time period US\$17.000 million.

In realizing the planned financial means, these are firstly based on the budget means which will be used to realize the road maintenance program, whereas concession models, foreign loans, etc. would be used for the construction of motorways and high-speed roads.

4. OTHER POSSIBILITIES OF ROAD FINANCING

The complexity of the road system and its relatively long construction and activation of infrastructure facilities, compared to the invested means in these objects requires usage of an efficient and cost-effective model which includes the widest circle of all the stakeholders and its proper evaluation in order to integrate the system optimally into the concept of modern market economy. Constant changes and increased development requirements, that have recently marked the international scene, result also in increased interest in the development of new financing techniques. Apart from the mentioned forms of financing from the budget, loans, private capital, etc., the so-called *Project Finance* has the leading role in finding new forms of financing. *Project Finance* allows feasibility of project whose realization, relying exclusively on traditional loan support in assuring financial means, would be difficult and in the majority of cases even impossible. Although the financial market has not yet given a unique definition of the *Project Finance*, its synthetic description can be as follows: *Financing operation in which*

one specific economic initiative/project, as a rule founded ad hoc¹, is evaluated mainly on the basis of its capability of generating profits and where cash flows², planned from management form the primary source for debt servicing.

The element which distinguishes these operations from the standard ones lies in the fact that the debt return capability estimates are based mainly on the planned profits of the financed initiative, rather than on the economic- property status of the promoters of such initiatives.

Project Finance is as a rule classified through two kinds of typologies:

1. Without Recourse³ - in this type of *Project Financing* the initiative/project and the promoters or third parties are completely separated, regarding the fact that the capability of profit generating (together with assets and the resources of the financed initiative) is the only relevant element for financial institutes for evaluation regarding debt servicing.
2. Limited Recourse⁴ - there are external elements to support the initiative. The damage compensation to financial institutes consists in certain forms of guarantee, such as contractual obligations of the promoters and/or third parties included in the initiative⁵ (apart from the capability of generating profit and assets and resources of the initiative).

The most important elements in the structure of a *Project Finance* include the planned time of realizing the initiative, planned costs of initiative realization and cash flows. The initiative must show adequate revenues which will insure timely servicing of the debt, financial plan must include sensitivity analyses of "dynamic type" which will verify the capability of the initiative to cover the debt servicing through variations of the in-advance determined economic parameters. In further harmonization and improvement of the financing and organization models, it would be useful, starting from the domestic, especially the experiences of the European countries, and for further development of the concept of road market economy, to define the forms of financing that will not question the plan and development projects.

5. CONCLUSION

In the creation of new roads or road networks and the correlation of achieving the best transport service, special emphasis is on the financing problem. High investments in the construction of roads require also a changed approach in forecasting the sources of financing the construction of roads or road systems in general.

In the past it was possible to make the choice of the desired traffic system without any greater mistakes. However, today's reforming phase of the economy requires introduction of new financing methods based on the market economy system and new technologies. The models of financing the traffic system construction need to be primarily stimulated through economic justification. Only proper evaluation of the selected road route will influence to a great extent the definition of the sources of financing as one of the most important elements in realizing construction.

In order to fulfil its traffic function, the traffic network must use the shortest and optimal way to connect the most important development regions and traffic nodes in an efficient, reliable and safe way. Focusing on the selection of an individual route, and not on the selection of the traffic network itself, a network is obtained that is more a sum of isolated than a set of inter-conditioned routes obtained by the network optimization procedure.

For the construction of a certain network, or its part, i. e. road route it is not sufficient that there is satisfactory traffic, and thus also a satisfactory need for its existence, but, considered from the economic and/or social standpoint, such investment should also be justified. The means invested in road infrastructure have to generate certain benefit that will within an adequate period of time ensure greater economic revenue, if this investment is considered from the social or economic standpoint. That is, the means invested in this way have to create adequate profit and cost-efficiency if considered from the commercial standpoint (concession). A road that has no satisfactory volume of traffic does not ensure realization of a major benefit, nor does it guarantee any major revenues. Unfortunately, even the today's volume of traffic on the majority of constructed motorways is not satisfactory, and the charged toll sufficient, in order to cover all the costs of the newly-constructed road network within an adequate period of time.

However, sometimes there are cases in which there is need for the construction of road network or its part where the volume of traffic is not sufficient, but the investment is justified for some other reason. In such cases the possibility is given that, because of some future economic effect that is not present at the given moment, it is not necessary to justify the construction by the economic or financial profit.

In order to determine in the best possible way the priorities in the construction of the road network, for the allocation of investment means, it is necessary to determine what benefit we want to achieve by concrete investments, and which criteria should be determined for individual investment activities. The rationalization of investment activities can be realized by the implementation of a larger number of method-

ological procedures, that are based on the cost-benefit analysis, as the component of the feasibility study, and that have been successfully applied for many years in the countries with the market economic system.

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SAŽETAK

MODELI FINANCIRANJA CESTOVNE INFRASTRUKTURE

Promet i prometna usluga već u svojoj ranoj fazi, počevši od prvobitne opće potrebe čovjeka za preživljavanjem i pronalaženjem hrane, prerasta u suvremeni sustav koji povećava složenost i međuovisnost unutar prometnog sustava, a ovoga opet sa sustavima svog okruženja. Prilikom nastajanja novih cesta i mreže cesta te postizanja što bolje prijevozne usluge, posebno je izražen problem financiranja. Velika investicijska sredstva potrebna za izgradnju cesta iziskuju i sustavno predviđanje izvora financiranja. Financiranje izgradnje cestovne infrastrukture otvara temeljnu dilemu, a to je da li troškove prebaciti izravno na državni proračun i sadašnju generaciju ili postupno taj teret prenositi na buduće generacije. Ova promišljanja zahtijevaju i određeni organizacijski pristup. Velika investicijska ulaganja u cestovnu infrastrukturu zahtijevaju da se prije same odluke o odabiru prometnog sustava nužno obavri racionalan izbor. Takav izbor potrebno je obaviti na temelju adekvatnih prometnih planova, što pretpostavlja svrstavanje svih potreba po njihovom stupnju kako bi svako ulaganje bilo racionalno alocirano.

KLJUČNE RIJEČI

prometno planiranje, modeli financiranja cesta, projekcije financijskog ulaganja, državni proračun, koncesije

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1. Specific economic unit which is founded for the development/realization of the initiative/project is generally marked as "Special Purpose Vehicle" (SPV).
2. Cash Flow.
3. No possibility of damage compensation from the promoter/co-owner.
4. With limited possibility of damage charge from the promoter/co-owner.
5. Obligations of buying back the product, sales of basic raw materials.

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