Dr. sc. Tanja Poletan Jugović / ***Ph. D.***
Mirna Dujmović Cerovac, dipl. oec.
Sveučilište u Rijeci / *University of Rijeka*
Pomorski fakultet Rijeka / *Faculty of Maritime Studies*
Studentska 2, 51000 Rijeka
Hrvatska / *Croatia*

Pregledni članak
Review article

UDK / *UDC*:
656.01(497.5:4-67 EU)
656.61.022.83 (497.5:4-67 EU)

Primljeno / *Received:*
2. travnja 2012. / *2nd April 2012*
Odobreno / *Accepted:*
20. travnja 2012. / *20td April 2012*

VREDNOVANJE UČINAKA PROVEDBE PROJEKTA "MORSKIH AUTOCESTA" U REPUBLICI HRVATSKOJ

EVALUATING IMPACTS OF "MOTORWAYS OF THE SEA" PROJECT IMPLEMENTATION IN THE REPUBLIC OF CROATIA

SAŽETAK

Projekt "morskih autocesta" na Jadranu (AdriaticMoS) projekt je koji se zasniva na ideji i strategiji povezivanja Europe s jugoistočnom obalom Europske unije, Ciprom i susjednim područjima putem transeuropskog multimodalnog transportnog sustava. Na taj se način daje prilika za razvitak priobalne plovidbe i intermodalnosti u cijeloj regiji, uvažavajući smjernice europske prometne politike koje u sklopu afirmacije održivog i učinkovitijeg prometa favoriziraju preusmjeravanje cestovnog teretnog prometa na alternativne prijevozne sustave. Implementacija navedenog projekta u Republici Hrvatskoj implicirat će brojne gospodarske i prometne učinke koje je potrebno analizirati i vrednovati kako bi se dobile realne procjene društvene korisnosti projekta. Slijedom toga, u ovome se radu predstavlja koncept "morskih autocesta", ističe se važnost i opravdanost uključivanja Republike Hrvatske u spomenuti sustav kao i prednosti koje bi taj koncept proizveo intenzivirajući integriranje Republike Hrvatske u sustav transeuropske prometne mreže. Posebice se utvrđuju učinci provedbe projekta "morskih autocesta" na Jadranu, sugerirajući primjenu cost-benefit analize kao odgovarajuće metode mjerenja troškova i koristi projekta.

Ključne riječi: *Transeuropska prometna mreža (TEN-T), "morske autoceste", projekt* Adriatic MoS*, učinci provedbe projekta,* cost-benefit *analiza*

SUMMARY

The "motorways of the sea" project in the Adriatic Sea ("AdriaticMoS) is a project based on the idea and strategy of connecting Europe with the south-east coast of the European Union, Cyprus and neighbouring areas through a trans-European multimodal transport system. This is an opportunity for the development of coastal navigation and intermodality in the entire region, by accepting the guidelines of the European transport policy that favour the redirection of road freight transport to alternative transport systems within the affirmation of sustainable and more efficient transport. The implementation of the abovementioned project in the Republic of Croatia will imply numerous economic and transport effects that need to be analysed and evaluated so as to obtain real estimates of social usefulness of the project. Subsequently, this paper presents the concept of "motorways of the sea", emphasizes the importance and justifiability of including the Republic of Croatia in the aforesaid system, as well as the advantages that this concept would generate by integrating the Republic of Croatia in the Trans-European Transport Network. Special emphasis is on determining the effects of "motorways of the sea" project implementation in the Adriatic Sea, suggesting the application of cost-benefit analysis as the appropriate method for measuring costs and benefits of the project.

Key words: *Trans-European Transport Network (TEN-T), "Motorways of the Sea", "Adriatic MoS" project, impacts of project implementation, cost-benefit analysis*

1. UVOD

Projekt razvoja "morskih autocesta"[1] (*Motorways of the Sea*) odnosi se na stvaranje novih intermodalnih pomorsko-orijentiranih logističkih lanaca u Europi, koji imaju za cilj poboljšati pristup tržištima diljem Europe. Spomenuti intermodalni logistički lanci podrazumijevaju kombiniranje pomorskog, cestovnog, željezničkog te prometa unutarnjim plovnim putovima s ciljem povećanja učinkovitosti prijevoza, što uključuje smanjenje troškova prijevoza, kraće vrijeme putovanja roba prema konačnom odredištu te smanjenje onečišćenja okoliša.

Njima se želi rasteretiti preopterećen europski cestovni sustav preusmjeravanjem prometa na željeznice i unutarnje plovne putove, koji su ujedno ekološki prihvatljiviji od korištenja cestovnog prometa. Dugoročno, razvoj "morskih autocesta" dovest će do ujednačavanja prometnih tokova u Europi i njihovog ravnomjernijeg korištenja te će se korištenjem luka koje su blizu krajnjem odredištu tereta smanjiti ukupni troškovi prijevoza.

Pretpristupnom pomorskom strategijom Republike Hrvatske koja je izrađena 2005. godine, utvrđena je dugoročna politika razvoja pomorskog prometa i hrvatskih luka. U Strategiji se ističe važnost uključivanja Hrvatske u mrežu "autocesta mora jugoistočne Europe", koji je kao pomorski uslužni, ali i infrastrukturni koridor koji prolazi kroz Jadransko more, od posebnog interesa za Republiku Hrvatsku.

Budući da kao trenutna nečlanica Europske unije, ne može koristiti sredstva iz TEN-T programa (*Trans-European Network for Transport)*, Republika Hrvatska je u suradnji s drugim jadranskim zemljama započela projekt *AdriaticMoS* ("morske autoceste Jadrana"), koji bi trebao omogućiti uključivanje u europske programe razvoja te dostupnost financijskih sredstava za razvoj prometnog sustava u narednom razdoblju.

"Morske autoceste" predstavljaju velik i dugoročan projekt, koji podrazumijeva ulaganja u javne objekte, te je nužna detaljna analiza samog projekta prije njegove provedbe, kako bi se izvršila procjena njegova utjecaja vodeći računa o održivom razvoju gospodarstva. Naime, održivi razvoj, kako je već poznato, podrazumi-

[1] Za pojam "morske autoceste" u hrvatskoj literaturi se koriste inačice "pomorske autoceste", "plave autoceste", "autoceste na moru" i sl.

1. INTRODUCTION

The development of the "Motorways of the Sea"[1] project refers to the creation of new intermodal maritime-oriented logistic networks in Europe, aiming at improving the access to markets throughout Europe. The aforementioned intermodal logistic networks imply the combination of sea, road, rail and inland waterways transport, with the aim of increasing transport efficiency, which includes the reduction of transport prices, reduction of transit time, and the reduction of environmental pollution.

They aim at easing the overloaded European road system by redirecting traffic to railroads and inland waterways, which are at the same time ecologically more acceptable than road traffic. In a long-term perspective, the development of "motorways of the sea" will bring to the optimal structure of traffic flows in Europe and their more uniformed utilisation, and by using ports that are close to final destination of freight will reduce the overall transport costs.

The pre-accession maritime strategy of the Republic of Croatia, elaborated in 2005, established the long-term development policy for sea transport and Croatian ports. The Strategy points out the importance of including Croatia in the network of "motorways of the sea of south-east Europe", that is a service maritime corridor, but also an infrastructure corridor that passes through the Adriatic Sea, of special interest to the Republic of Croatia.

Since as a current non-EU member state Croatia cannot benefit from TEN-T ("Trans-European Network for Transport") program funding, the Republic of Croatia, in cooperation with other Adriatic countries entered into the "AdriaticMoS" project, which should enable the inclusion in European development programs and the availability of financial resources for the development of traffic system in the following period.

"Motorways of the Sea" represent a comprehensive and long-term project that implies investment in public facilities, therefore a detailed analysis of a project is required before its implementation, so as to evaluate its impact, taking into consideration the sustainable development of economy. In fact, sustainable development

[1] The concept of "Motorways of the Sea" in Croatian literature used versions of "maritime highway", "blue highway" "highway to the sea", etc.

jeva stabilni gospodarski razvoj, uvjetovan ekološkom ravnotežom i društvenim napretkom te je iznimno važno da hrvatski stručnjaci uključe sve tri komponente u razvojne programe zemlje.

Tretirajući navedeni problem istraživanja, osnovni ciljevi u ovome radu su: istaknuti važnost integracije Republike Hrvatske u europsko transportno tržište te konkretno u projekt "morskih autocesta istočnog Mediterana" unutar TEN-T programa Europske unije, te istaknuti nužnost i potrebu objektivnog vrednovanja društveno-ekonomskih učinaka projekta, primjenom odgovarajuće metode.

2. INTEGRACIJA REPUBLIKE HRVATSKE U SUSTAV "MORSKIH AUTOCESTA"

Integracija Republike Hrvatske u sustav "morskih autocesta istočnog Mediterana" jedna je od relevantnih pretpostavki integracije u europsko prometno tržište. Slijedom toga u ovome se dijelu rada analiziraju osnovni principi i zahtjevi europske prometne politike te koncept sustava "morskih autocesta".

2.1. Europska prometna politika i integracija Republike Hrvatske u europsko prometno tržište

Ciljevi europske prometne politike istaknuti su u službenom dokumentu Europske komisije objavljenom pod naslovom *Bijela knjiga*, 1992. godine *(White Paper on Growth, Competitivenes and Employment)*, a koji kao osnovni cilj europske prometne politike ističe dva sustava integracije [1]:

- integraciju prijevoznih sredstava međusobnim povezivanjem različitih grana prijevoza (uporabom različitih prijevoznih sredstava)
- integraciju nacionalnih prometnih mreža u koherentnu europsku strukturu mreža.

Po drugi puta, *Bijela knjiga* kao temeljni dokument kojim se definira prometna politika, a time i infrastrukturna politika Europske unije, izlazi pod nazivom *Europska politika transporta za 2010. – Vrijeme odluke.* Kao osnovni cilj u navedenom se dokumentu ističe balans između gospodarskog razvitka, kvalitativnih i sigurnosnih zahtjeva društva u svrhu razvitka moder-

implies stable economic growth, conditioned by ecological balance and social progress, while it is crucial for Croatian specialists to include all three components in country's development programs.

Dealing with the said research problem, the main goals of this paper are: emphasizing the importance of integrating the Republic of Croatia in the European transport market, particularly in the "motorways of the sea of south-east Mediterranean" within the EU TEN-T program, and emphasizing the necessity and need for an objective evaluation of socio-economic impacts of the project by implementing the appropriate method.

2. INTEGRATION OF THE REPUBLIC OF CROATIA INTO THE "MOTORWAYS OF THE SEA" SYSTEM

The integration of the Republic of Croatia into the "East Mediterranean Motorways of the Sea" is one among pertinent presuppositions of integration into the European traffic market. As a consequence, this part of paper analyses basic principles and requisites of the European traffic policy and the concept of the "motorways of the sea" system.

2.1. European transport policy and the integration of the Republic of Croatia into the European traffic market

The objectives of the European transport policy are included in the official document of the European Commission called the White Paper on Growth, Competitiveness, and Employment, which emphasizes two systems of integration as main objectives of the European transport policy [1]:

- the integration of means of transport by linking different transport sectors (by using different means of transport);
- the integration of national traffic networks into a coherent European networks structure.

For the second time the White Paper, as basic document that defines the transport policy, and therefore the infrastructure policy of the European Union, is issued as "European transport policy for 2010 – Time to decide". As

nog i održivog transportnog sustava. Unutar toga Europska komisija je predložila više od 60 mjera za razvitak prometnog sustava koje bi trebale utjecati na smanjenje cestovnog prometa, revitalizaciju željezničkog prometa, promoviranje pomorskog i riječnog prometa te kontrolirani rast zračnog prometa.

Program država članica Europske unije, a osobito njegov dio koji se odnosi na izgradnju vanjskih odnosa pomoću bolje povezanosti s državama izvan Europske unije, u prvi plan ističe prometnu infrastrukturu. Stoga je posebno značajnu pozornost potrebno posvetiti konceptu Transeuropske mreže prometnica (TEN – *Transeuropean Transport Network)* i konceptu paneuropskih koridora koji integriraju Hrvatsku u europski prometni sustav [3].

Usporedno s povećanjem broja članica Europske unije integriraju se i nacionalne mreže prometnica kako bi se oblikovala Transeuropska mreža prometnica (TEN). Glavni cilj je izgradnja potrebnih prometnica i povezivanje nacionalnih mreža u jedinstvenu europsku mrežu, čime bi se uklonila uska grla, a udaljenije regije povezale u zajednički sustav europskih prometnica.

Pored toga, države Europske unije nastoje proširiti europsku prometnu mrežu i na države izvan Unije. Posebice se to odnosi na države srednje i istočne Europe koje čine značajno tržište, a istovremeno preko njih prolaze značajni tranzitni pravci prema tržištima Azije. Da bi se to postiglo, stvara se paneuropska mreža prometnih koridora.

Budući da je stvaranje kvalitetne komunikacije između europskih država, osnovni preduvjet za proces europske integracije, da bi valorizirala svoj povoljan geografski položaj, dobila odgovarajuću prometnu ulogu u europskim prostorima, ostvarila potpunu integraciju sa suvremenom Europom, i ekonomsku korist od širenja europskog tržišta, Republika Hrvatska nedvojbeno treba djelovati u pravcu kvalitetnog prometnog povezivanja s Europom [3].

U tom je smislu, od velikog značenja uključenost hrvatske prometne mreže u projekte europskog prometnog sustava i sustav verificiranih europskih koridora.

Paneuropski prometne koridore koji tranzitiraju teritorijem Republike Hrvatske i integriraju je u europski prometni sustav su:

main objective, the mentioned document emphasizes the balance between economic progress, quality and safety requirements of the society for the development of modern and sustainable transport system. Within this document the European Union proposed more than 60 measures for the development of traffic system, which should impact on the decrease of road transport, revitalisation of rail transport, promotion of sea and inland waterways transport, and the controlled growth of air transport.

The program of EU member states, and especially the part referring to the creation of external relations through a better connection with non-EU countries, puts traffic infrastructure into foreground. Therefore, it is important to pay special attention to the concept of TEN – Trans-European Transport Network and the concept of Pan-European corridors that integrate Croatia into the European traffic system. [3]

In parallel with the increasing number of EU member states, national road networks are integrated as well, in order to create a Trans-European Transport Network (TEN). The main objective is the creation of necessary roads and linking national networks into a unique European network, which would eliminate bottlenecks, and connect farther regions into a common system of European roads.

Besides that, the EU member states aim at widening the traffic network onto non-EU countries. This refers especially to Central and East European countries that represent an important market, and at the same time are crossed by important transit routes towards Asian markets. In order to achieve that, the Pan-European network of traffic corridors is being created.

Since the creation of a quality communication among European countries is a basic prerequisite for European integrations process, in order to estimate its favourable geographical position, obtain adequate traffic role in the European area, achieve complete integration with modern Europe, and economic benefit from the expansion of European market, the Republic of Croatia unquestionably has to act towards a quality traffic connection with Europe. [3]

In this sense, the inclusion of Croatian traffic network into European traffic system projects

- Koridor VII – vodni put Dunava s pritocima i rijeka Sava
- Koridor X – Salzburg – Villach – Ljubljana – Zagreb – Beograd – Skopje – Solun
- Ogranak koridora X– Xa – Graz – Maribor – Zagreb
- Ogranak koridora V – Vb – Rijeka – Zagreb – Budimpešta
- Ogranak koridora V – Vc – Ploče – Sarajevo – Osijek – Budimpešta.

Republika Hrvatska smještena je na izuzetno dobrom geoprometnom položaju za uključivanje u sustav "morskih autocesta", budući da je Jadransko more duboko uvučeno u europsko kopno. Tu činjenicu Hrvatska svakako treba iskoristiti za uključivanje u europsko transportno tržište u okviru TEN-T prometne mreže Europske unije. Ali, da bi Hrvatska imala koristi od svog dobrog geoprometnog položaja, potrebno je intenziviranje razvojnog ciklusa luka i prometne infrastrukture, posebice željezničke infrastrukture.

Strateški dio infrastrukture svake priobalne zemlje su morske luke, a sustav "morskih autocesta" dodatno naglašava njihovu važnost, jer će se daljnji razvitak TEN-T mreže Europske unije temeljiti upravo na učinkovitim lučkim sustavima. Iskustva u razvoju svjetskih luka ukazuju na činjenicu da luke moraju slijediti dinamičan razvoj suvremene prometne tehnike i tehnologije, kako bi se održale i napredovale na tržištu.

Temelj razvoja hrvatskih luka je povećanje tranzitnog tereta iz i prema zemljama u zaleđu, budući da se radi o usluzi koja predstavlja izvozni proizvod. Postojeća lučka infrastruktura u hrvatskim lukama ne udovljava zahtjevima koje uvjetuje jedinstveno europsko tržište, stoga je modernizacija luka i prometne infrastrukture nužan preduvjet povećanja tranzitnog tereta, posebice kontejnerskog i Ro-Ro prometa. Razvoj pomorsko-prometne mreže u Republici Hrvatskoj je važan za međusobnu povezanost infrastrukturne mreže, a time i razvoja pomorskog i kopnenog prometnog sustava na razini Hrvatske, ali i jugoistočne Europe i čitave Europske unije.

and system of verified European corridors is of utmost importance.

The Pan-European traffic corridors that transit over the territory of the Republic of Croatia and integrate it into the European traffic system are:

- corridor VII – Danube waterway with affluents and the river Sava;
- corridor X – Salzburg – Villach – Ljubljana – Zagreb – Belgrade – Skopje – Thessaloniki;
- corridor branch X – Xa – Graz – Maribor – Zagreb;
- corridor branch V – Vb – Rijeka – Zagreb – Budapest;
- corridor branch V – Vc – Ploče – Sarajevo – Osijek – Budapest.

The Republic of Croatia is located in a very favourable geo-transportation position for the inclusion into the "motorways of the sea" system, since the Adriatic Sea deeply cuts into the European continent. By all means Croatia should avail from that fact for joining the European transport market within the EU TEN-T traffic network. But for Croatia to benefit from its favourable geo-transportation position, it is necessary to intensify the port and traffic development cycle, especially rail infrastructure.

The strategic infrastructure part of every coastal country is represented by sea ports, and the "motorways of the sea" system additionally stresses their importance, because the future development of the TEN-T network will be based on efficient port systems. Experiences in the development of world ports show that ports must follow a dynamic development of modern traffic techniques and technologies in order to remain and improve their position on the market.

The basis for the development of Croatian ports is the increase of transit freight from and to countries in the hinterland, since it is a service that represents an export product. The existing port infrastructure does not satisfy the requirements set by the common European market, so a necessary prerequisite for the increase of transit freight, especially container and Ro/Ro traffic. The development of sea-traffic network in the Republic of Croatia is important for the interconnection of infrastructure network, and therefore the development of sea and land traffic systems at Croatian level,

2.2. Republika Hrvatska u sustavu "morskih autocesta istočnog Mediterana"

Postojeću distribucije prometnih tokova u Europi karakterizira koncentracija pomorskog prometa u području luka sjeverozapadne Europe (Rotterdam, Antwerpen, Hamburg) koje svojima kapacitetima i prometnim vezama sa zaleđem trenutno mogu odgovoriti potrebama prometne potražnje. Međutim, osim koncentracije i zasičenosti prometnih tokova na spomenutom lučkom području, takva situacija implicira i druge negativnosti u distribuciji prometnih tokova, a to je činjenica da se većina tereta iz luka sjeverozapadne Europe otprema cestovnim prijevoznim sredstvima. To rezultira velikim eksternim troškovima koji se očituju kroz onečišćenje, zagušenje prometnica, prometne nezgode, itd.

Dugoročni cilj prometne politike Europske unije je ujednačavanje i ravnomjernija raspodjela prometnih tokova, uvažavajući koncept održivog razvitka. Stoga je, prometna politika Europske unije usmjerena na razvoj Transeuropske prometne mreže (TEN-T), kojom bi se trebao prestrukturirati promet tereta u Europi, na način da se osim ulaganja u kopnenu prometnu infrastrukturu podrže i stvore pretpostavke za formiranje tzv. "morskih autocesta". Njima bi se glavni prometni koridori i morske luke povezali na način da se favoriziraju i u prometne tokove uključe one luke koje su bliže krajnjim odredištima tereta.

Budući da sredozemne luke predstavljaju kraći i ekonomičniji put povezivanja Europe s Bliskim i Dalekim istokom, Europska unija naglašava važnost razvoja TEN-T mreže prema lukama južnih europskih poluotoka (Pirinejski, Apeninski i Balkanski).

Razvoj "morskih autocesta" predložila je Europska komisija u Bijeloj knjizi o prometu, koja je usvojena 2001. godine, a pravni i financijski okvir projekta odredio je Europski parlament 2004. godine usvajanjem TEN-T smjernica, među kojima se kao najvažniji ističu sljedeći ciljevi projekta [6]:

- preusmjeravanje teretnog prometa s kopna na more
- povećanje prometne povezanosti
- smanjenje preopterećenja cestovnog prometa kroz preraspodjelu tereta.

but also south-east European, and in the entire European Union.

2.2. The Republic of Croatia in the system of "East Mediterranean Motorways of the Sea"

The existing distribution of traffic flows in Europe is characterised by the concentration of sea traffic in the port areas of north-west Europe (Rotterdam, Antwerp, Hamburg) that with their capacities and traffic connections with the hinterland can immediately respond to the needs of traffic demand. Nevertheless, besides concentration and saturated traffic flows in the aforementioned port area, this situation implies also other negativities in the distribution of traffic flows, and that is the fact that most freight from northwest European ports is shipped by road. This results in high external costs that manifest through pollution, traffic congestion, traffic accidents.

Long-term objective of the EU traffic policy is the standardization and a more uniformed allocation of traffic flows, respecting the concept of sustainable development. Therefore, the EU traffic policy is focused on the development of trans-European transport network (TEN-T), which would reorganise freight traffic in Europe, in a way that besides investing in land traffic infrastructure, it supports and creates premises for the creation of the so-called "motorways of the sea". Those would connect main traffic corridors and sea ports so as to favour and include in traffic flows those ports that are closer to freight end destination.

Since Mediterranean ports represent a shorter and more economical way of connecting Europe with the Middle and Far East, the EU stresses the importance of developing TEN-T network towards ports of south European peninsulas (Iberian, Italian and Balkan).

The development of the "motorways of the sea" was suggested by the European Commission in the White Paper on transport, accepted in 2001, and the legal and financial framework of the project was established by the European Parliament in 2004 with the adoption of TEN-T guidelines, among which the most relevant project objectives are the following [6]:

- the redirection of freight traffic from land to sea;
- the increase of traffic cohesion;
- the reduction of overloaded road traffic through the reallocation of freight.

Smjernicama su također određena četiri osnovna koridora na kojima će se formirati projekti od europskih interesa [7]:

- "autoceste Baltičkog mora", koje povezuju baltičke zemlje sa zemljama srednje i zapadne Europe
- "autoceste mora zapadne Europe", koje vode od Portugala i Španjolske preko Atlantskog luka do Sjevernog i Irskog mora
- "autoceste mora jugoistočne Europe" (istočnog Mediterana), koje povezuju Jadran s Jonskim morem i istočnim Mediteranom, uključujući i Cipar
- "autoceste mora jugozapadne Europe" (zapadnog Mediterana), koje povezuju Španjolsku, Francusku, Italiju i Maltu, uključujući i povezivanje s "autocestama mora jugoistočne Europe" i Crnim morem.

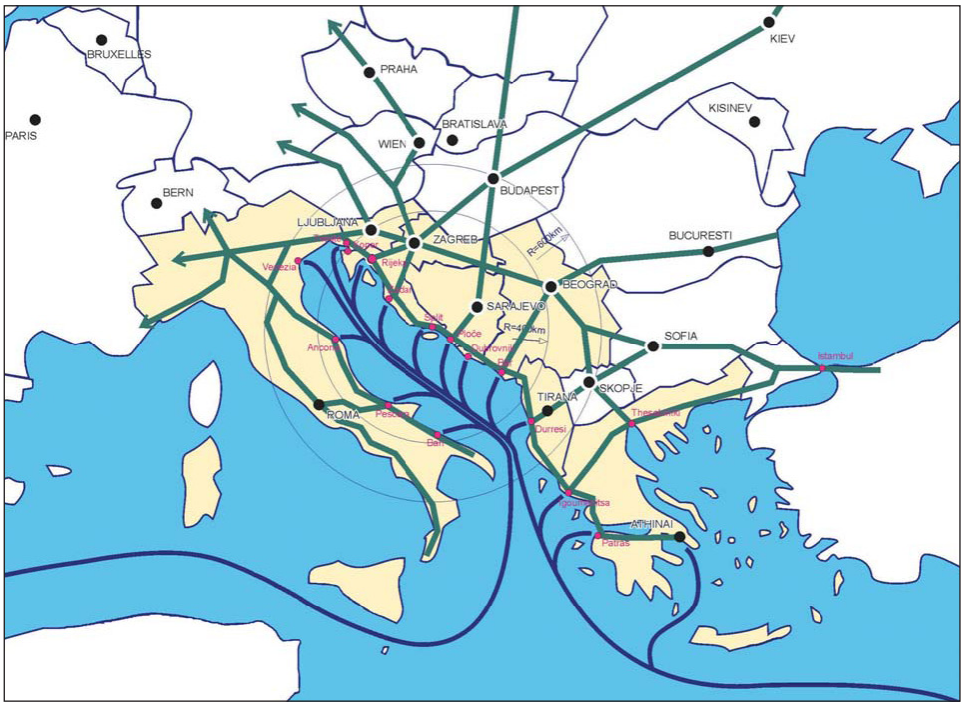
Projekt "morskih autocesta istočnog Mediterana" su unutar TEN-T programa Europske unije provele Slovenija, Italija, Malta, Cipar i Grčka. Budući da Republika Hrvatska nije članica Europske unije, ona ne može koristiti sredstva iz TEN-T programa te stoga nije ni sudjelovala u tom projektu. To je razlogom da je Hrvatska zajedno s ostalim jadranskim zemljama pokrenula

The guidelines defined as well four main corridors where projects with European interests will be formed [7]:

- "Motorway of the Baltic Sea", connecting Baltic countries to countries of Central and Western Europe;
- "Motorway of the Sea of western Europe" leading from Portugal and Spain via the Atlantic Arc to North Sea and Irish Sea;
- "Motorway of the Sea of south-east Europe" (Eastern Mediterranean), connecting the Adriatic to the Ionian Sea and the Eastern Mediterranean, including Cyprus;
- "Motorway of the Sea of south-west Europe" (Western Mediterranean), connecting Spain, France, Italy and Malta, and linking with the "Motorway of the Sea of south-east Europe" and the Black Sea.

The "Motorway of the Sea of Eastern Mediterranean" project within the EU TEN-T program was implemented by Slovenia, Italy, Malta, Cyprus and Greece. Since Croatia is not member of the EU, it cannot benefit from the TEN-T program funds, and therefore did not participate in that project. This is why Croatia and other Adriatic countries established the

Zemljovid 1: Potencijalni pravci "morskih autocesta" u Republici Hrvatskoj
Chart 1 *Potential routes of the "Motorways of the Sea" in the Republic of Croatia*



Izvor / ***Source:*** http://www.mmtpr.hr/UserDocsImages/STRATEGIJA%20H-cb.pdf (03.03.2012.)

projekt *AdriaticMoS* (*Adriatic Motorways of the Sea* – "morske autoceste Jadrana"), koji bi trebao biti dodatak Master planu "morskih autocesta istočnog Mediterana".

Implementacija projekta *AdriaticMoS* podrazumijeva stvaranje zajedničke razvojne strategije svih jadranskih zemalja na području prometa, te uključivanje prometnih sustava s istočne obale Jadrana u europske programe razvoja. Time će zemljama s istočne obale Jadrana postati dostupna financijska sredstava za razvoj njihovog prometnog sustava u razdoblju koje slijedi.

Dakle, temeljna zadaća projekta *AdriaticMoS* je napraviti plan razvoja pomorskog prometa i intermodalnog sustava prijevoza na Jadranu. Prije izrade samog plana, treba izvršiti detaljnu analizu trenutnog stanja infrastrukture i prijevozničkih servisa na Jadranu. Na temelju te analize izradit će se program projekta, u koji moraju biti uključeni troškovi izgradnje potrebne infrastrukture i izvori financiranja, realna potražnja za prijevozom, razdoblje potrebno za ostvarenje programa te očekivana korist od implementacije projekta. Ukupan budžet projekta iznosi 1.790.770 €, od čega se 85% osigurava kroz IPA program (*Instrument for Pre-Accession assistance*)[2], a vodeći partner je *Rete Autostrade Mediterranee SpA*. (RAM) iz Italije [11]. Razvoj projekta *AdriaticMoS* će imati pozitivan utjecaj na cjelokupan razvoj TEN-T mreže Europske unije, jer će se njegovom provedbom dodatno smanjiti zakrčenje cestovnog prometa u Europi. To će se također pozitivno odraziti na očuvanje okoliša i pridonijet će održivom razvoju gospodarstva u regiji.

Pored kopnenih koridora te koridora unutarnjim plovnim putovima koji tranzitiraju teritorijem Republike Hrvatske, izradom "Master plana morskih autocesta istočnog Mediterana" 2009. godine utvrđeno je devet potencijalnih koridora "morskih autocesta" u tom dijelu Europe, od kojih su za Republiku Hrvatsku važna četiri [2]:

- Koridor III, koji povezuje Jonsko more/zapadnogrčke luke (Igoumenitsa, Patras) s istočnim dijelom sjevernojadranskih luka (Kopar, Rijeka, Zadar, Trst, Monfalcone)

[2] IPA program je novi instrument pretpristupne pomoći za razdoblje 2007. – 2013., koji zamjenjuje dosadašnje programe CARDS, PHARE, ISPA i SAPARD.

project "AdriaticMoS" ("Adriatic Motorways of the Sea") that should be an annex to the Master Plan of the "Motorway of the Sea of Eastern Mediterranean".

The implementation of the "AdraticMoS" project implies the creation of a common development strategy of all Adriatic countries in terms of traffic, and the inclusion of traffic systems from the eastern coast of the Adriatic in the European development programs. This will make possible for the countries of the eastern coast of the Adriatic to benefit from available financial resources for the development of their traffic system in the following period.

Therefore, the basic task of the "AdriaticMoS" project is to create a development plan for sea traffic and intermodal transport system in the Adriatic. Before the creation of the plan, a detailed analysis of the situation of current infrastructure and transport services in the Adriatic has to be carried out. On the basis of that analysis a project plan will be made, which has to include the cost of the construction of necessary infrastructure and financial resources, real transport demand, the period of time necessary to achieve the program, and the expected benefits from the project implementation. The total budget of the project amounts to 1,790,770 €, of which 85% is ensured through the IPA program (Instrument for Pre-Accession assistance)[2], and the leading partner is "Rete Autostrade Mediterranee SpA" (RAM) from Italy [11]. The development of the "AdriaticMoS" project will have a positive impact on the overall TEN-T network of the EU, since its implementation will additionally decrease the road traffic congestion in Europe. This will reflect positively also on the environmental protection and will contribute to sustainable development of the economy in the region.

Besides road corridors and inland waterway corridors that transit through Croatian territory, with the creation of the "Master Plan of Motorway of the Sea of Eastern Mediterranean" in 2009, nine new potential corridors of "motorways of the sea" were established in that part of Europe, among which four are important for the Republic of Croatia [2]:

- Corridor III, linking the western ports of the Ionian Sea/Greek (Igoumenitsa, Patras) with

[2] IPA program is a new instrument of pre-accession aid for the period 2007-2013, which replaced the former programs CARDS, PHARE, ISPA and SAPARD.

- Koridor V, koji spaja istočni dio sjevernojadranskih luka (Kopar, Rijeka, Zadar, Trst, Monfalcone) sa zapadnim dijelom sjevernojadranskih luka (Ancona, Ravenna)
- Koridor VII koji povezuje istočni dio sjevernojadranskih luka (Kopar, Rijeka, Zadar, Trst, Monfalcone) sa zapadnim dijelom sjevernojadranskih luka (Venecija, Chioggia) i sjevernim dijelom južnojadranskih luka (Split, Ploče)
- Koridor IX, kojim se povezuje zapadni dio sjevernojadranskih luka (Venecija, Chioggia) s južnim dijelom središnjih mediteranskih luka (Marsaxlokk, Valletta). Ovaj je koridor za Hrvatsku značajan zbog već postojeće pomorske veze između luke Marsaxlokk i luke Rijeka.

Svoje adekvatno mjesto na jednom od navedenih koridora "morskih autocesta" trebale bi naći i strateške hrvatske luke Rijeka, Zadar, Split, Šibenik, Ploče i Dubrovnik intenzivirajući na taj način integriranje Republike Hrvatske u europsko transportno tržište. To naravno podrazumijeva modernizaciju spomenutih luka kroz ulaganja u lučku prometnu infrastrukturu, kao i ulaganja u kopnenu prometnu infrastrukturu, odnosno kopnene koridore u funkciji konkurentne kopnene otpreme/dopreme iz/za spomenute luke.

3. PRIJEDLOG METODOLOGIJE VREDNOVANJA PROJEKTA "MORSKIH AUTOCESTA" U REPUBLICI HRVATSKOJ

Planiranje i implementacija projekta "morskih autocesta" je izuzetno kompleksan posao, koji zahtijeva provedbu detaljne analize projekta. Budući da projekt uključuje ulaganja u javne i infrastrukturne objekte, od velike je važnosti izrada procjene utjecaja njegove implementacije na budući razvoj Republike Hrvatske, kako bi se opravdala potrebna ulaganja, odnosno kako bi se objektivno utvrdili troškovi i koristi provedbe spomenutog projekta.

3.1. Mogućnosti primjene *cost-benefit* analize

Metoda *cost-benefit* analize, odnosno metoda analize koristi i troškova je postupak kojim se procjenjuju društvene i gospodarske koristi i šte-

- Corridor V, connecting the eastern part of North-Adriatic ports (Koper, Rijeka, Zadar, Trieste, Monfalcone) to the western part of North-Adriatic ports (Ancona, Ravenna);
- Corridor VII, linking the eastern part of North-Adriatic ports (Koper, Rijeka, Zadar, Trieste, Monfalcone) with the western part of North-Adriatic ports (Venice, Chioggia) and the northern part of South-Adriatic ports (Split, Ploče);
- Corridor IX, connecting the western part of North-Adriatic ports (Venice, Chioggia) to the southern part of Central Mediterranean ports (Marsaxlokk, Valletta). This corridor is important for Croatia due to the already existing maritime connection between Marsaxlokk and Rijeka ports.

The appropriate position on one of the mentioned "motorways of the sea" should refer to strategic Croatian ports Rijeka, Zadar, Split, Šibenik, Ploče and Dubrovnik, intensifying in this way the integration of the Republic of Croatia in the European transport market. This requires the modernisation of the aforesaid ports through investments in port traffic infrastructure, as well as investments in road traffic infrastructure, that is road corridors with the function of competitive dispatch/delivery from and to the mentioned port.

3. PROPOSAL FOR THE METHODOLOGY OF EVALUATING THE PROJECT OF "MOTORWAYS OF THE SEA" IN THE REPUBLIC OF CROATIA

The planning and implementation of the "motorways of the sea" project is a very complex work that requires the implementation of a detailed project analysis. Since the project includes investments in public and infrastructure facilities, it is of utmost importance the creation of the evaluation of the impact of its implementation on future development of the Republic of Croatia, in order to justify the necessary investments, that is objectively establishing the costs and advantages of the implementation of the aforementioned project.

te koje će se pojaviti ostvarenjem nekog projekta, a temelji se na određivanju postojeće vrijednosti očekivanih troškova i koristi ulaganja u neki projekt radi procjene opravdanosti njegove realizacije.

Dok se neke druge analitičke metode bave ocjenjivanjem individualnih koristi projekata, *cost-benefit* analiza je usmjerena na njihovo ukupno društveno vrednovanje.

Sam postupak *cost-benefit* analize sastoji se od [9]:

- definiranja projekta, utvrđivanja očekivanih troškova i koristi te njihovog mjerenja
- izbora diskontne stope, diskontiranja troškova i koristi, te
- uspoređivanja sadašnje vrijednosti troškova i koristi radi donošenja odluke o prihvaćanju ili odbacivanju konkretnog projekta.

Cost-benefit analiza temelji se na načelu tzv. potencijalnog Paretovog napretka[3], prema kojemu je isplativo ulagati u svaki projekt kod kojeg su koristi onima koji ih ostvaruju veće od troškova onih kojima su ti troškovi prouzrokovani. Pritome je temeljni cilj *cost-benefit* analize dokazati da je određeni projekt društveno prihvatljiv (gledajući društvo u cjelini, a ne pojedinca).

Dakle, izrada *cost-benefit* analize bi trebala omogućiti donošenje odluke o tome je li društvo spremno prihvatiti razinu troškova (šteta) koji će biti posljedica provedbe nekog projekta u odnosu na koristi koje će taj projekt donijeti društvu.

Slijedom toga, metoda *cost-benefit* analize, adekvatna je i objektivna metoda kojom je moguće objektivno vrednovanje koristi i troškova projekta koji je predmet istraživanja u ovome radu, kao realne pretpostavke za opravdanost provedbe istoga. Nadalje se daje pregled postupka provođenja *cost-benefit* analize provedbe projekta **"**morskih autocesta", kao podloge za donošenje konačne odluke o potrebnim ulaganjima, te kao podloga za provođenje eventualnih korekcija projekta.

[3] Paretov napredak (prema talijanskom ekonomistu Vilfredu Paretu) označava raspodjelu u kojoj netko dobiva, a nitko ne gubi. Budući da takva raspodjela u suvremenom društvu nije moguća, ekonomisti su za projekte koji su bili predmet cost-benefit analize uveli pojam *potencijalnog Paretovog napretka*.

3.1. Possibilities of implementing the cost-benefit analysis

The cost-benefit method, that is the method of analysing benefits and costs is a procedure that evaluates social and economic benefits and costs that will emerge with the project, and is based on determining existing value of expected costs and benefits from investments in a project for the evaluation of justifiability of its implementation.

While other analytical methods deal with evaluating individual benefits of projects, the cost-benefit analysis is focused on their overall social evaluation.

The cost-benefit analysis procedure consists of [9]:

- defining the project, establishing expected costs and benefits and their measurement,
- selecting the discount rate, discounting costs and benefits, and
- comparing present value of costs and benefits for the decision about accepting or refusing a specific project.

The cost-benefit analysis is based on the principle of Potential Pareto Superiority[3], according to which it is cost-effective to invest in any project where the party gaining from the move gains more than the other party loses. In so doing, the main objective of the cost-benefit analysis is to prove that a specific project is socially acceptable (taking into consideration the overall society, not an individual).

Therefore, the creation of a cost-benefit analysis should enable the decision whether a society is ready to accept costs (losses) that will be a consequence of the implementation of a project in relation to the benefits that this project will bring to the society.

Subsequently, the cost-benefit analysis method is appropriate and objective method that provides objective evaluation of benefits and costs of a project that is subject of research in this paper, as real assumption for the justifiability of its implementation. Furthermore, it is given an overview of the procedure of implemen-

[3] Pareto Superiority (after the Italian economist Vilfredo Pareto) refers to a situation in which someone is better off, and no one is worse off. Since this situation is not possible in the modern society, economists introduced the term Potential Pareto Superiority for projects that included the cost-benefit analysis.

3.2. Utvrđivanje i mjerenje troškova i koristi projekta "morskih autocesta" u Republici Hrvatskoj

Prilikom definiranja mogućih koristi i troškova razvoja i provedbe projekta *AdriaticMoS*, valja imati na umu da se one, osim na gospodarstvo i društvo, odnose na zdravlje ljudi i ekosustav, budući da svaki projekt da bi bio opravdan, mora zadovoljiti uvjete održivog razvoja. Također, prilikom mjerenja mogućih troškova i koristi provedbe projekta trebali bi biti obuhvaćeni svi relevantni čimbenici vezani uz projekt, kao i njihov pojedinačni utjecaj na implementaciju projekta.

3.2.1. Troškovi i koristi formiranja "morskih autocesta" u Republici Hrvatskoj

Morski i riječni promet je specifičan u odnosu na kopneni jer ne zahtijeva izgradnju prometnica (cesta, željeznice), pa u tom smislu nema troškova izgradnje prometne infrastrukture, krčenja šuma i obradivih površina te zagađenja i narušavanja ekosustava, koje izgradnja kopnenih prometnica podrazumijeva. Međutim, formiranje "morskih autocesta" podrazumijeva kombiniranje vodnog i kopnenog prijevoza, što u konačnici uključuje i izgradnju, odnosno postojanje odgovarajućih kapaciteta kopnene prometne infrastrukture kojom će se realizirati kvalitetna i konkurentna povezanost luka sa zaleđem, odnosno s užim i širim gravitacijskim područjem.

U tom smislu, kao temeljne troškove (štete) pri formiranju i realizaciji "morskih autocesta", treba istaknuti sljedeće:

- troškovi razvoja i implementacije sustava kontrole i nadzora pomorskog prometa s ciljem povećanja sigurnosti pomorskog prometa i zaštite okoliša (VTS sustav)
- troškovi razvoja sustava plovidbenih pravaca i sustava odijeljene i usmjerene plovidbe na Jadranu s ciljem smanjivanja opasnosti od pomorskih nezgoda
- troškovi modernizacije luka, odnosno troškovi izgradnje (obnove) lučkih terminala
- troškovi marketinga na europskom i svjetskom tržištu, kako bi se potaknulo privlačenje pomorskog prometa prema hrvatskim lukama
- troškovi izgradnje kopnene infrastrukture, odnosno cestovne te posebno željezničke in-

ting the cost-benefit analysis within the "motorways of the sea" project as background for the final decision on necessary investments, and as background for the implementation of possible corrections of the project.

3.2. Establishing and measuring costs and benefits of the "motorways of the sea" project in the Republic of Croatia

When defining possible benefits and costs in the development and implementation of the "AdriaticMoS" project, one should take into consideration that those, except from economy and society, refer also to people's health and ecosystem, since every project, in order to be justified, has to satisfy sustainable development requirements. Furthermore, when measuring possible benefits and costs of project implementation, all relevant factors connected to the project should be included, as well as their individual impact on project implementation.

3.2.1. Costs and benefits of the creation of "motorways of the sea" in the Republic of Croatia

Sea and inland waterways traffic is specific if compared to road traffic since it does not imply the construction of routes (road and rail), so in this sense there is no cost for the construction of traffic infrastructure, clearing woods and arable lands, pollution and violation of ecosystem, which the construction of land routes does imply. However, the creation of "motorways of the sea" implies the combination of water and land transport, which in the end includes also the construction, that is the existence of appropriate capacities within road traffic infrastructure, which will serve to carry out quality and competitive connection of ports and the hinterland, that is with narrower and wider gravitational area.

In this sense, as basic costs (losses) when creating and implementing "motorways of the sea" the following has to be stressed:

- costs of developing and implementing the control and monitoring systems of sea traffic with the objective of increasing sea traffic safety and environmental protection (VTS system);
- costs of developing sea routes and routeing and traffic separation schemes with the aim of reducing hazards of sea accidents;

frastrukture, kojima bi se hrvatske luke paneuropskim prometnim koridorima na konkurentan način povezale s krajnjim odredištima tereta
- troškovi održavanja cestovne i željezničke infrastrukture koje treba biti u skladu s europskim i svjetskim standardima
- troškovi (gubici) u šumarskoj industriji, poljoprivredi, (…) zbog potrebe izgradnje (obnove i modernizacije cestovne i željezničke infrastrukture)
- troškovi uslijed smanjenje prihoda uslužnim djelatnostima (trgovine, ugostiteljstva i sl.) koje se nalaze na postojećim cestama zbog preusmjeravanja prometa na novoizgrađene ceste i željeznicu
- troškovi uvjetovani ekološkim posljedicama za stanovništvo i ekosustav (buka, zagađenje tla,…) na prostorima na kojima bi se intenzivirao kopneni promet, odnosno cirkulacija robnih tokova
- troškovi uslijed neželjenih, ali mogućih ekoloških incidenata na moru, uzrokovanih primjerice zagađenjem s brodova te pomorskim nesrećama i havarijama
- troškovi mogućih negativanih utjecaja na morsku floru i faunu zbog povećanog broja brodova koji pristižu u luke (ispuštanje balastnih voda, pomorske nesreće i sl.);
- troškovi mogućih negativanih utjecaja na priobalni turizam (uslijed zagađenja mora i priobalja te smanjene privlačnosti morskog okoliša)
- troškovi mogućeg negativnog utjecaja na sektor ribarstva
- troškovi uslijed pogoršanja uporabne kakvoće morske vode.

Nasuprot navedenim troškovima, odnosno štetama, kao koristi odnosno pozitivni efekti provedbe projkta "morskih autocesta" može se očekivati sljedeće:
- modernizacija i razvoj luka i lučkih terminala
- zapošljavanje ljudi
- gospodarski rast i razvoj
- društveni rast i razvoj
- povećanje i afirmacija pomorskog prijevoza
- povećanje i afirmacija željezničkog prometa kao ekološki adekvatnog vida kopnenog prijevoza posebice kada je riječ o prijevozu masovnih tereta

- costs of port modernisation, that is costs of constructing (renovation) of port terminals;
- costs of marketing on European and world markets, in order to encourage the attraction of sea traffic toward Croatian ports;
- costs of constructing land infrastructure, that is road and especially rail infrastructure, so that Croatian ports would connect in a competitive way with end freight destinations through Pan-European traffic corridors;
- cost of road and rail infrastructure maintenance that has to be in accordance with European and world standards;
- costs (losses) in wood industry, agriculture, (…) due to the construction necessity (renovation and modernisation of road and rail infrastructure);
- costs due to the reduction of revenues for service activities (shops, catering industry, etc.) that are on existing roads, and due to the redirection of traffic on new roads and rail;
- costs due to ecological consequences for the population and the environment (noise, land pollution…) in the areas where land traffic would become more intense, that is the circulation of flow of goods,
- costs due to unwanted but possible environmental accidents on the sea, caused for example by pollution from ships, sea accidents and average;
- costs of possible negative impacts on marine flora and fauna due to increased number of ships arriving to ports (ballast waters discharge, sea accidents, etc.);
- costs of possible negative impacts on coastal tourism (due to sea and coast pollution and the less attractive sea environment);
- costs of possible negative impact on the fishing industry;
- costs due to the deterioration in the usable quality of seawater.

As opposed to mentioned costs, that is losses, benefits, that is positive effects of the implementation of the "motorways of the sea" project are as follows:
- modernisation and development of ports and port terminals;
- employment;
- economic growth and development;
- social growth and development;

- smanjenje cestovnog prometa i svih posljedica koje taj vid kopnenog prijevoza uvjetuje u teretnom prijevozu (zagađenja, prometne nesreće, gužve, uska grla i sl.)
- povećana sigurnost kopnenog prometa, odnosno cestovnog i željezničkog prometa kao posljedica adekvatne distribucije teretnog prijevoza (u korist željezničkog prijevoza) te kao posljedica modernizacije, obnove i razvoja kopnene infrastrukture
- smanjenje vremena putovanja tereta, a time i smanjenje troškova putovanja tereta
- povećanje kvalitete i konkurentnosti cjelokupne prometne usluge na novim intermodalnim pravcima i logističkim lancima.

Treba istaknuti da su prethodno definirani potencijalni troškovi i koristi provedbe projekta, samo neki od temeljnih, te da bi dubinska analiza istih trebal uključiti čitav niz dodatnih, ovdje nespomenutih pozitivnih i negativnih efekata provedbe projekta.

Ipak, ilustracija prikaza potencijalnih koristi i troškova implementacije projekta "morskih autocesta" u Republici Hrvatskoj ovdje je dana kako bi se potvrdila temeljna filozofija *cost-benefit* analize. Naime, za razliku od računica koje su uobičajene kod razmatranja financijskih učinaka nekog gospodarskog zahvata, *cost-benefit* analiza obuhvaća znatno šire područje te razmatra posljedice nekog gospodarskog zahvata na užu i širu okolinu, uzimajući u obzir međuutjecaje s drugim zahvatima, što naravno opravdava primjenu navedene metode.

3.2.2. Mjerenje utjecaja učinaka "morskih autocesta" na gospodarski razvoj Republike Hrvatske

U procjeni utjecaja nekog projekta na gospodarstvo, društvo i/ili okoliš moguće je koristiti dva osnovna načina ocjenjivanja troškova i koristi implementacije projekta putem *cost-benefit* analize:

- određivanje mjerljivih koristi i troškova projekta (izraženih u novčanim jedinicama) te
- određivanje tzv. nemjerljivih koristi i troškova projekta (putem različitih ljestvica uspoređivanja vrijednosti utjecaja).

Za odnos *benefit-cost* u novčanim terminima odgovarajuća je primjena sljedeće formule [4]:

- increase and affirmation of sea transport;
- increase and affirmation of rail traffic as ecologically appropriate land transport, especially when it is about massive freight transport;
- reduction of road transport and all consequences that this mean of land transport causes in freight transport (pollution, traffic accidents, traffic jams, bottleneck, etc.);
- increased land traffic safety, that is road and rail traffic as a consequence of an appropriate distribution of freight transport (in favour of rail transport), and as a consequence of modernisation, renovation, and development of land infrastructure;
- reduced freight transport time, and therefore reduced freight transport costs;
- increase in quality and competitiveness of the overall traffic service on new intermodal routes and logistic chains;

It is important to highlight that previously defined potential costs and benefits of project implementation are just among basic ones, and that their deeper analysis should include a series of additional, here not mentioned positive and negative effects of project implementation.

However the illustration of potential benefits and costs of "motorways of the sea" project implementation in the Republic of Croatia is given here so as to confirm the basic philosophy of the cost-benefit analysis. Namely, different from calculations that are usual when analysing financial impacts of an economic intervention, the cost-benefit analysis comprises a wider area and examines the consequences of an economic intervention on both narrow and wider environment, taking into consideration mutual impacts with other interventions, which justifies the use of the mentioned method.

3.2.2. Measuring the influence of "motorways of the sea" impacts on the economic development of the Republic of Croatia

In the evaluation of the influence of a project on the economy, society and/or environment it is possible to use two main methods for evaluating costs and benefits of project implementation through the cost-benefit analysis:

- establishing tangible benefits and costs of the project (expressed in monetary units) and

$$(B-C)=\{\ \sum_{t=1}^{T}\frac{B_t}{(1+i)^t}-\sum_{t=1}^{T}\frac{C_t}{(1+i)^t}\ \}$$

Diskontiranje : $\frac{F}{(1+i)^t}$

pri čemu je:

B – ukupna korist

C – ukupni troškovi

i – diskontna stopa koristi/troškova koji se ispoljavaju u različitim vremenima

B_t / C_t – koristi/troškovi izraženi u novčanim jedinicama nakon vremena t

F – koristi ili troškovi B_t ili C_t

T – ukupno vrijeme trajanja projekta.

Jedno od važnijih pitanja koje se postavlja prilikom provedbe *cost-benefit* analize je kako novčano izraziti troškove koje nije moguće izravno novčano izraziti. Stoga su tijekom vremena u metodologiji *cost-benefit* analize razrađene neke od metoda za novčano izražavanje spomenutih troškova kao što su [5]: spremnost na plaćanje, trošak putovanja, vrijednost imovine, trošak zamjene, prijenos koristi, itd.

3.2.3. Izbor diskontne stope, diskontiranja troškova i koristi, te uspoređivanja sadašnje vrijednosti troškova i koristi

Diskontna stopa je mjera vremenske vrijednosti novca, dakle to je stopa po kojoj se buduće koristi i troškovi svode (diskontiraju) na sadašnju vrijednost. To je jedan od najsloženijih problema u *cost-benefit* analizi te hrvatski stručnjaci trebaju pažljivo pristupiti postupku odabira vrijednosti diskontne stope.

Važno je istaknuti da će visoka diskontna stopa umanjiti sadašnju vrijednost koristi investicijskih projekata i obratno. Nakon određivanja diskontne stope, potrebno je diskontirati troškove i koristi kako bi se utvrdile one koristi i troškovi koji će se pojavljivati za vrijeme trajanja projekta, diskontirani na sadašnju vrijednost.

Budući da se svi očekivani troškovi te posebno koristi realizacije nekog projekta ne ostvaruju odmah nakon implementacije projekta, već u bližoj ili daljoj budućnosti, oni se moraju homogenizirati kako bi bili usporedivi, što se u pravilu čini njihovim diskontiranjem. Važnost izbora odgovarajuće diskontne stope uočava se iz samog aritmetičkog obrasca [13]:

- establishing so-called intangible benefits and costs of the project (through various scales and comparing impact values).

For the relation benefit-cost in monetary units, the following formula is applied [4]:

$$(B-C)=\{\ \sum_{t=1}^{T}\frac{B_t}{(1+i)^t}-\sum_{t=1}^{T}\frac{C_t}{(1+i)^t}\ \}$$

Discounting: $\frac{F}{(1+i)^t}$

where:

B – total benefit,

C – total costs,

i - discount rate of benefits/costs that are seen in different times,

B_t / C_t – benefits/costs expressed in monetary units after the time t,

F – benefits or costs B_t or C_t,

T – total time/length of the project.

One of the main questions during the implementation of the cost-benefit analysis project is how to express in monetary terms costs that are not possible to define directly in monetary terms. Therefore, over the time in the methodology of cost-benefit analysis were elaborated some of the methods for expressing aforementioned costs in monetary terms, such as [5]: willingness to pay, travel expense, assets value, exchange value, benefit transfer, etc.

3.2.3. Selection of discount rate, discounting costs and benefits, and comparing present value of costs and benefits

The discount rate is a measure of time value of money, so it is a rate according to which future benefits and costs are discounted to present value. This is one of the most complex problems in the cost-benefit analysis and Croatian experts must approach carefully to the selection of the discount rate value.

It is important to notice that a high discount rate will reduce the present value of investment projects and vice versa. After determining the discount rate, it is necessary to discount costs and benefits in order to define those benefits and costs that will appear during the project, discounted to the present value.

Since all expected costs and especially benefits of the implementation of a project do not

$$PV_B = B_1/(1+r) + B_2/(1+r)^2 + ... + B_n/(1+r)^n$$
$$PV_C = C_1/(1+r) + C_2/(1+r)^2 + ... + C_n/(1+r)^n$$

gdje su:

PV_B = sadašnja vrijednost očekivanih koristi u razdoblju od n godina
PV_C = sadašnje vrijednost očekivanih troškova u razdoblju od n godina
B_1 = očekivane koristi u godini
C_1 = očekivani troškovi u godini
r = kamatna (diskontna) stopa.

Uspoređivanje sadašnje vrijednosti svih očekivanih troškova i koristi nekog projekta radi procjene opravdanosti njegove realizacije je također izuzetno važan dio *cost-benefit* analize. Svaki projekt kojem je razlika koristi i troškova > 0 te kvocijent koristi i troškova > 1 može se ocijeniti kao prihvatljiv.

3.3. Ograničenja u primjeni *cost-benefit* analize

Primjena *cost-benefit* analize podrazumijeva i određena ograničenja koja osim spomenutih problema oko mjerenja koristi i troškova te odabira diskontne stope, uključuje i problem mogućeg sukoba ciljeva projekta koji je predmet analize.

Spomenuti problemi još uvijek nemaju zadovoljavajuća rješenja, a pored njih postoje i određene poteškoće oko primjene *cost-benefit* analize u nekim područjima gospodarskih i društvenih djelatnosti. Slijedom toga, neki stručnjaci su mišljenja da je *cost-benefit* analiza relativno statična te zbog toga neprikladna za vrednovanje projekata koji za posljedicu imaju značajnije strukturalne promjene. Ipak, sva ograničenja *cost-benefit* analize ne dovode u pitanje njenu korisnost pri općem vrednovanju društvenih projekata.

Učinkovito rješavanje problema primjene *cost-benefi* analize zavisi od puno čimbenika, kao što su primjerice: sustav odlučivanja, stvoreno političko ozračje, organizacija i okolnosti izvršavanja zadataka te motiviranost onih koji te zadatke izvršavaju.

Cost-benefit analiza projekta *AdriaticMoS* od velike je važnosti za procjenu opravdanosti realizacije samog projekta. Treba naglasiti da, ukoliko analiza pokaže da je projekt opravdan, nije poželjno dugoročno daljnje planiranje i odgoda provedbe projekte, što je u Republici Hrvatskoj čest slučaj, s obzirom da je nažalost nemali broj projekta koji se godinama proučavaju i planiraju materialise immediately after project implementation, but sometimes in the future, they have to be homogenised in order to become comparable, which is usually done by discounting them. The importance of selecting an appropriate discount rate can be seen from the arithmetic form [13]:

$$PV_B = B_1/(1+r) + B_2/(1+r)^2 + ... + B_n/(1+r)^n$$
$$PV_C = C_1/(1+r) + C_2/(1+r)^2 + ... + C_n/(1+r)^n$$

where:

PV_B = present value of expected benefits in the period of n years
PV_C = present value of expected costs in the period of n years
B_1 = expected benefits in year
C_1 = expected costs in year
r = interest (discount) rate

Comparing present values of all expected costs and benefits of a project for the evaluation of justifiability of its implementation is also a very important part of the cost-benefit analysis. Each project whose difference of benefits and costs > 0 and the benefits and cost quotient > 1 is evaluated as acceptable.

3.3. Limitations in the implementation of cost-benefit analysis

The implementation of the cost-benefit analysis includes certain limitations that besides aforementioned problems of measuring costs and benefits and the selection of the discount rate include also the problem of possible conflicts about the objectives of the program that is the topic of analysis.

Aforementioned problems still do not have satisfactory solutions, and besides them there are difficulties about the implementation of the cost-benefit analysis in some fields of economic and social activities. Therefore, some professionals think that the cost-benefit analysis is relatively static, and so not appropriate for evaluating projects that have as a consequence important structural changes. However, all limitations of the cost-benefit analysis do not question its efficiency in general evaluation of social projects.

Effective problem solving of the implementation of cost-benefit analysis depends upon a number of factors, such as: the decision-making

ju te se izrađuju programi provedbe, bez konačne implementacije i provedbe samog projekta u konačnici.

4. ZAKLJUČAK

Razvoj "morskih autocesta" nesumnjivo predstavlja temelj budućeg razvoja prometne mreže Europske unije. Taj sustav prijevoza "od vrata do vrata" na kvalitetan način rješava brojne prometne probleme, među koima se u prvom redu ističu rasterećenje cestovnog prometa i smanjenje zagađenja okoliša te smanjenje ukupnih troškova prijevoza tereta. Sustav "morskih autocesta" povećava pouzdanost transporta, jer se korištenjem morskih putova prijevoza izbjegava kašnjenje tereta zbog prometnih gužvi, što je sasvim sigurno iznimno važno za sve sudionike u lancu prometa tereta.

Smjernicama Transeuropske prometne mreže već su određeni koridori kojima će prolaziti pravci "morskih autocesta" u Europi, a na zemljama članicama Unije je implementacija njihovih prometnih sustava u spomenute koridore. Republika Hrvatska svakako na sve načine treba tražiti svoju priliku za uključivanje u TEN-T mrežu. Unutar toga, jedna zasigurno vrijedna prilika je intenziviranje razvojnog ciklusa pomorskog prometa, uz modernizaciju luka i osiguranje kvalitetne kopnene otpreme/dopreme tereta unutar projekta *AdriaticMoS*, odnosno projekta "morskih autocesta" Jadrana.

Drugim riječima, projekt *AdriaticMoS* predstavlja priliku za intenzivnije inetgriranje Republike Hrvatske u jedinstveno transportno tržište Europske unije koje bi multipliciralno brojne pozitivne efekte kako na prometni tako i na cjelokupni gospodraski sustav države.

Unutar projekta *AdriaticMoS*, Republika Hrvatska je započela ciklus oporavka pomorskog prometa, putem obnove i modernizacije luka, a 2011. godine pušten je u probni rad i sustav kontrole i nadzora pomorskog prometa (VTS sustav). Također, Hrvatska je gotovo u potpunosti obnovila i izgradila mrežu autocesta (još se očekuje izgradnja najjužnijeg dijela, kojim će se povezati Split i Dubrovnik), koja će znatno pridonijeti razvoju sustava "morskih autocesta". Najveće napore svakako će trebati uložiti u izgradnju željeznica, budući da postojeća željeznička infrastruktura ne može odgovoriti plasystem, created political environment, organisation, task execution circumstances, and the motivation of those who carry out those tasks.

The cost-benefit analysis of the project "AdriaticMoS" is of utmost importance for the evaluation of justifiability of the very project implementation. It is necessary to stress that, if the analysis show that the project is justifiable, further long-term planning and the delay of project implementation are not advisable, which is a common situation in the Republic of Croatia, and not a small number of projects are being analysed and planned for years, implementation programs were created, but there is no final implementation of the project.

4. CONCLUSION

The development of "motorways of the sea" is certainly a basis for future development of the EU traffic network. This door-to-door transport system in a quality way solves a number of traffic problems, among which the most important ones are the unloading of road traffic and the reduction of environmental pollution, and the reduction of overall freight transport costs. The "motorways of the sea" system increases transport reliability since by using sea transport routes freight delays due to traffic jams are avoided, which is very important for all participants in the freight traffic chain.

The guidelines of Trans-European traffic network already established the corridors that will include the routes of the "motorways of the sea" in Europe, and the EU member states have to implement their traffic systems in the aforementioned corridors. The Republic of Croatia has to ask by all means its chance to be included in the TEN-T network. Within that, a very valuable opportunity is the intensification of the development cycle of sea traffic, together with the modernisation of ports and ensuring quality land dispatch/delivery of freight within the "AdriaticMoS" project, that is the "Adriatic motorways of the sea".

In other words, the "AdriaticMoS" project represents an opportunity for a more intense integration of the Republic of Croatia into the common transport market of the EU that would multiply a number of positive effects both on traffic and the overall economic system of the country.

niranom rastu pomorskog i lučkog prometa te potrebi kvalitetne otpreme/dopreme sukladno zahtjevima suvremenog europskog tržišta.

Budući da ocjenjivanje isplativosti projekta u svezi s velikim i kapitalno intenzivnim javnim i infrastrukturnim objektima zahtijevaju dubinsku analizu i istraživanja, u ovome radu dan je prijedlog metodologije vrednovanja projekta "morskih autocesta" u Republici Hrvatskoj korištenjem metode *cost-benefit* analize. Primjena *cost-benefit* analize projekta *AdriaticMoS* dala bi vrijedne informacije i objektivna polazišta u procjeni društvene korisnosti i šteta (troškova) koje bi trebala priozvesti njegova provedba.

Within the "AdriaticMoS" project the Republic of Croatia started a cycle of sea traffic recovery through the reconstruction and modernisation of ports, and in 2011 a test system for controlling and monitoring sea traffic (VTS system) was set off. Moreover, Croatia has almost completely renovated and constructed the motorways network (it is still expected the construction of the most narrow part that will connect Split and Dubrovnik) that will contribute to the development of the "motorways of the sea" system. Greatest efforts will have to be put into the construction of rails, since the existing rail infrastructure can not respond to the planned growth of sea and port traffic, and the need for a quality dispatch/delivery according to the requirements of the modern European markets.

Since the evaluation of cost-effectiveness of the project, linked to a large and capital-intensive public and infrastructure facilities require a deep analysis and research, this paper gave a methodology proposal for evaluating the project of "motorways of the sea" in the Republic of Croatia by using the cost-benefit analysis. The implementation of the cost-benefit analysis within the "AdriaticMoS" project would give valuable information and an objective starting point in the evaluation of social benefits and losses (costs) caused by its implementation.

LITERATURA / *REFERENCES*

[1] Dvorski, S., F. Ruža, Značajke prometne politike država Europske unije i paneuropskih prometnih koridora te njihov utjecaj na Republiku Hrvatsku, Suvremeni promet, 19 (1999),1-2., str. 69-73.

[2] European Commission, East Mediterranean Master Plan of the Motorways of the Sea, 2009.

[3] Poletan Jugović, Tanja, Višekriterijska analiza u valoriziranju Paneuropskog koridora Vb, doktorska disertacija, Rijeka, T. Poletan Jugović, 2005.

[4] Rumenjak, D., Metoda koristi i troškova (*cost- benefit)* u procjeni utjecaja na okoliš, Zbornik radova VII. međunarodnog simpozija o gospodarenju otpadom, Zagreb, 2002.

[5] Rumenjak, D., Problemi određivanja troškova okoliša u *cost-benefit* analizi, Zbornik radova VIII. međunarodnog simpozija gospodarenja otpadom, Zagreb, 2004.

[6] http://ec.europa.eu/transport/infrastructure/ten-t-policy/transport-mode/motorways-sea_en.htm (03.03.2012.)

[7] http://ec.europa.eu/transport/maritime/motorways_sea/preparing_en.htm (03.03.2012.)

[8] http://www.europa.eu., "White Paper: European Transport Policy for 2010 – Time to Decide" (12 September 2001, Commission, COM 2001); više o tome cf.

[9] http://www.efzg.hr/dok/MGR/scmolic//ekonomika%20obrazovanja/Mali%20 leksikon%20 odgoja%20i%20 obrazovanja.pdf. (03.03.2012.)

[10] http://www.prometna-zona.com/koridori.html (03.03.2012.)

[11] http://www.shortsea.hr/hr/AdriaticMoS (03.03.2012.)

[12] http://www.mmtpr.hr/UserDocsImages/STRATEGIJA%20H-cb.pdf (03.03.2012.)

[13] http://web.efzg.hr/dok/MGR/vbaric/fdd/FDD%205.ppt; Barić, V., Temelji financiranja javnog sektora i društvenih djelatnosti (12.03.2012.)