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# Shipowner management in accordance with mutual agreement

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## ABSTRACT

This scientific paper deals with management of all parties of maritime transport services with an emphasis on shipowner management for purposes of optimizing ship voyage costs by applying Virtual Arrival of the vessel to the port. Virtual Arrival is a process involving an agreement to reduce a vessel's speed during voyage due to berth occupancy at ship accommodation at the discharge port. The reduction in speed during voyage will result in reduced fuel consumption, which directly affects shipowner management, namely voyage costs. The proposed algorithm of Virtual Arrival defines interdependence of the parties of the maritime transport process as well as the actions undertaken in the following procedure of the arrival. The algorithm results show the possibility of creating a mutual financial benefit and display profitability of shipowner management and other parties of the Mutual Agreement. Furthermore, the paper analyzes Mutual Effects of the Virtual Arrival to all other represented parties of the maritime transport process.

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## An Overview of Previous Researches

Analysis of relevant works dealing with Virtual Arrival indicates there are few scientific papers concerning this particular subject matter. Noteworthy papers related to this subject analyze ship speed in liner shipping with the number of vessels in the transport chain [1,2]. The subject matter of this paper is shipowner management in accordance with Mutual Agreement, and significant contribution is the effect of the Virtual Arrival to shipowner management, and particularly to other parties of the maritime transport process. From professional papers, the project Optimising Voyage Management and Reducing Vessel Emission established by the two industry bodies; International Association of Independent Tanker Owner (INTERTANKO) and Oil Companies International Marine Forum (OCIMF) in collaboration with the European Union should be emphasized. [3]

### 1. Introduction

Maritime transport process is based on a business policy that aims at achieving a favorable financial result. Thus, it is necessary to constantly monitor cost-effectiveness as an income to costs ratio, which is one of the most signifi-

cant economical indicators of success. Therefore, it can be stated that the shipowner business policy as an activity is a set of planned, coordinated, regulated and controlled activities focused on selecting optimal solutions for financial strategies, tactics, plans, instruments and means by which a business goal of a shipowner set for a certain period is achieved in a rational manner. [4]

There is no internationally accepted standard cost classification for shipping industry and the costs vary considerably, however, they can be divided into five categories [5]:

- **Operating costs** that represent daily expenses of ship management, essentially those cost such as crew, stores and maintenance that will be incurred whatever trade the ship is engaged in. Such costs are calculated for each year with respect to the number of days in exploitation in order for them to finally be included in freight. [6]
- **Periodic maintenance** costs are incurred when the ship is dry-docked for major repairs. The periods between dockings are prescribed by classification societies that include periodical and special surveys in their regulations. With older vessels, this cost can be significant and is not a part of the operating cost.

- **Voyage costs** are variable costs associated with a specific voyage and mostly manifested in bunker consumption, port charges, agencies charges and channel dues.
- **Capital costs** and their return are mostly linked to credits and leasing, dividends and amortization costs with achieving the desired profit rate.
- **Cargo-handling costs** represent the expense of loading, stowing and discharging cargo especially relevant in shipping line. The level of these costs can be reduced by investing in the vessels' structure with certain cargo equipment.

Shipowners are over the long term confronted with a large increase in fuel prices and increasingly demanding regulations of the ecological legislation, which affects their business considerably. In the early 1970s, fuel prices were relatively low considering other management costs, and shipowners were not focused primarily on fuel costs. In the 2014, an exponential growth of fuel prices is present and for example, according to Martin Stopford, 47% of voyage costs are fuel costs while voyage costs take up 40% of total shipowner costs.[7,8] Maritime industry responded to this situation with a special vessel construction, alternative main and auxiliary engines run by new energy sources, while line shipping adapted utilizing a new logistical organizational approach to optimal ship management based on three reduced speed. (Eco-speed, Super Eco-speed and Extra Eco-speed). Reduced speed navigation has an advantage of decreased voyage costs, namely, decreased bunker consumption, which is one of the key factors in sustainable shipowner policy. Speed optimization

depends on cargo flow during a certain period of time and the freight price, so it can be stated that shipowners constantly deal with financial logic and mathematical determination of optimal ship speed.

The overall chain of supply on a certain line and fleet distribution, i.e. adding additional ships to a line, will result in a decrease of optimal speed and will also maintain a constant cargo flow. However, the subject matter of research conducted in this paper is shipowner management in function of agreed ship speed reduction during a voyage, and significant impact to other parties of the maritime transport process in accordance with known delay at the discharge port.

## 2. The process of the agreed ship speed reduction during a voyage

A process that involves an agreement to reduce a vessel's speed on voyage to meet a Required Time of Arrival (RTA) when there is a known delay at the discharge port is called Virtual Arrival [3]. It is necessary to note that for setting up the process of Virtual Arrival, the following initial conditions must first be met:

1. timely and accurate detection of terminal occupancy,
2. a known delay at the discharge port,
3. prediction of its time period.

Timely and accurate detection of berth occupancy is a prerequisite for the possibility of initiating Virtual Arrival and achieving Mutual Agreement. Port delay can occur for many reasons such as berth occupancy due to dense traffic

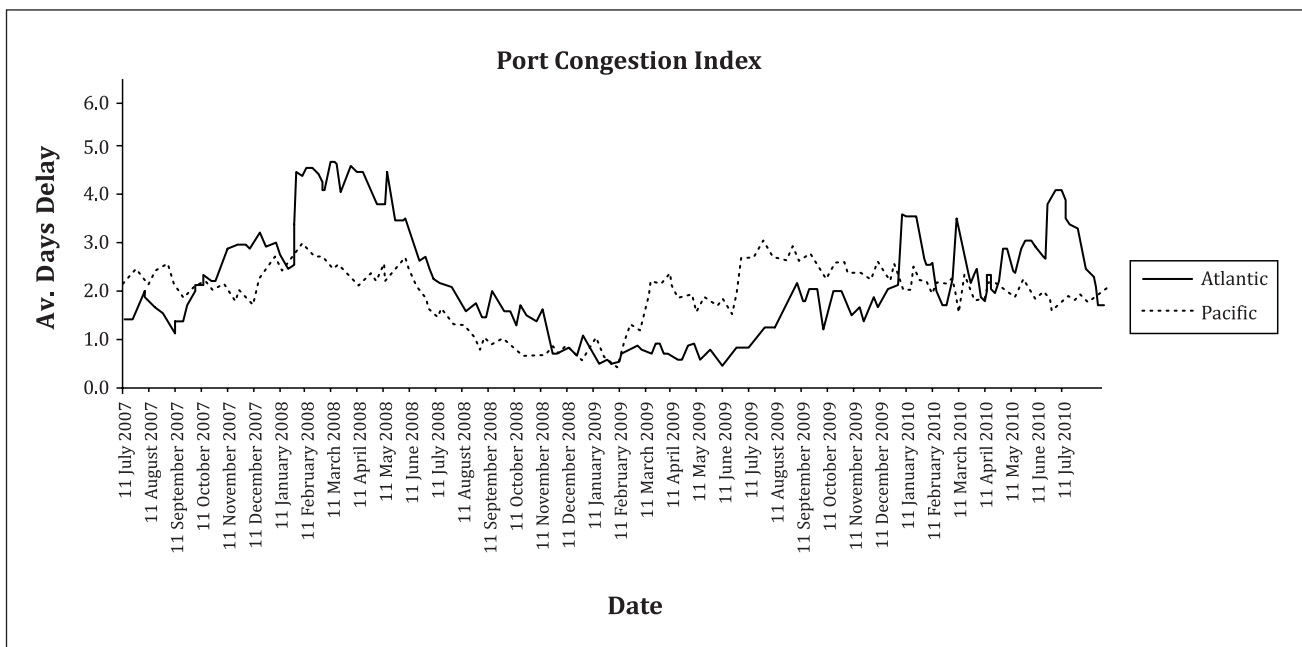


Figure 1 Port Congestion Index

or limited port infrastructure (insufficient terminal capacity, number of berths or cargo equipment), reconstruction or alternations of the existing infrastructure, bad weather conditions or sudden extraordinary events (technical malfunction, explosion, pollution, strike). Predicting its time period plays a significant role in determining new required time of the vessel's arrival to port. Virtual Arrival of the vessel would provide an opportunity to remove inefficiencies in the transport chain by means of the agreed and optimal speed.

The average port delay for ports of the Atlantic and the Pacific oceans based on the study "Global Ports" from shipbroker Simpson Spence & Young for bulk cargo carriers is displayed in Figure 1. The results show that average port delay for ports on the Atlantic vary approximately from one to five days, while for the Pacific ports, the delays vary from one to four days. These data could considerably contribute to real time conditions for adapting the Virtual Arrival of a vessel to port and achieving Mutual Agreement and, thus, influencing shipowner management and other parties of the maritime navigation process.

If port delay is known, the estimated time of the ship's arrival to the port (ETA) is replaced by the new required time of the vessel's arrival to the port (RTA).

Speed reduction will result in fuel consumption optimization and will also significantly contribute to decreasing the emission of harmful gases, and thus it will be in consonance with the development of ecological legislation. With regard to the new time and the adaptation of the Virtual Arrival of a vessel to a port, Mutual Agreement primarily between the shipowner and the charter would be applied, and it is necessary to analyze what effect would be achieved to other parties of the overall process.

### 3. The parties in the process of Virtual Arrival

Numerous parties having specialized and defined tasks participate in the complex transport process of the port operation and organization and port service. From the arrival of the vessel to the port of her departure, many parties play various roles and, according to their tasks, are divided into [9]:

1. government institutions, in charge of port business;
2. business entities performing business activities.

The function of the government institutions is to look after the port's interests and successfully accomplish the tasks set by the competent authorities with prompt and simple administrative procedures and continuity of the chain of supply. The bodies of authority that participate in the port management are Harbor Master, Port Authority, Custom Authority, Immigration Office, Veterinary and Fito-Sanitary Inspections. Within the framework of the operation of those bodies, different interests, such as fulfilling tasks and activities of the competent authority and preserving the continuity of the port technological operation process, must be harmonized.

Business function is performed by the parties that directly participate in the port operation activities: Port handling company, Shipowner, Pilot service, Mooring and Towing services, Shipping agent, Freight forwarder, inland operators, Port tug and service, Service organizations for port installation maintenance, Financial organizations, insurance companies and other service companies for provision of services for goods, passengers and vessels, Meteorological and navigation services, Port Control Center. Within the framework of the port handling company, the stevedore and port goods clerk conduct loading and unloading cargo, stowing cargo onboard and transloading cargo from one means of transport to the other.

The results of the Virtual Arrival to the port could be divided into:

1. Mutual Benefit,
2. Mutual Effect.

Mutual Benefit of intake refers to the advanced shipowner management and the financial interest of the charterer, while Mutual Effect of the Virtual Arrival relates to other parties of the maritime transport process.

### 4. Mutual benefit due to Virtual Arrival

If the delay of the possibility of ship accommodation at the port of discharge is present, if the charterer insists, it is necessary to reach an agreement with the shipowner concerning the vessel's Virtual Arrival with speed reduction in order to achieve Mutual Agreement. The algorithm of the Virtual Arrival is displayed in Figure 2.

Average ship speed is defined according to the new agreed time of arrival of the vessel into the port. In compliance with the management, the shipowner may in theory refuse to make an agreement concerning the vessel's Virtual Arrival to port for reasons of future organization of the chain of supply, or more specifically, for purposes of constant cargo flow, or in cases when minor repairs or vessel maintenance at the port of discharge have been precisely determined. Furthermore, the master, as the shipowners' legal representative, can in theory refuse to decrease speed for safety reasons (speed reduction below a certain level for purposes of possible technical limitations, or speed reduction in high-risk areas i.e. areas with piracy activity).

Cooperation and trust between the shipowner and the charterer, as well as common accord concerning the implementation of the vessel's Virtual Arrival by other participants of the port management, are important for the realization of the agreement. In order to decrease bunker consumption, after the agreement between the shipowner and the charterer has been made, speed is optimized and adjusted to the new agreed vessel's time of arrival into the port of discharge. During the voyage, speed is also dynamically adjusted to the newfound hydrometeorological conditions predicted by the weather forecast and the sea state of the navigation area obtained by the hydrometeorological centre.

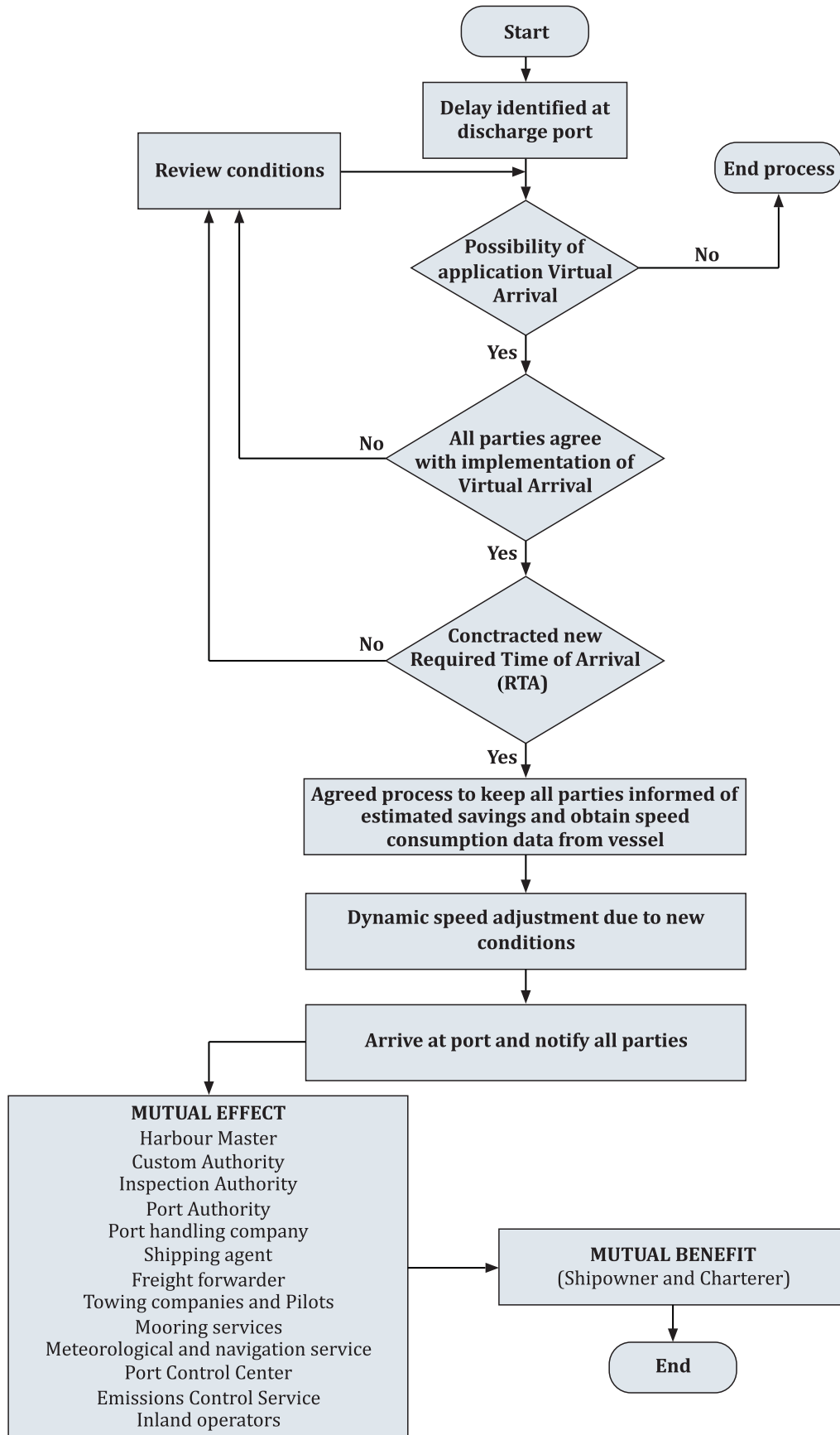


Figure 2 Algorithm of Virtual Arrival Process

Upon the vessel's arrival to the port, all the parties of the navigation process would be notified and then the calculation of the financial gain would be conducted. Only the two agreed parties would have financial benefit from bunker consumption economy, the shipowner and the charterer in proportion of 50:50. The charterer's primary obligation is to pay freight, unless stated otherwise in the agreement, however, according to the Mutual Agreement, the charterer must refund additional days of navigation to the shipowner at the agreed cost reduced by 50% of bunker consumption economy. The agreed cost for additional days of navigation could be approximately calculated according to the prices of demurrages. In other words, the shipowner would be compensated by additional days of navigation based on demurrages and the 50% of bunker consumption economy. Therefore, both agreed parties achieve Mutual Benefit. This kind of shipowner management could considerably contribute to economical efficiency in conditions of high fuel prices and increasingly demanding regulations of the MARPOL convention.

Activities and guidelines for shipowner adjustment to ecological legislation can be divided into organizational and technological [10,11]. Accordingly, the realization of the vessel's Virtual Arrival would be another significant organizational guideline for shipowners' adjustment in compliance with the development of the ecological legislation.

## 5. Mutual effect due to Virtual Arrival

Virtual Arrival could have a considerable effect to the port community stakeholders within the framework in the seaport business. All government institutions and stakeholders in the process, which are conducting business within the seaport area on concession basis, should adapt to the newly formed agreed time of arrival of the vessel. Time domain plays a crucial role in organizing information and document exchange between all coordinators of the port community. The result of Virtual Arrival will manifest itself in some important documents related to seaport operations such as Port Operations and Services Order (POSO), Minutes of Coordination Meeting, Notice of Arrival, Vessel Permission and Bill of Lading. Furthermore, by way of Port Control Centre, Port Authority attempts to achieve maximum maritime safety and traffic regulation, as well as timely engagement of all maritime services, such as towing companies, pilots and mooring services, necessary for the situation. With the implementation of the virtual process, maritime safety in the port area is increased since the time of the vessel being on anchorage area is shortened.

The main effect of the Virtual Arrival will influence discharge and cargo delivery, and the logistical organization of forwarding. The freight forwarder handles forwarding cargo and its organization in maritime transport. As the transport coordinator, freight forwarder contacts inland operators, stevedores, customs office and other bodies

of authority according to the set time of arrival to port. Organization and coordination of inland carriers and port operation are important factors for timely cargo forwarding to the recipients. In accordance with Virtual Arrival, i.e. new time of arrival of the vessel to the port, freight forwarder would play a significant role in reorganizing these parties with the aim of more successful cargo forwarding.

Another important factor, that has an indirect effect, is terminal load that depends on the flow of Virtual Arrivals and affects the possibility of cargo reception for purposes of efficient service with a positive effect to all parties that participate in the processes. Development of Virtual Arrival is based on the coordination of all parties of the maritime transport process. In contemporary conditions of terminal management, it is impossible to efficiently organize activities and processes without information and communication technologies that must enable planning, coordinating and controlling all activities. [12,13]

System development must be prompt, efficient and reliable, with timely dynamic changes of ship speed and accurate arrival to port, especially to those users that must have access to that information as the most important part of their management.

## 6. Conclusion

The shipping industry is a service that is under an increasing economical pressure on the international maritime market. However, shipowner activity is based on a set of optimal solutions and financial strategies. The prerequisite for implementation Virtual Arrival is based on port delay and inability to accommodate ships, as well as on mutual cooperation of the shipowner and the charterer. The suggested shipowner management adjustments, in compliance with Mutual Agreement, will offer a new challenge in business policies, and decreased speeds will have a direct impact on bunker consumption, i.e. on decreasing voyage costs. Prior to decreasing and optimization, it is necessary for the two parties to make an agreement beneficial for both parties. After the vessel's arrival to the port, profitability will be calculated i.e. Mutual Benefit between the parties and Mutual Effect among Port community stakeholders within the framework in the seaport business will be defined. Virtual Arrival could be a long-term process for shipowners in function of sustainable development. Therefore, the authors recommend constant speed adjustment and realization of the agreement as a result of the newly found port delay. Apart from researching economical effects of Virtual Arrival, it is necessary to observe its effect in view of new ecological norms in order for the shipowner companies to respond to increasingly demanding ecological legislation. The authors for future work also recommend the application of Virtual arrival on different agreement types.

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## References

- [1] Wang, W., Meng, Q.: Liner ship deployment with container transshipment operations, *Transportation Research, Part E* 48, 2012, pp. 470–484.
- [2] Wang, W., Meng, Q.: Liner ship schedule design with sea contingency time and port time uncertainty, *Transportation Research, Part B*, 2012, pp. 615–633.
- [3] Optimising Voyage Management and Reducing Vessel Emissions - an Emissions Management Framework, OCIMF, First Edition, 2010.
- [4] Zelenika, R.: Temelji logističke špedicije, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 2005.
- [5] Stopford, M.: *Maritime Economics*, 3<sup>rd</sup> Edition, London, 2009.
- [6] Jurčević, M., Mitrović F., Nadrljanski M.: System dynamics and Theory of Chaos in Freight Rate Forming in Shipping, *Promet – Traffic&Transportation, Scientific Journal on Traffic and Transportation Research*, Vol. 22, No. 6, 2010, pp. 433–438.
- [7] UNCTAD; *Review of Maritime Transport*, 2014.
- [8] Ivčec, R., Jugović, A., Kos, S.: Određivanje troškova broda u plovbi poradi uspješnosti izvođenja optimizacije brodskog kapaciteta, *Naše more, Znanstveni časopis za more i pomorstvo*, Vol. 56, No. 1–2, 2009.
- [9] Kesić, B.: *Ekonomika luka*, Sveučilište u Rijeci, Pomorski fakultet u Rijeci, Rijeka, 2003.
- [10] Radonja, R., Jugović, A.: Poslovna politika brodara u kontekstu razvoja ekološkog zakonodavstva, *Pomorstvo*, Vol. 25, 2011, pp. 319–341.
- [11] Jurić, V., Županović, D.: Ecological Impacts of Diesel Engine Emissions, *Promet – Traffic&Transportation, Scientific Journal on Traffic and Transportation Research*, Vol. 24, No. 2, 2012, pp. 151–159.
- [12] Tijan, E., Agatić, A., Hlača, B.: Evolucija informacijsko-komunikacijskih tehnologija na kontejnerskim terminalima, *Pomorstvo/ Scientific Journal of Maritime Research*, Vol. 24, 2010, pp. 27–40.
- [13] Kolanović, I., Dundović, Č., Jugović, A.: Customer-based port service quality model, *Promet – Traffic&Transportation, Scientific Journal on Traffic and Transportation Research*, Vol. 23, No. 6, 2011, pp. 495–502.
- [14] Bešković, B., Tvrđy, E.: Agile Port and Intermodal Transport Operations Model to Secure Lean Supply Chains Concept, *Promet – Traffic&Transportation, Scientific Journal on Traffic and Transportation Research*, Vol. 23, No. 2, 2011, pp. 105–112.