

# Selection Criteria of the Container Terminal Operational Model in the Port of Rijeka, Croatia

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*Abstract:* The container terminal is an essential factor in the global supply chain and an important hub between modes of maritime and land transport. Public management system and global terminal operators have shown a strong interest in creating an efficient operational model of container terminals. With the growth of globalization and the consequent institutional reform in the port sector, joint venture between public and private partners have recently become a common operational model for port development. Private sector participation in joint venture models brings the necessary capital and know-how, and the expected effectiveness of core activities, construction, maintenance and operational activities. Port of Rijeka Container Terminal (PRCT) have a specific management model, where the Port of Rijeka Authority (PRA, the concession provider) and company Adriatic Gate Inc. (AGCT, concessionaire) have entered into a concession. The container terminal operational model can be categorized through a public, private or a combination of service delivery, the ownership of infrastructure, superstructure, handling equipment and stevedore activity. Some governments as part of the public management system and global terminal operators have shown a strong interest in creating an efficient container terminals operational model. With the growth of globalization and the consequent institutional reform in the port sector, public-private partnership has recently become a common operational model for port development. An important precondition for the conclusion of the concession agreement in Port of Rijeka Container Terminal (PRCT) is the obligation of investment in facilities superstructure and handling equipment by the concessionaire. In this article authors seek to find answers to the following questions in one hand what are the important criteria for choosing a container terminals operational model and to other what form of a operational model based on the share of the private sector, ownership and corporate performance is suitable for Port of Rijeka Container Terminal (PRCT).

*Key-Words:* Port of Rijeka Container Terminal, operational model, joint venture, public and private port relation

## 1. Introduction

With the trend of privatization and liberalization, the container terminals business model of management in recent decades largely changed. Involving businesses in the private sector in the management of the ports can be increased in their effectiveness. It is often used as an optimal solution management terminal through a combination of public and private sector. In practice, it happens with many container terminals carrying out activities such as loading / unloading, towing, storage, etc. as outsourcing by stevedore company.

Container terminals are complex systems with highly dynamic relationships between different handling, transport and storage unit and absence of complete knowledge about future events. There are a whole range of problems in the decision-making of logistics planning and control at container terminals. Problems in decision making can be defined at three levels; design of the terminal, operational planning and required time control.

The creation of port corporation brings new opportunities for port operators for inclusion in the affairs of other countries of container traffic. Increase operational efficiency involves decisions in legislative and institutional terms, choosing models of ownership to the allocation of funds for investment in infrastructure

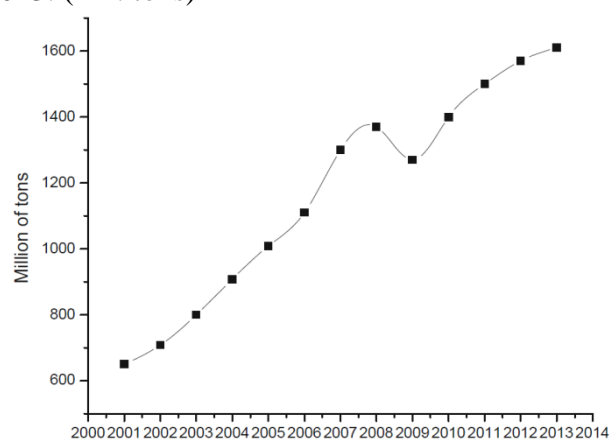
## 2. Container traffic in general

The use of containers in international maritime transport increased dramatically in recent years. Figure 1 shows the growth of the world container traffic from year 2000 to 2014. Further growth in container traffic is expected in the coming years, especially in the transport route between Europe and Asia.

Introduction to the process of containerization took place in the 1960s, when a container is presented as a standard unit and a new transport concept in

international trade. Handling and transport of containers between the various actors in the supply chain, including manufacturers globally, freight forwarders, shipping companies, shipping centers and customers. Container Terminals primarily perform the service road junction between the different modes of transport, for example, domestic rail or road transport and maritime transport.

**Fig. 1.:** Growth of international containerised shipping volume, 2001–2013. (mil. tons)



Source: Modified from UNCTAD (2013, p. 23)

With growth in container traffic a large number of container terminals is expanding its capacities and investments in terminal infrastructure and superstructure accompany this growth. In addition, in order to increase the efficiency of terminal business operations there is a trend of automating operational activities using modern transshipment technology and intelligent transport systems, especially in countries with higher costs of operating personnel. Cranes managed by the working staff of the terminal is increasingly left to their place automated equipment at the terminal (AGV). Surging commodity flows and container transport shipping companies and the consequent growing competition between different container terminals at the individual transport routes. At container terminals

not only grow transshipment facilities, already in use and sophisticated information technology and logistics software control systems as well as automation of handling systems .

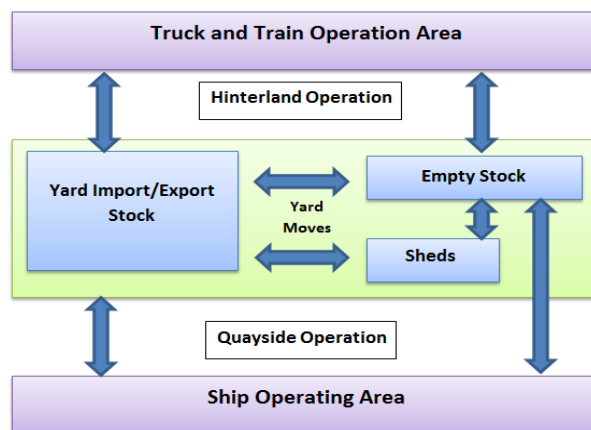
### 3. Container terminals operational management

Container Terminals vary in size, function, space and consists of a certain subsystems (Fig.2.). Ship loading / unloading or transshipment of goods to the quay of the terminal (Ship Operation Area) s performed with the help of container cranes. Position of import and export containers shall be in yard and stock, which is generally divided into several parts. Premises used for loading / unloading of containers on wagons or trucks are common subsystems container terminals and make the same connection with inland container terminal infrastructure, railways and roads (Truck and Train Operation Area).

The container terminal is an essential factor in the global supply chain and is an important hub between modes of maritime and land transport. The main activity of the container terminal (Steenker, 2004) includes loading / unloading of containers on the berth in the context of the whole ship's operating area.

Temporary storage at the terminal shall be in container terminal stock to where it performs loading / unloading in inland transport which takes place at truck and rail operating area, shown in Fig.2.

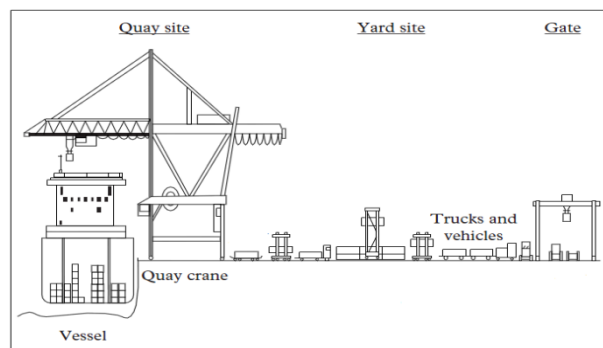
**Fig. 2.:** Operation areas of a seaport container terminal and flow of transports



Source: Modified from Steenken et al. (2004), p. 6

Temporary storage at the terminal shall be in container terminal stock to where it performs loading / unloading in inland transport which takes place at truck and rail operating area as can be seen in the Fig. 3.

**Fig.3.:** Container transportation and handling chain



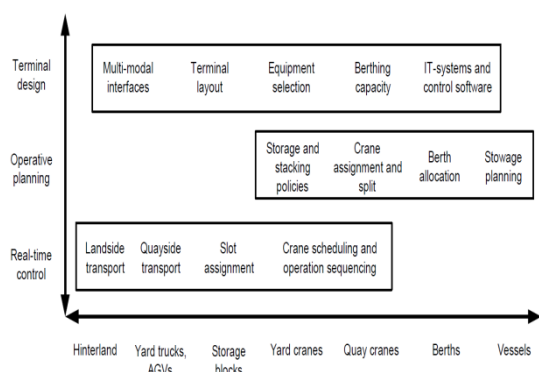
Source: Modified from Steenken et al. (2004), p. 13

Container terminals are complex systems with highly dynamic relationships between different handling, transport and storage unit and absence of complete knowledge about future events. There are a whole range of problems in the decision-making of logistics planning and control at container terminals. Problems in decision making can be defined at three levels as shown in Fig.4: Design of the terminal,

operational planning and required time control.

After arriving at the terminal from the truck or wagon, a container is identified and registered with the basic data (eg, content, destination, ship loading, shipping companies), pass along with internal transport equipment and distributed to one of the stocking area. The exact position of the temporary storage container is provided with a row position and height of the row, and the time of arrival of containers at the container terminal. To accommodate the container to the desired position using the specialized reloading vehicle and crane. Finally, before reaching the required ship, container is transported from the stocking area on the berth there embarks on a desired position on the board using container cranes. The terminal operational with regard to imported container takes place in reverse order of the displayed export containers.

**Fig. 4.:** Logistics planning and control issues in seaport container terminals



Source: Adapted by Design, Operation Management and Logistics Control Issues, H. Kim, H.-O.Guenter, 2007, p 209.

On a global scale of container terminals operation today performed a handful of global container terminal operators . Ten largest container terminal operators manage 36% of the world's container traffic in 2011 ( Drewry Maritime Research 2012) can be seen in Table 1. The largest global container terminal operators are Port of Singapore Authority

(PSA ) , Hutchison Port Holdings ( HPH ) Dubai Ports World ( DPW ) and APM Terminals ( APMT ).

**Table 1.:** Global Terminal Operator Lists for 2010 and 2011

2010				2011			
List	Terminal Operator	TEU (mil)	% (rate)	List	Terminal Operator	TEU (mil)	% (rate)
1	PSA	51.3	9.4	1	PSA	47.6	8.1
2	HPH	36.0	6.6	2	HPH	434.4	7.4
3	DPW	32.6	6.0	3	DPW	33.1	5.6
4	APMT	31.6	5.8	4	APMT	32.0	5.4
5	SIPG	19.5	3.6	5	Cosco	15.4	2.6
6	CMHI	17.3	3.2	6	TIL	12.1	2.1
7	Cosco	13.6	2.5	7	CSTD	7.8	1.3
8	MSC	9.9	1.8	8	Evergreen	6.9	1.2
9	SSA Marine	8.6	1.6	9	Eurogate	6.6	1.1
10	Modern Terminals	8.3	1.5	10	HHLA	6.4	1.1

#### 4. The container terminal operational model and activities

Governments of some countries as part of the public management system and global terminal operators have shown a strong interest in creating an efficient container terminals operational model. With the growth of globalization and the consequent institutional reform in the port sector, public-private partnership has recently become a common business model for port development. Private sector participation (eg, HPH, DP World and APM Terminals) brings the necessary capital and know-how, and the expected effectiveness of core activities, construction, maintenance and operational activities (UNCTAD, 2013).

Furthermore, the creation of port corporation brings new opportunities for port operators in individual countries for inclusion in the affairs of other countries of container traffic. Increase operational efficiency involves decisions in legislative and institutional terms, choosing models of ownership to the allocation of funds for

investment in infrastructure (UNCTAD, 2013).

In this article, seeks to find answers to the following questions:

1. What are the important criteria for choosing a container terminals operational model?
2. What form of a operational model based on the share of the private sector, ownership and corporate performance is suitable for Port of Rijeka Container Terminal (PRCT)?

The container terminal operational model can be categorized through a public, private or a combination of service delivery, the ownership of infrastructure, superstructure, reloading equipment and stevedore activity.

As shown in Table 2, assets/operation in Public, Landlord and Private port can be different in infrastructure, superstructure, stevedoring and other handling operations.

**Table 2.:** The port ownership model.

Assets/operations	Public port	Tool port	Landlord port	Private port
Infrastructure (including port land)	Publicly owned	Publicly owned Publicly owned	Publicly owned	Privately owned
Superstructure	Publicly owned	Publicly owned	Privately owned	Privately owned
Stevedoring operations	Publicly operated	Privately operated	Privately operated	Privately operated
Other cargo handling operations	Mainly publicly operated	A mixture of publicly and privately operated	A mixture of publicly and privately operated	Mainly privately operated

Source: Alderton, P. M. (2008). *Port management and operation* (3rd ed.). Informa: London

As shown in Table 3, the public port (eg. Port of Singapore) is a port managed by national government. The Port Authority owns, maintains and uses the port property and perform transshipment activities.

**Table 3.:** Classification of terminals

Management of the terminal by the public sector and public use terminals,	General public terminals
Management of the terminal by the private sector and the use of terminals in a variety of uses	Public terminals for priority berthing
	Terminals dedicated and rented out to shipping companies
	Terminals operated jointly by shipping companies
Management of the terminal by the private sector and the public use of the terminal.	Terminals constructed by the government and subsequently leased out to terminal operators
	Terminals constructed and operated by terminal operators
	Terminals constructed and operated by shipping companies
	Terminals constructed and operated through joint ventures between terminal operators and shipping companies

Source: Adapted by Togzon and Heng 2005., p.36.

On the other hand, a private port (eg. UK Ports) owns, is the operator and managed by a private operator. The so-called "tool" model port, the port authority owns, develops and maintains port infrastructure and handling equipment, while stevedore private companies perform coastal transshipment and are usually contractually obligated to shipping companies and licensed by the port authorities (Table 2.).

Finally, so-called. "Landlord" port is characterized by a combination of public-private services. Port Authority leased port infrastructure by private operators. Private operators are responsible for ensuring the loading equipment and the activities of loading / unloading. Examples of so-called "landlord" port the port of Rotterdam, the port of Antwerp and the port Kaohsiung.

Literature from the themes of container terminals operational models (Baird 1995; Tongzon and Heng 2005; Chen 2009), according to the type of operator and the basic motive of the use of the terminal shows the following division as shown in Table 3.

In general, the public container terminals have a traditional approach in order container vessels arrivals at the berth. When the ship late in the public container terminal, it will stand in order to access the

quay. Such an approach creates problems for shipping companies how to maintain the schedule. Container Terminals which want to become attractive for the berthing of large container ships, adapting priority landing ships of the same in order to maintain their schedule of sailing. In this business model, port authorities and shipping companies enter into an agreement that gives priority shipping company adherence to the container terminal berth.

The operational model of rental container terminal means that Port Authority leased the container terminals and other facilities to shipping companies under long-term agreements. In the case of public container terminals operated by the private sector, the port authority receives rental income and management fee as the owner of the terminal, which is operated by private companies. Under this operational model, the use of terminals by private companies is not limited to ships berthing in the private or public property. Furthermore, the terminals can be operated as businesses, which increases the efficiency of coastal reloading.

The terminals can be further divided according to their ownership structure of the terminals wholly owned and "joint venture" terminals. With regard to the operational activities of the terminal or business, the terminals which have activities in the private sector, operational outsourcing and combinations thereof.

With the trend of privatization and liberalization, the container terminals operational model of management in recent decades largely changed. Involving businesses in the private sector in the management of the ports can be increased in their effectiveness. It is often used as an optimal solution management terminal through a combination of public and private sector. In practice, it happens with many container terminals carrying out activities such as loading / unloading, towing, storage, etc. as outsourcing by stevedore company.

## 5. The basic features of the operational model Port of Rijeka Container Terminal (PRCT) by 2010

Before the definition of a operational model Port of Rijeka Container Terminal (PRCT), below lists the primary features of the Port of Rijeka: the Port of Rijeka Authority, the Adriatic Gate Inc., Port of Rijeka Inc. (Table 4.), and a description of the port area, port infrastructure and superstructure, handling devices and equipment and marine waters PRCT (Table 5.).

Description of the basic features of the Port of Rijeka Container Terminal and other factors in its operations:

- a) Port of Rijeka: Rijeka port area is defined by the Republic of Croatia Government Decision including PRCT,
- b) Port of Rijeka Container Terminal (PRCT): part of the port area of the Port of Rijeka. The existing infrastructure, superstructure and handling equipment defined by the concession contract between the Port of Rijeka Authority and the Adriatic Gate Inc.,
- c) Port of Rijeka Authority (PRA): the grantor of the concession to PRCT and the managing body of the port of Rijeka  
The ownership structure of the Port of Rijeka Authority: The institution established by the Decision of the Croatian Government, a non-profit legal entity.
- d) Adriatic Gate Inc. (Adriatic Gate Container Terminal - AGCT): the concessionaire at PRCT, pursuant to the Decision of the Administrative Board of the Port of Rijeka Authority on the basis of international tender for the concession  
The ownership structure of the Adriatic Gate Inc. (on 12.2010): 100% of Port of Rijeka Inc.

e) Port of Rijeka Inc.(LR): the Port Corporation and stevedore company (for PRCT),

The ownership structure of Port of Rijeka Inc.(LR) on December 2015.: In the majority state-owned.,

f) Adriatic Gate Inc.: the operator of the PRCT (local container terminal operator)

g) Operational Business PRCT: Adriatic Gate Inc.

The basic features of the Port of Rijeka Container Terminal and other factors in its operations are shown in Table 4.

**Table 4.:** Description, Ownership and Operational Model in Port of Rijeka Container Terminal (PRCT) on December 2010.

Entity related by PRCT	Description	Ownership	Operational Model
Port of Rijeka	port area is defined by the Republic of Croatia Government Decision including PRCT	non-ownership regime, maritime domain managed by the Port of Rijeka Authority	differe
Port of Rijeka Authority (PRA)	the grantor of the concession to PRCT and the managing body of the port of Rijeka	the institution established by the Decision of the Croatian Government, a non-profit legal entity	State regulation
Adriatic Gate Inc. (AGCT)	the concessionaire at PRCT (pursuant to the Decision of the Administrative Board of the Port of Rijeka Authority on the basis of international tender for the concession)	100% of Port of Rijeka Inc.(on Decemeber 2010.)	operational outsourcing
Port of Rijeka Inc (LR)	the Port Corporation and stevedore company for PRCT	the majority state-owned	outsourcing for PRCT

Source: Main by author with data Archieve by Port of Rijeka Authority and Port of Rijeka Inc.

h) The ownership of PRCT infrastructure (substructure) without the berth edge of quays and marine waters: non-owner regime, maritime domain concession in Adriatic Gate Inc.

i) The ownership of PRCT infrastructure (superstructure), the berth edge of the quays and marine waters: non-ownership regime, maritime domain managed by the Port of Rijeka Authority,

j) Port superstructure PRCT (superstructure): non-ownership regime, maritime domain concession in Adriatic Gate Inc.

k) The berth handling equipment, container cranes Samsung (2 pieces): maritime domain concession in Adriatic Gate Inc.

l) Mobile handling equipment and devices: Ownership Adriatic Gate Inc.

m) The sea waters area around the terminal: Maritime domain managed by the Port of Rijeka Authority regulated the Government decision on the establishment of the Port of Rijeka Authority Description is shown in Table 5.

**Table 5.:** Assets related by Port of Rijeka Container Terminal (PRCT) with main features

PRCT Assets	Description	Ownership/Concession	Investment	Maintenance
PRCT Assets	terminal area, terminal roads and rails, berths without quays edge	non-ownership regime, maritime domain under concession by AGCT	AGCT & PRA	AGCT
Infrastructure	terminal sheds,	non-ownership regime, maritime domain under concession by AGCT	AGCT	AGCT
Berth handling equipme	2 gantry contain	State ownership under	AGCT	AGCT

nt	ner crane (Samsung)	concession by AGCT		
Mobile handling and transport equipment	towage, trailer, RMG, RS, transtainers	AGCT	AGCT	AGCT
Aquatorium	Sea water area around the terminal	non-ownership regime, maritime domain manage by PRA	PRA	PRA
Berth quay wall	Quay wall on operational berth	non-ownership regime, maritime domain manage by PRA	PRA	PRA

Source: Made by author with data Archive by Port of Rijeka Authority and Port of Rijeka Inc.

In accordance with legal regulations in the Republic of Croatia (Maritime Domain and Sea Port Law in Republic of Croatia, 1995), the port area is the maritime domain. Maritime domain represents a nonproprietary system. The port open to public traffic managed by the port authorities or port authority manages the maritime domain in the port area which are consists of the port infrastructure and superstructure. Basics guidelines of the White Paper of the European Union in the section Port separating function manage and control port (the port authority) of the functions using the port facilities (port companies or concessionaires). In accordance with the legislation in the maritime domain in the Republic of Croatia can perform activities only on the basis of concessions. This means that the concession provider (the port authority) and the concessionaire (company) have signed a concession agreement that governs the rights and obligations of economic activities in the port area (Croatian Seaports Law).

PRCT a specific management model, where the PRA and AGCT have entered into a concession contract on period for 32 years. The concession contract regulates the rights and obligations of the activity in the port area PRCT. An important precondition for the conclusion of the concession agreement is the obligation of investment in facilities superstructure and handling equipment by the concessionaire.

## 6. Criteria for the selection of the container terminal operational model

There are four main criteria for the choice of business model container terminals: 6.1. Profitability, 6.2. The concession, 6.3. Environment and 6.4. Operational capabilities, which will be described in conjunction with other criteria in the following:

### 6.1. Profitability

#### 6.1.1. Sources of Financing

The necessary infrastructure of the container terminal, which is used for performing activities (berth operating, open storage area, the area loading / unloading on land vehicles), reloading equipment (container cranes, tractors, mobile reloading equipment in stock) and other equipment and devices require a large initial capital. Unlike other businesses in their operations in container terminals is the large share of fixed facilities (infrastructure) that can not use this for other purposes than the purpose of performing activities of loading / unloading and storage. Time amortization of such facilities is usually very long. Due to the close relationship of container terminals and shipping companies operating on the turbulent global market,



there is great risk in potential shortfalls necessary amount of cargo. Therefore, large investments to these risks can result in high costs and lead companies managing container terminals in a very unfavorable situation. For these reasons funding sources are one of the most important criteria for selecting a business model container terminals.

#### 6.1.2. Cost-effectiveness

When establishing the business system, and in making decisions about investing, one should take into account the operating costs. Since container terminals need huge capital investment, investors will focus on predicting the financial viability, especially when they are private companies. Private companies are usually willing, more than government agencies, include higher capital investment in equipment which can improve the operability and efficiency of the terminal. At the same time, private companies will pay more attention to the level of financial return on investment through operational activities. When implementing such a decision, prospective investors evaluate two important questions (Wiegmans et al. 2002). Musso et al. (2006):

1. Is the net present value (NPV) obtained on the basis of cost effectiveness of container terminal positive?
2. Is the internal rate of return (IRR) investment in the container terminal is higher than the interest on the market?

Analysis of cost effectiveness, which is a segment of the financial viability of operating the business of container terminal, will help investors predict whether the terminal session can produce a profit. Such an evaluation is vital in the management of container terminals.

#### 6.1.3. Economic effectiveness

The infrastructure of the container terminal in the most common case is a type of public property. Tests of some practical cases have shown that the objectives of the business of container terminal is primarily profit-making, but also that the creation of the hinterland development. Container Terminals with recognizable efficiency and a well-developed port will attract investors and their investments in port projects, create jobs directly in port operations or other activities in the region. In a situation where the chosen container terminal business model, to take into account not only the financial profitability of operations of the terminal, but also the contribution of such a model to its economic environment.

#### 6.1.4. The effectiveness of the implementation period

It is necessary to perform the full range of tasks when planning the construction of the terminal and other facilities before it begins the implementation itself, and with it the need and huge financial resources. When the market demand shipping is high, it is much easier to find sources of funding for the work of building a terminal. Such a situation in the market helps to create a greater profit in a relatively short period of time.

In the other case, when demand on the world shipping market is low or when supply is greater than demand, competition is becoming stronger and more difficult to achieve the desired amount of services. For these reasons, the time parameter of implementation of the business model is a very important criterion.

The decision making process, system selection and system of financial management of port activities is subject to statutory limitations and decisions made by administrative authorities. As a result, their operational efficiency and effectiveness of timing parameters can not be easily

compared when it comes to the public sector when it comes to private companies. When choosing a business model of the container terminal, to be very clear about which model to be implemented more quickly.

## 6.2. The Concession

### 6.2.1. The ownership

The inclusion of private companies in container terminal has become a worldwide trend (Farrell 2012). There are two basic models of ownership of container terminals by private companies: full ownership and called "Joint venture".

The so-called "Joint venture" model in the container terminal is when two or more companies have common ownership and operational water container terminal. The terminal model in full ownership implies ownership and operating from one of the port companies. For models called "joint venture" in some parts of the world there are legal restrictions, but generally there is one side of the public administration.

### 6.2.2. The concession on activities

Governments of some countries through the public administration have the main role in port operations. In recent years, many governments have set a new, leading role in the market, with its own involvement in port operations. These governments through public administration, as a rule hold the lead through equity contracts is thus have a strong control over the activities of container terminals. An example of such a model management container terminals can be found in the ports of Shanghai and Ningbo (one of the world's leading port in terms of turnover of all commodities, and individually for container traffic).

Contrary to traditional economic theory, and the general opinion that the

intervention of some governments in the market, including maritime, can have an adverse effect of an effective model, (Wiegmans et al. 2002) has argued that while strong competition in the market there, retaining a controlling stake ownership of the container terminal can promote the healthy development of the industry, and accordingly, and control operational business terminal.

The container terminal operational business includes berth loading / unloading, transport to stocking area and all other activities in stock container terminal (Scheme 1). The concession on the activities of the container terminal exists in different forms according to different container terminal business models. Here you can notice the different roles of public administration and private companies that have each other in relation to decision-making in investment and choosing financial strategies (Dekker and Verhaeghe 2012).

## 6.3. Environment

### 6.3.1. The shipping market and the cargo volume

One of the important goals pursued by the port business is the realization of commercial activities in the port and requests by shareholders or founders. In other words, investment in container terminals go in the direction of increasing container traffic and increasing the efficiency of loading / unloading activities.

By choosing investment strategies, projects will be evaluated following Tsai (1991):

- # Increase economic growth environment,
- # Increase the volume of the market,
- # New demand on the shipping market in order to cover costs.

These factors must be taken into consideration when choosing a container terminal business model. The development of the shipping market is a common factor in deciding on the level of investment and

container terminal business model. It is customary, when weaned on investing in a specific container terminal, so do not consider the current situation in the shipping market, which may be strong or weak. As a basis for making investment decisions, it must be more to consider short, medium and long-term analysis of the development potential of the maritime market.

### 6.3.2. The wishes of potential investors

The most important factor when making a decision on forming a joint venture model is the answer to the question, who is a business partner (eg, a global terminal operator) and whether it intends to invest. In recent years, the trend was the involvement of private companies instead of public administration in the affairs of the container terminals. In the current operational activities of container terminals, partners, and investors are usually containerized shipping companies and specialized container terminal operators. When selecting a model of management of the container terminal, an important parameter is the desire and the ability of the container terminal operator for investment.

### 6.3.3. The impact of the existing terminal operators

The usual way of investing in port facilities is to create public infrastructure container terminals where it is expected to also result in certain benefits for the national economy. If a port operator and the corporation decided to engage in the performance of activities of the container terminal in the form of a joint venture and if the port corporations should not pay a fee for use of the terminal areas and thus has an advantage over other players in the port business, then the port corporation may be called for competition with the private sector for profit making. Also, the existing operators in the port may be

requested from the port corporation to reduce the fee for use of the space of the container terminal and other costs of activities.

### 6.3.4. Restrictions in legislation

If there are excessive restrictions in the field of human resources management, then perform activities resulting in small flexibility. Farrell (2012) showed that the model of joint venture container terminal where at least one partner from a public organization, it is the performance of the subject of legal restrictions. Common example of the complexity of the legislation palsies result lengthy process of preparing strategies to achieve the final implementation which can reduce the interest of investors. When investment projects in infrastructure including close cooperation with the public sector, investors need to be familiar with the national legal system. For this reason, legal restrictions must be subject to analysis in the selection of the business model of the container terminal.

## 6.4. Operating possibilities

### 6.4.1. Know-how in the container terminal operation

The trend of private companies means that investors in container terminals includes existing terminal operators in the port operational and international companies container terminals. The main reason is that local operators have a better understanding of the domestic market or the necessary knowledge on specific areas of the organization. In this way, understanding the market, domestic operators will quickly bring additional advantages in performance of activities.

Of course it's infrastructure and other devices to terminals completely specific to each container terminal. These differences have an impact on the outlook for the costs of the terminal. Operational and overhead staff terminal enters the

model joint venture terminal just with that specific knowledge from everyday practical performance of the activity.

#### 6.4.2. The effectiveness of the equipment

Supply of devices and equipment for a specific terminal, a longer period of time and going through various legal procedures. Even worse is the fact that no income at the time of purchase of equipment and costs, for example. Interest is already being repaid. Sometimes it is difficult to obtain the equipment and devices of the terminal with a clear prediction of the costs involved. Period of use of the equipment and devices is often longer (average 20 years), from the time of closing the financial structures.

The operational efficiency of appliances and equipment of the container terminal is a very important parameter for the shipping company when choosing a port in which to fit their ships. Period procurement of tools and equipment from the public administration and state-owned companies are often very long and is subject to a number of restrictions by national legislation. For all these reasons, the period of procurement of equipment and devices must be taken into consideration when choosing a container terminal business model.

#### 6.4.3. Sales and marketing opportunities

Container Terminals carry out their work in a very competitive environment, so that sales and marketing terminal, and the opportunities they have in the market is an important parameter of business of container operators. The choice of port depends greatly on the port costs, but with today's customers ports take into account the marketing opportunities and reputation of the port. For these reasons, the promotion and presentation of the possibilities for the port is a very important parameter that affects

the choice of business model of the container terminal. It is very important for the new container terminal operator, presenting its capabilities to business activities in the market in order to attract customers.

The four main criteria and other criteria are shown in Table 5.

## 7. The electing process of a new operational model in Port of Rijeka Container Terminal (PRCT)

The Port of Rijeka Authority presented a new Master Plan in 2008, as well as strategic orientation of port development in the next decade. The main feature of the Master Plan for container traffic adjusted capacity of its terminals with container market demand. The Master Plan is based on a detailed review of economic growth, business forms, access to alternative transport corridors and Central Europe transport corridors. The Master Plan includes an investment program depending on market demand. An important determinant of the Master Plan is a traffic forecast. Shown in Table 6.

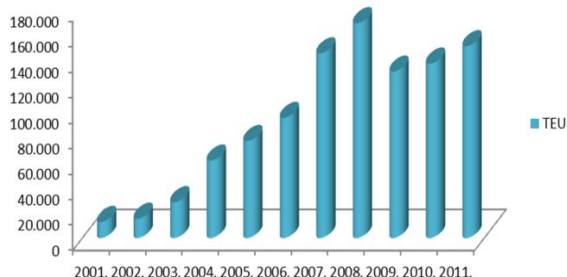
**Table 6.:** Port of Rijeka Master Plan, container traffic forecast (TEU)

Scenario	2020	2025	2030
Low	460,024	698,315	1,017,203
Middle	637,181	1,050,984	1,658,996
High	854,354	1,525,221	2,605,659

Source: Arhieve Port of Rijeka Authority

Strategic framework of container traffic in the PRCT are basically the construction of container terminals capacity with market demand. Consider modern trends of port globalization, in port area are divided responsibility in the creation of these facilities. On the one hand the investments in port infrastructure and superstructure by the Port Authority as a concession provider and part of the public administration, and other investments in the handling and transport equipment and new information technology by companies, concessionaire.

**Fig. 5.:** Container traffic Port of Rijeka Container Terminal 2001 to 2011.(TEU)



Source: Made by author with data Port of Rijeka Inc. Archive

The intensive rise in container traffic in 2003, optimization of logistic chain and the arrival of new shipping lines pointed to the need to increase the capacity of the Port of Rijeka Container Terminal. The construction of the new operating berth with a sea depth of 14.5 m allows the safe mooring of larger container ships primarily on direct service with the Far East.

**Fig.6.:** Port of Rijeka Container Terminal on December 2011.



Source: www.rijekadanas.com, 28.12.2011.

The investment in the second phase of the PRCT is part of the obligations of the PRA (the concession provider) which provided funding for its implementation. The second phase relates to investments in port infrastructure (new berth and storage area, train station) and the superstructure (new input-output point, down service).

The investment into the handling and transport equipment, shore cranes and storage equipment is part of obligation by AGCT (the concessionaire,) pursuant to the Concession Agreement.

The newly built section of the terminal allows the application of the modern generation of coastal crane (reach 18 containers across the width of the ship) and storage equipment, with new berth and water depth along the berth of the new 14,5 meters for ships more than 10,000 TEU capacities. Because the business plan provides for concessionary transport and up to 60% of containers by rail, it was necessary to significantly increase the existing capacity of loading-unloading station wagons. For this purpose, made the preliminary design of the reconstruction of railway yards Rijeka.

## 8. The electing process of a new operational model in Port of Rijeka Container Terminal (PRCT)

Port of Rijeka Container Terminal has a specific business model where the Port of Rijeka Authority and company Adriatic Gate Inc. have entered into a concession contract in duration of 32 years. The concession contract regulates the rights and obligations of the activity in the port area. An important precondition for the conclusion of the concession agreement is the obligation of investment in handling and transport equipment by the concessionaire. Adriatic Gate Inc. committed in the period of the concession, among other things, invest in new equipment, terminal information system and maintaining infrastructure and superstructure and attached schedule, which is an integral part of the contract. The contract provides the obligations of the Port of Rijeka Authority through the construction of infrastructure and superstructure of the second phase of the container terminal as described hereinbefore.

Based on requests for extension of the concession duration between the Port of Rijeka Authority and the Adriatic Gate Inc. 28.12.2009.godine concluded amendment of the Concession Agreement which concessions for the container terminal extends for 30 years starting in 2011 upon the expiration of the basic Treaty of 2001. The accepted criteria for choosing future joint venture partner in the Adriatic Gate Inc. and defined the course of the overall selection process and the method of implementation based on the call of the international public tender. Adriatic Gate, as the concessionaire started in finding a joint venture partner to fulfill its obligations under the contract. The joint venture partner is a company that has a segment of the market share in operating of container terminals. Besides the equipment must be able fulfilling the modernisation requirements according to the concession agreement and has "know-how" in container transport logistics. The tender procedure is conducted. This was the first such process of finding a joint venture

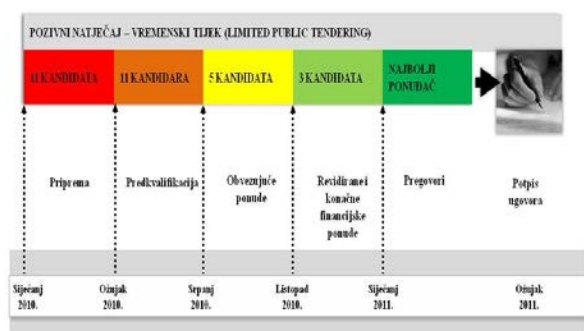
partner in Croatian ports. The competition received a total of 11 bids from companies that are among the world's largest operators : APM Terminals, DP World, HHLA, ICTSI, Grup TCB, TO Delta, Mariner, OPM, Hutchison, PSA, Dragados

Pre-qualification documents have submitted by a total of eight interested companies. With list analysis of potential joint venture partners narrowed to five companies. Five prequalified candidates were invited to submit bids, which must include: securing supply, ownership structure, business plan and financial offer. Binding bids were submitted by three candidates:

- A. APM Terminals - Rotterdam
- B. Hamburger Hafen und Logistik AG - Hamburg
- C. International Container Services Inc. - Manila

Bids are evaluated according to the Business Plan and the financial offer, and the overall result of the tendering procedure for the selection of ICTSI preferred joint venture partners and have him start negotiations. If the outcome of negotiations with ICTSI would not be positive, tender scheduled to continue negotiations with the second-best bidder. Chronology process of introducing private capital into the Adriatic Gate Inc. is shown in Fig. 7..

**Fig. 7 :** Joint venture partner finding proceeding to Container Terminal in Port of Rijeka



Source: Port of Rijeka Inc.

After completion of the tender procedure company International Container Terminal Services Incorporated (ICTSI) has been chosen for a joint venture partner. ICTSI is global container terminal operator, established in 1987 with headquarters in Manila, Philippines. It is present in 7 container terminals in the Philippines and 16 container terminals around the world. In Europe there is a concession for the handling of containers in another Baltic Container Terminal in Gdynia, Poland.

Agreement on joint venture partnerships and mergers in the company Adriatic Gate Inc. between the Port of Rijeka Inc. and ICTSI signed 05.03.2011.godine. The contract defined the container terminal investment significantly exceeds the investment plan from the concession agreement, and include the implementation of modern technologies and full automation of monitoring the unloading, storage and shipping containers. With the investment, the joint venture partner is committed to provide increased traffic by opening new markets of Central and Southeast Europe, to ensure a strong leap forward in logistics and joint participation in the new projects of the Port of Rijeka Authority and the Port of Rijeka Inc. and to respect social obligations with a minimum retained the acquired rights of workers. In accordance with the commitments assumed in the Appendix to the Concession Agreement, capital reserves to be used for investment

in infrastructure and equipment and Terminal.

## 9. The basic features of the PRCT operational model by 2012.

After completing the download process, ICTSI become new owner of the company that manages the container terminal and started making the PRCT Business Plan. The most important part of the Business Plan was Terminal Master plan. Master plan defines the following parameters: spatial plan of the terminal, the principle storage containers, purchase of new container cranes, storage equipment, storage, organization of storage in phases, defining berth capacities, the handling capacity of container cranes, storage equipment, transport equipment, commitment shore, entry and exit point, service area, installation, evaluation of investment costs, manpower, etc. described in Scheme 6.

As part of the Master Plan AGCT defined and projection container terminal capacity. The maximum capacity has several limiting parameters, such as storage space and the railroad access. The basic prerequisite is the construction of the second phase of the container terminal. After considering these limitations the maximum annual capacity of the container terminal was defined on 500,000 TEU.

The container terminal operational model from the point of view of the Adriatic Gate Inc. the option "a joint venture, ownership of the operating business", which can be seen from Table 7.

The ownership structure of the Adriatic Gate dd (AGCT) as a local operator terminal is divided into shares of 51% of ICTS as a global operator terminal and the Port of Rijeka 49% as the port corporations and local stevedore for PRCT. Adriatic Gate Inc. (AGCT) is essentially a joint venture, or partnership interests in a company foundation between ICTSI and Port of Rijeka Inc. Activities in the

terminal is fully owned by the Adriatic Gate Inc. the ownership of the operating business of Options 4, Table 7.

### 10. Selection criteria analysis of the PRCT operational model

Due to the existing literature in this issue, container terminals can be divided according to type of ownership (full ownership or joint venture ) and the type of investments (Ownership of the operating business , Outsource-operated , Jointly-operated) as shown in Table 7 .. These two dimensions create six possible options container terminals .

**Table 7.:** A preliminary proposal of container terminal operational models

Operational Ownership		Ownership of the operational activity	Outsource-operated	Jointly-operated
Subsidiary company	Full ownership	OPTION 1: Full ownership, Ownership of the operational activity	OPTION 2: Full ownership, Outsourcing of operational activity	OPTION 3: Full ownership, Combination of operational activity
	Joint venture	OPTION 4: Joint venture, Ownership of the operational activity	OPTION 5: Joint venture, Outsourcing over operational activity	OPTION 6: Joint venture, Combination of operational activity

Source: Adapted by Togzon and Heng 2005., p.46.

#### 10.1. The analysis of the business model " Full ownership " (OPTIONS 1-3)

In the three models complete ownership of the operational activity, the port corporation covers the entire investment in the container terminal. The advantage of these three models is that the port corporation has complete control over the operational activity of the container terminal, meaning owns 100% ownership of the terminal. As a consequence of this

model of ownership, has great flexibility in the operational activity, which greatly affects the attractiveness of providing transshipment activities and attract shipping companies.

**OPTION 1** container terminal, "full ownership, ownership of the operational activity" is fully investment by one company (David and Stewart, 2010). this model, which in its organizational structure has sector under full ownership of the port corporation with the principal function of the container terminal operational activity can be found in the example of the operational model of Hutchison Port Holdings Ltd (HPH). Operational models with the outsourcing (Notteboom and Winkelmanns, 2001) in essence, assumes that a entity is not sufficiently competitive in the global environment and must give part of operational activity (activities) in outsourcing. Furthermore, in today's trend of globalization, the outsourcing operational model allows shipping companies, freight forwarders and operators of container terminals developing new business.

The business model **OPTION 2**, "full ownership, outsourcing of operational activity", the container terminal is built entirely on the basis of port investment corporations, while the individual activities of the container terminal surrender in outsourcing various operators, including stevedore companies and other operators of container terminals. Port Corporation is not included in the coastal operating activity or operational activity of stock at the container terminal. Taking part in the outsourcing of activities with specialized devices, the port corporation can concentrate on their main (core) business. This may be one of the best operational model (Quinn and Hilmer, 1994). Furthermore, the port corporation, which lacks experience in operating of container terminal, will be able to create experience and specialist knowledge in its operations.



The business model of **OPTION 3**, "full ownership, a combination of operational activities", the port corporation owns and maintains container terminals, while operating activity is performed by the combination of port corporations and stevedore company or operator of container terminals. The advantage of this operational model is that an investor or company that invests in the container terminal can take part in the operational activities of the terminal. This model can help increase the operational capability of a company that invests in terminal eg. port corporations. Furthermore, the port corporation invests huge financial resources in handling equipment and terminal devices in its initial phase as well as participation in the operational activity business. It is common in this model of shared operational activity to share profits from the business.

## 10.2. The analysis of the operational model "Joint venture" (OPTIONS 4-6)

The operational model of a joint venture, there are three options called "joint venture, ownership of the operational activity", "joint venture, outsourcing over operational issues" and "joint venture, the combination of the operational activity," David and Stewart (2010) emphasize that the joint venture established when two or more companies have co-ownership of the subject company. This type of partnership is usually established when local government sets certain restrictions for foreign investors. In some cases, container terminals operator establish a partnership with a local operator of container terminals, such as for example, the port corporation to achieve higher profits in compliance with the regulations of the local government and eliminate interference in the direct participation of foreign company. In this case the management of container terminal is done smoothly and regulatory.

In the case of the huge capital investment, the establishment of a joint venture model with a partner, to some extent, can help solve the problem of inadequate capital to a specific operator of the container terminal. In the case when one of the partners as a joint venture specialized container terminal operator, a company that invests can acquire specialized techniques and experience necessary for the performance of the container terminal.

Operational model **OPTION 4**, "a joint venture, ownership of the operational activity," includes a case where the port corporation co-financed by the container terminal with some other investors. Partner in a joint venture owns certain shares with respect to the size of the investment. Partner with the largest share in the investment and typically holds most of the property. In this operational model, the port corporation may have a high degree of flexibility in operating the business as long as there under his management all related activities of the container terminal.

Operational model **OPTION 5**, "a joint venture, outsourcing of operational issues," the case when the port corporation and co-financed by other operators in the container terminal, but not as partners involved in the operational activity of the terminal. The same delegate tasks to stevedore companies and other operators of container terminals that specialize in certain occupations. (Lu et al. 2012). The same model combines the advantages of a joint venture and outsourcing. Of course, that in this model there are also some disadvantages. For example, some business partners who invest in the container terminal can be deprived of the opportunity of fostering interdisciplinary ability to integrate different functions because none of them involved in the activities of the container terminal (Quinn and Hilmer, 1994).

Business Model **OPTION 6**, "joint venture, a combination of operational activities", includes a case

where the port corporation and co-financed by other operators in the container terminal operational activity. Ownership share of each partner is common in relation to the amount of funds invested by each individual. There are cases where the operator of the container terminal operator of legal restrictions and therefore invest the same financial amount as the local operator of the container terminal or local government, or where the ratio of foreign investors in the property is less than the local terminal operator local government (Rossignol 2007). This operational model has the legal rights of a joint venture and combinations of operations. Contribution corporation that manages the container terminal along with stevedore company or other operator of the container terminal is retaining ownership of the container terminal at the same time have the opportunity to gain experience in operating the container terminal business. While certain port corporation may be engaged in a partnership with a large number of operators from different operational segments, the operating activities of the terminal will become a complex and less manageable for the performance of port activities.

### 10.3. The Port of Rijeka Container Terminal operational model after December 2012

Before the definition of a Port of Rijeka Container Terminal operational model below lists the primary features of the Port of Rijeka, the Port of Rijeka Authority, the Adriatic Gate Inc., Port of Rijeka Inc., International Container Terminal Services Incorporated (ICTSI) and the description of the port area, the Port of infrastructure and superstructure, reloading devices and equipment and marine KTB waters.

a) Port of Rijeka: Rijeka port area is defined by the Decision of the Government including PRCT

b) PRCT: part of the port area of the Port of Rijeka. The existing infrastructure, superstructure and reloading equipment defined by the concession contract between the Port of Rijeka Authority and the Adriatic Gate Inc.

c) Port of Rijeka Authority: the grantor of the concession and the managing body of the Port of Rijeka

The ownership structure of the Port of Rijeka Authority: The institution was established by the Decision of the Croatian Government, a non-profit legal entity.

d) Adriatic Gate Container Terminal (AGCT): the concessionaire at PRCT, pursuant to the Decision of the Administrative Council of the Port of Rijeka on the basis of international tender for the concession

The ownership structure of the Adriatic Gate Company (12.2015): 51% ICTSI Manila, 49% of Port of Rijeka Inc

e) International Container Terminal Services Inc. (ICTSI): the global terminal operator Ownership Structure ICTSI: Private Property

f) Port Corporation and stevedore companies (of PRCT): Port of Rijeka Inc.

The ownership structure of Port of Rijeka Inc. (12.2015.): A combination of public and private ownership

g) Operator of the PRCT (local container terminal operator): Adriatic Gate Inc. (Adriatic Gate Container Terminal - AGCT)

h) Operational Business PRCT: Adriatic Gate Inc. (Adriatic Gate Container Terminal - AGCT)

i) The ownership of infrastructure PRCT (substructure) without the berth edge of quays and marine waters: non-owner regime, maritime domain concession in Adriatic Gate Inc.

j) The ownership of infrastructure PRCT (superstructure), the berth edge of the quays and marine waters: non-ownership regime, maritime domain managed by the Port of Rijeka Authority,

k) Port superstructure PRCT (superstructure): non-ownership regime, maritime domain concession in Adriatic Gate Inc.

l) The berth handling equipment, container cranes Samsung (2 pieces): maritime domain concession in Adriatic Gate Inc.

m) Mobile handling equipment and devices: Ownership Adriatic Gate Inc.

n) The sea waters area around the terminal: Maritime domain managed by the Port of Rijeka Authority regulated the Government decision on the establishment of the Port of Rijeka Authority

ICTSI , the global operator of container terminals through the company Adriatic Gate Inc. carries out activities in the container terminal in accordance with OPTION 6, " joint venture, a combination of operating business ."

**Table 8.:** Description, Ownership and Operational Model in Port of Rijeka Container Terminal (PRCT) on December 2012.

Entity related by PRCT	Description	Ownership	Operational BusinessModel
Port of Rijeka	port area (Port System) is defined by the Republic of Croatia Government Decision including PRCT	non-ownership regime, maritime domain managed by the Port of Rijeka Authority	different in relation to concessionaire and activities
Port of Rijeka Authority (PRA)	the grantor of the concession to PRCT and the managing body of the port of Rijeka	the institution established by the Decision of the Croatian Government, a non-profit legal entity	State regulation
Adriatic Gate Inc. (AGCT)	the concessionaire at PRCT (pursuant to the Decision of the Administrative Board of the Port of Rijeka Authority on the basis of international tender for the concession)	51% ICTSI Manila, 49% of Port of Rijeka Inc (on December 2012.)	joint venture, ownership of the operational activity(OPTION 4)
Port of Rijeka Inc (LR)	the Port Corporation and stevedore company for PRCT	the majority state-owned	joint venture, outsourcing over operational activity (for PRCT)
International Container Terminal Services Incorporated ICTSI	Global Port Operating Company	Private owned	operation owned, joint venture (for PRCT)

Source: Main by author with data Archieve by Port of Rijeka Authority and Port of Rijeka Inc.

The container terminal operational model from the point of view of the Adriatic Gate Inc. the option "a joint venture, ownership of the operating business", which can be seen from Table 8.

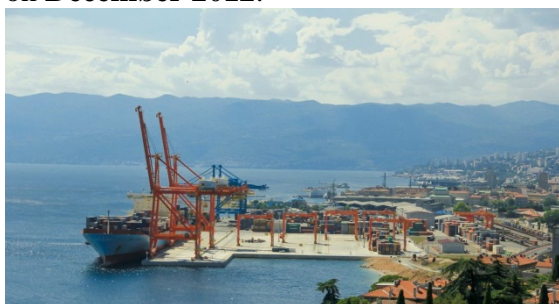
Adriatic Gate Inc (AGCT) share ownership in relation 51% ICTSI Manila and 49% of Port of Rijeka Inc. on December 2012 as shown in Table 8. Port of Rijeka Inc. as local port corporation and stevedore company AGCT become joint venture partner with ICTSI for AGCT.

The port corporation, Port of Rijeka Inc.(LR) co-financed by the container terminal with new investor. Partner in a joint venture owns certain shares with respect to the size of the investment (49% LR and ICTSI 51%). ICTSI as partner with majority share in the investment and typically holds most of the property in AGCT. In this business model AGCT have a ownership on operation business. LR have high degree of flexibility in operating the business under this management all related activities outsourced in the container terminal.

As long as the port corporation lacks the experience necessary for operations of the terminal, it may cause a higher cost operations and Port of Rijeka Inc.(LR) enter in that operational model. The case can reduce the amount of profit margins and reduce its investment attractiveness of the existing business partners which may result in a final withholding investments. There is a trend among the global operators of container terminals as ICTSI for the establishment of container terminals companies through a joint venture and the entrance to the agreements on the division of profits which

establish partnerships on long-term . Determinants of profit sharing specified in the agreement can help ICTSI to minimize their operational risk. AGCT should provide a range of services through the performance of the shipping companies. These services include the planning of call the ship by the wharf, the necessary handling equipment and devices, storage area, the required number of towage vehicles for the transport of containers from / to the quay and devices for identifying and searching containers. All this is necessary to carry out operations at the container terminal.

**Fig.7.:** Port of Rijeka Container Terminal on **December 2012.**



Source:www. rijekadanas.com, 28.12.2015.

In the event that the AGCT should provide a wide range of other activities that do not require specialized knowledge of specific sectors, services selected on the basis of outsourcing . Outside companies typically provide economies of scale. Their services contribute to the effective control of operating expenses and generate creating higher profits. Outsourcing of different services to different companies can spare the operators of container terminals of spending time and resources needed to coordinate the different sectors of the same operational system. Outsourcing will not affect the operational efficiency of operators in basic activities and will also reduce the competitive ability of operators in the market. Finally, the biggest advantage of the operational model "operating model - Outsourcing" is reducing operational costs and providing

professional services to customers. Furthermore, there is a specific risk that may arise from the same operational model.

Agreement on joint venture partnerships and mergers in the company Adriatic Gate Inc. between the Port of Rijeka Inc.and ICTSI signed on March 5<sup>th</sup>, 2011. The contract defined the container terminal investment significantly exceeds the investment plan from the concession agreement, and include the implementation of modern technologies and full automation of monitoring the unloading, storage and shipping containers. With the investment, the joint venture partner is committed to provide increased traffic by opening new markets of Central and Southeast Europe, to ensure a strong leap forward in logistics and joint participation in the new projects of the Port of Rijeka Authority and the Port of Rijeka Inc. and to respect social obligations with a minimum retained the acquired rights of workers. In accordance with the commitments assumed in the Appendix to the Concession Agreement, capital reserves to be used for investment in infrastructure and equipment and Terminal.

New owner of the AGCT that manages the container terminal and started making the PRCT Business Plan .The most important part of the Business Plan was Terminal Master plan. Master plan defines the following parameters : spatial plan of the terminal , the principle storage containers , purchase of new container cranes , storage equipment , storage, organization of storage in phases , defining berth capacities, the handling capacity of container cranes, storage equipment, transport equipment, commitment shore , entry and exit point , service area , installation , evaluation of investment costs , manpower , etc .

As part of the Master Plan AGCT defined and projection container terminal capacity. The maximum capacity has several limiting parameters, such as storage space and the railroad acces. The

basic prerequisite is the construction of the second phase of the container terminal. After considering these limitations the maximum annual capacity of the container terminal was defined on 500,000 TEU.

## 11. Conclusion

Strategic framework of container traffic in the Port of Rijeka are basically the construction of container terminals capacity with market demand. In port area are divided responsibility in the creation of these facilities consider modern trends of port globalization,. On the one hand the investments in port infrastructure and superstructure by the Port Authority as a concession provider and part of the public administration, and other investments in the handling and transport equipment and new information technology by the port operators as concessionaire. According to the type of operator and the basic motive of the terminal use management of the container terminal can be divided in management of the terminal by the public sector and public use terminals, management of the terminal by the private sector and the use of terminals in a variety of uses and management of the terminal by the private sector and the public use of the terminal. After completing the joint venture selection process in the Port of Rijeka Container Terminal (PCRT) the International Container Terminal Services Inc. (ICTSI) as global terminal operator become new majority owner of the company Adriatic Gate Int. (AGCT). Operationa model "a joint venture, ownership of the operational activity" includes a case where the port corporation Port of Rijeka Inc.(LR) co-financed by the container terminal with other investor the International Container Terminal Services Inc. (ICTSI). Partner in a joint venture owns shares with respect to the size of the investment. Joint venture partner with the

largest share in the case of PRCT is ICTSI (51% ownership) which is also the investor and holds most of the property in AGCT.

As part of the Master Plan AGCT defined and projection container terminal capacity. The maximum capacity has several limiting parameters, such as storage space and the railroad acces. The basic prerequisite is the construction of the second phase of the container terminal. After considering these limitations the maximum annual capacity of the container terminal was defined on 500,000 TEU. As long as the port corporation lacks the experience necessary for operations of the terminal, it may cause a higher cost operations and Port of Rijeka Inc.(LR) enter in that business model. The analysis of the operational model Joint venture there is a trend among the global operators of container terminals as ICTSI for the establishment of container terminals companies and the entrance to the agreements on the division of profits which establish partnerships on long-term . Determinants of profit sharing specified in the agreement can help ICTSI to minimize their operational risk. AGCT should provide a range of services through the performance of the shipping companies which are the main parameters for increase the cargo volume in PRCT.

## References

- Alderton, P. M. (2008). Port management and operation (3rd ed.). Informa: London.
- Baird, A. J. (1995). Privatization of trust ports in the United Kingdom: Review and analysis of the first sales. *Journal of Transport Policy*, 2(2), 135–143.
- Chao, S. L., & Lin, Y. J. (2011). Evaluating advanced quay cranes in container terminals.
- Transportation Research Part E: Logistics and Transportation Review, 47(4), 432–445.

- Chen, J. H., Lee, D. H., & Cao, J. X. (2012). A combinatorial benders' cuts algorithm for the quayside operation problem at container terminals. *Transportation Research Part E: Logistics and Transportation Review*, 48(1), 266–275.
- Cheon, S. H., Dowall, D. E., & Song, D.W. (2010). Evaluating impacts of institutional reforms on port efficiency changes: ownership, corporate structure, and total factor productivity changes of world container ports. *Transportation Research Part E: Logistics and Transportation Review*, 46(4), 546–561.
- Cheung, R.K., Li, C. L., & Lin, W. (2002). Interblock crane deployment in container terminals. *Transportation Science*, 36(1), 79–93.
- David, P. A., & Stewart, R. D. (2010). *International logistics - the management of international trade operations* (3rd ed.). USA: Cengage Learning.
- Dekker, S., & Verhaeghe, R. J. (2012). *The blackwell companion to maritime economics* (1st ed.). USA: Blackwell.
- Dolan, J.G. (2008). Shared decision-making - transferring research into practice: The analytic hierarchy process (AHP). *Patient Education and Counseling*, 73(3), 418–425.
- Drewry Maritime Research. (2014). *Global container terminal operators annual review and forecast 2013*. <http://www.drewry.co.uk/news.php?id=232>. Accessed 27 June 2014.
- European Journal of Operational Research 147: 1-16
- Farrell, S. (2012). The ownership and management structure of container terminal concessions. *Maritime Policy and Management*, 39(1), 7–26.
- Fransoo, J. C., & Lee, C.Y. (2013). The critical role of ocean container transport in global supply chain performance. *Production and Operations Management*, 22(2), 253–268.
- Gupta, G., & Gupta, H. (1992). Outsourcing the IS function - is it necessary for your organization? *Information System Management*, 9(3), 44–50.
- Heaver, T., Meersman, H., & Moglia, F., Van De Voorde, E. (2000). Do mergers and alliances influence European shipping and port competition? *Maritime Policy and Management*, 27(4), 363–373.
- Ho, W. (2008). Integrated analytic hierarchy process and its applications—A literature review. *European Journal of Operational Research*, 186(1), 211–228.
- Jin, J. G., Lee, D. H., & Cao, J. X. (2014). Storage yard management in maritime container terminals. *Transportation Science*. (article in advance)
- Kim, K. H., & Kim, H. B. (2002). The optimal sizing of the storage space and handling facilities for import containers. *Transportation Research Part B: Methodological*, 36(9), 821–835.
- Kolstad, I., & Villanger, E. (2008). Determinants of foreign direct investment in services. *European Journal of Political Economy*, 24(2), 518–533.
- McFarlan, F. W., & Nolan, R. L. (1995). How to manage an IT outsourcing alliance? *Sloan Management Review*, 36(2), 8–23.

Maritime Domain and Sea Port Law in Republic of Croatia, 1995

Meisel, F., & Bierwirth, C. (2013). A framework for integrated berth allocation and crane operations planning in seaport container terminals. *Transportation Science*, 47(2), 131–147.

Murty KG, Liu J, Wan YW, Linn R (2005) A decision support system for operations in a container terminal. *Decision Support Systems* 39: 309-332

Musso, E., Ferrari, C. & Benacchio, M. (2006). Port investment: Profitability, economic impact and financing. In K.

Cullinane & W. Talley (Eds.), *Port economics: Research in transport economics* (Vol 16, pp. 171–218) Amsterdam:

Elsevier. Ng, A., & Yu, K. (2006). Assessing the attractiveness of ports in the North European container transshipment market: An agenda for future research in port competition. *Maritime Economics and Logistics*, 8(3), 234–250.

Notteboom, T. E., & Winkelmann, W. (2001). Structural changes in logistics: How will port authorities face the challenge? *Maritime Policy and Management*, 28(1), 71–89.

Notteboom, T. E., & Rodrigue, J. P. (2010). The corporate geography of global container terminal operator. *Maritime Policy and Management*, 39(3), 249–279

Pallis, A. A., Vitsounis, T. K., & Langen, P. W. D. (2010). Port economics, policy and management: Review of an emerging research field. *Transport Reviews*, 30(1), 115–161.

Port of Rijeka Authority Arhieve 2011 – 2012

Port of Rijeka Inc. Arhieve 2011  
Quinn, J. B., & Hilmer, F. G. (1994).

Strategic outsourcing. *Sloan Management Review*, 35(4), 43–55.

Riopel D (eds) *Logistics Systems: Design and Optimization*, pp 213-243. Springer, New York

Rao, K., & Young, R. R. (1994). Global supply chains: Factors influencing outsourcing of logistics functions.

*International Journal of Physical Distribution and Logistics Management*, 24(6), 11–19.

Rossignol, M. H. L. (2007). Global terminal operators: An overview. the Inter-American Committee on Port (CIP): Washington.

Saaty, T. L. (1980). *The analytic hierarchy process*. New York: McGraw-Hill.

Smith, M. A., Mitra, S., & Narasimhan, S. (1998). *Information systems outsourcing: A study of pre-event firm characteristics*.

*Journal of Management Information Systems*, 15(2), 61–93.

Steenken D, Voß S, Stahlbock R (2004) Container terminal operation and operations research – a classification and literature review. *OR Spectrum* 26: 3-49

Taleb-Ibrahimi, M., Castilho, B. D., & Daganzo, C. F. (1993). Storage space vs handling work in container terminals.

*Transportation Research Part B: Methodological*, 27(1), 13–32.

Tongzon, J., & Heng, W. (2005). Port privatization, efficiency and

competitiveness: Some empirical evidence from container ports (terminals).

Transportation Research Part A: Policy and Practice, 39(5), 405–424.

United Nations Conference on Trade and Development (UNCTAD). (2013). Review of maritime transport 2013. New York: United Nations Publication.

Vaidya, O. S., & Kumar, S. (2006). Analytic hierarchy process: An overview of application.

European Journal of Operational Research, 169(1), 1–29.

Verhoeven, P. (2010). A review of port authority functions: Towards a renaissance? Maritime Policy and Management, 37(3), 247–270.

Yang CH, Choi YS, Ha TY (2004) Simulation-based performance evaluation of transport vehicles at automated container terminals. OR Spectrum 26: 149-170

Wang M (2005) The rise of container transport in Asia. In: Lee TW, Cullinane K (eds)

World Shipping and Port Development, pp 10-35. Palgrave, Basingstoke

Wiegmans, B. W., Ubbels, B., & Rietveld, P., Nijkamp, P. (2002). Investments in container terminals: Public private partnerships in Europe. Maritime Economics, 4(1), 1–20.

Zhang, C., Wan, Y. W., Liu, J., & Linn, R. J. (2002). Dynamic crane deployment in container storage yards. Transportation Research Part B: Methodological, 36(6), 537–555.

Zhang, C., Liu, J., Wan, Y. W., Murty, K. G., & Linn, R. J. (2003). Storage space allocation in container terminals.

Transportation Research Part B:  
Methodological, 37(10), 883–903.  
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