

# IMPACT OF NAUTICAL VESSELS ON CROATIAN NAUTICAL SEA PORTS CAPACITY

**Nina Perko**

Ministry of the Sea, Transport and Infrastructure  
Head of department for ports and maritime domain  
Prisavlje 14, HR - 10000 Zagreb, Croatia  
nina.perko@pomorstvo.hr

**Vlatka Stupalo**

**Natalija Jolić**

Faculty of Transport and Traffic Sciences  
Vukelićeva 4, HR - 10000 Zagreb, Croatia  
vstupalo@fpz.hr, natalija@fpz.hr

## ABSTRACT

Nautical vessels are explored in terms of their navigational capabilities, their purpose, nautical plan, and available navigation services as well as in terms of their infrastructure and service level requirements inside ports. The development of nautical tourism in Croatia is constantly pushing the demand and supply of nautical vessels that satisfy the need for travel and pleasure. Nautical tourism is an important part of Croatian tourist service in general. Tourist service is provided to boater, initiator of nautical tourism, primarily on vessels and inside nautical tourism ports. The capacity of the nautical tourism port is determined by the number of sea berths and land berths. Different types of nautical vessels require different content, service and berth in the port. When planning the construction of new berths and ports or expansion of existing ones, it is important to take into consideration the trend of the arrival of vessels of greater length and width.

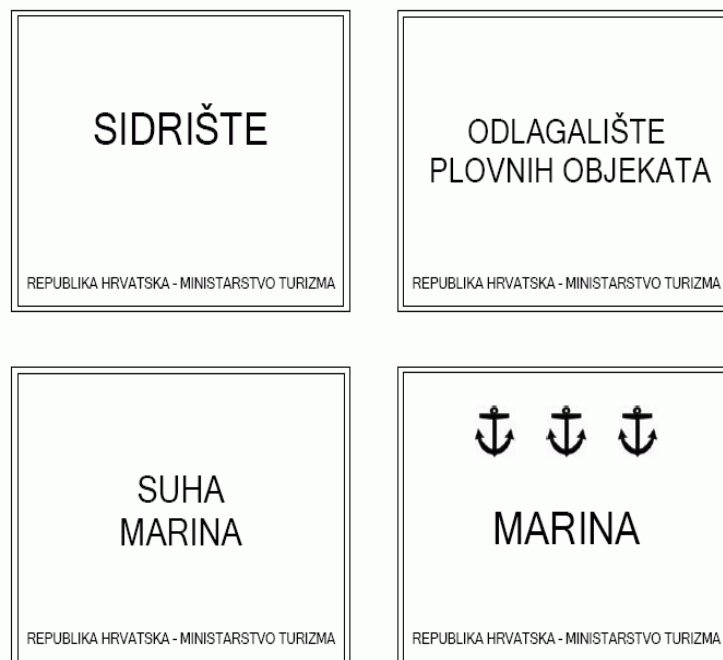
## 1 INTRODUCTION

Nautical tourism is an important part of the Croatian tourism offer. The Law on tourism services (National Gazette 68/07 and 88/10) defines nautical tourism as the navigation and stay of tourists on vessels (yachts, boats and ships, for personal use or economic activity, etc.) and nautical tourism ports for leisure and recreation. Tourism services are provided to boaters, i.e., initiators of nautical tourism, primarily on vessels and inside nautical tourism ports.

Vessels that participate in nautical tourism are ship, boat or yacht designed and equipped to provide nautical tourism services. [3] According to the type of service it offers, a vessel can be categorized as: *excursion vessel* (offering transport services to tourist that last up to 24 hours, with the possibility of offering food and drinks, but no accommodation), *cruise vessel* (offering transport service to tourists that last more than 24 hours, with compulsory offering of food, beverages, and accommodation), *boat rental without accommodation*, i.e., one-day charter (rental of vessels with or without crew for personal needs of leisure and recreation - fishing, diving, etc. - up to 24 hours, without accommodation), *boat rental with accommodation*, i.e., charter (offering daily charter service and accommodation). Excursion vessels and cruise vessels, depending on the level of service they offer, fall inside the following categories: two-rudder, three-rudder, four-rudder and five-rudder.

According to the Regulation on the classification and categorization of nautical tourism ports (National Gazette 72/08), nautical tourism ports in Croatia are also classified by the type of services provided inside the port. We can differentiate between (Figure 1):

- Anchorage - part of the sea or water area suitable for the anchoring of vessels and equipped with safe anchorage devices
- Land storage - part of land that is fenced and equipped for storage of vessels on land, offering transportation services, and services of lowering and pulling vessels out of the sea. Tourists cannot stay in these ports and the preparation of the vessel cannot be done here.
- Land marina - part of land that is fenced and equipped for storage of vessels on land, offering transportation services, and services of lowering and pulling vessels out of the sea. Tourists can stay in these ports and the preparation of the vessel can be done here. Moreover, it is allowed to offer beverages and food.
- Marina - part of the coast and water area specifically built and equipped for the provision of berthing services, accommodation of tourists inside vessels and other services. Drinks, beverages and meals are also provided inside marina. Marinas are categorized into 5 categories (two-anchor, three-anchor, four- and five-anchor). According to the data provided by the Croatian Central Bureau of Statistics, there are 60 marinas (land marina and marina) in the Republic of Croatia.



**Figure 1: Standardized panels for labelling types and categories of nautical tourism ports (Translation: Republika Hrvatska-Ministarstvo turizma: Republic of Croatia-Ministry of Tourism, Sidrište: Anchorage; Odlagalište plovni objekata: Land storage; Suha marina: Land marina), Source: [4]**

**Table 1: Nautical ports in Croatia, 2010**

County	Anchorage	Mooring	Marinas				Uncategorised nautical ports	Total
			Land marina	Marina, 1 <sup>st</sup> category	Marina, 2 <sup>nd</sup> category	Marina, 3 <sup>rd</sup> category		
County of Primorje-Gorski kotar	8	6	7	1	3	3	1	30
County of Zadar	8	8	-	-	4	4	-	24
County of Šibenik-Knin	-	-	-	2	4	5	-	11
County of Split-Dalmatia	-	1	2	-	5	3	1	13
County of Istria	-	3	-	3	6	2	1	15
County of Dubrovnik-Neretva	-	-	1	-	2	-	-	5
<b>TOTAL</b>	<b>16</b>	<b>18</b>	<b>10</b>	<b>6</b>	<b>24</b>	<b>17</b>	<b>3</b>	<b>98</b>

Source: [7]

In addition to the abovementioned nautical tourism ports (Table 1), boaters are attracted to nautical berths located inside ports for public transport. Most of these are the so-called seasonal berths which are situated in the old historic town centres on the coast and the islands. At these berths vessels are moored or anchored in the order they come to the port or in regard to the characteristics of the vessel. The part of the port open for boaters must be marked. The provision of water supply, electricity, garbage collection, etc. can be made and charged on the basis of concession.

## 2 NAUTICAL TOURISM PORTS CAPACITIES IN THE REPUBLIC OF CROATIA

In 2007 the share of Croatia in the nautical vessels berths offer of Mediterranean countries amounted to around 6.9%, France 47.3% Italy 10.4%, Greece 6.4%, Turkey 4.9%, etc. Given the length of the coastline, Croatia has about 2.6 nautical berths per kilometre, France 64, Italy 3.1, Spain 20.2, Greece 1.1, Turkey 2.2, etc. Accordingly, Croatia still has unused comparative advantages and the potential to increase its competitiveness on the nautical services market [1, p.6.].

In the summer of 2007 the Institute of Tourism conducted a survey entitled "Attitudes and consumption of sailors in Croatia" or "TOMAS-Boat 2007". As part of the research, different characteristics of boaters' travel and stay in Croatia were continuously studied. Spatial distribution of marinas, preservation level of nature, cleanness of the sea, social security and hospitality were recognized as competitive advantages of Croatia in comparison with other Mediterranean yachting destinations. The biggest Croatian drawbacks were the capacity and equipment of marinas, image of the country, catering offer and "value for money" of the overall nautical offer.

The capacity of nautical tourism ports is determined by the number of berths and dry berths. Due to market demand (varying size of vessels at berth), it can vary up to 20% [4]. Nautical berths can be yearlong, seasonal and transit. Carrying capacity is yearlong and seasonal. Vessel admittance services are permanent and transit berth rental. Apart from berthing, nautical ports also offer other services that make part of the nautical services offer (commercial, sporting, servicing, etc.) [1, p.6.]. The capacity of nautical sea ports is shown in Table 2.

**Table 2: Capacity of nautical sea ports in Croatia (2006-2010)**

Year:	2006	2007	2008	2009	2010
<b>Number of nautical ports</b>	<b>95</b>	<b>94</b>	<b>97</b>	<b>98</b>	<b>98</b>
Out of that, marinas	56	56	58	58	60
Water surface, m <sup>2</sup>	4,241,550	3,309,958	3,387,879	3,293,558	3,313,110
<b>Number of moorings, total</b>	<b>15,827</b>	<b>15,834</b>	<b>16,403</b>	<b>16,848</b>	<b>16,913</b>
Out of that: for vessels lengths					
Under 6 m	1,014	1,056	1,054	1,184	1,239
6-8 m	2,096	2,144	2,128	2,136	2,097
8-10 m	3,475	3,566	3,602	3,579	3,542
10-15 m	7,564	7,414	7,591	7,827	7,842
Over 15 m	1,678	1,654	2,028	2,122	2,193
Length of shoreline equipped for mooring, m	116,455	117,127	66,038	63,824	64,715
<b>Space for land storage, number of berths</b>	<b>5,127</b>	<b>5,186</b>	<b>5,189</b>	<b>5,209</b>	<b>5,125</b>
Total surface area on land, m <sup>2</sup>	792,609	831,372	760,469	753,369	756,538
Of that covered area, m <sup>2</sup>	7,930	5,450	5,756	5,246	6,596

Source: [6,7,8,9,10,11]

According to data provided by the Croatian Central Bureau of Statistics, the total revenue from nautical tourism in 2010 amounted to 574.1 million dollars and was realized in 98 nautical tourism ports. Out of this total revenue, 75.9% or 435.9 million was realized from berth rental. The total revenue increased by 5.7% compared to the year 2009, while the revenue from berth rental increased by 7.4%.

On 31 December 2010 there were 14,431 vessels at permanent berths in nautical tourism ports, which is 2.5% less than on 31 December 2009. Sea berths were used by 12,661 (87.7%) of vessels, (Table 3) while only dry berths were used by 1,770 (12.3%) vessels. According to the type of vessel, permanent sea berths were used by the following types of vessels: 46.7% motor yachts, 47.9% sailing yachts, and 5.4% other vessels. According to the national flag carried, most vessels at permanent berths came from Croatia (35.5%), Austria (18.2%), Germany (15.3%), United States (6.6%), Slovenia (6.0 %) and Italy (5.3%), accounting together for 86.9% of the total number of vessels at permanent berths [7] (Graph 1).

Number of transit vessels in nautical tourism ports in 2010 amounted to 206,028 or 0.9% more than in 2009 (Table 4). According to the type of vessels, out of the total of 198,988 transit vessel that used sea berths, 32.7% were motor yachts, 64.6% sailing yachts, and 2.7% other vessels. In this period most transit vessels came from Croatia (42.1%), Italy (23.0%), Germany (10.7%), Austria (7.6%) and Slovenia (4.9%), accounting together for 88.3% of the total number of transiting vessels (Graph 1). Only dry berths were used by 7,040 vessels [7].

**Table 3: Number of vessels in nautical sea ports, in sea, by vessel length, *permanently moored* (2006-2010)**

Vessel length	Number of Vessels, <i>permanently moored</i> , situation as on 31 December				
	2006	2007	2008	2009	2010
Under 6 m	573	534	574	569	614
6 – 8 m	1,465	1,493	1,453	1,323	1,323
8 – 10 m	2,852	2,817	2,937	2,791	2,642
10 – 12 m	3,476	3,667	3,738	3,776	3,544
12 – 15 m	2,744	2,781	2,998	3,158	3,228
15 – 20 m	697	749	908	980	1,011
Over 20 m	141	188	200	281	299
<b>TOTAL</b>	<b>11,948</b>	<b>12,229</b>	<b>12,808</b>	<b>12,878</b>	<b>12,661</b>

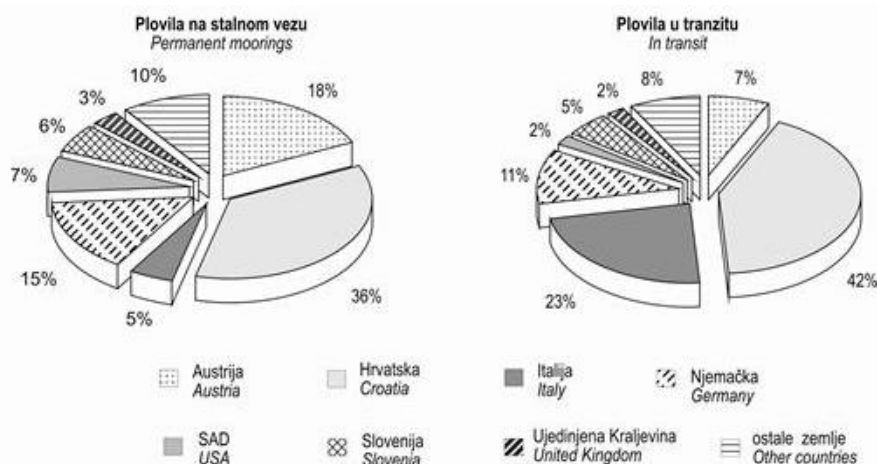
Source: [7,8,9,10,11]

**Table 4: Number of vessels in nautical sea ports, in sea, by vessel length, *in transit* (2006-2010)**

Vessel length	Number of Vessels, <i>in transit</i>				
	2006	2007	2008	2009	2010
Under 6 m	7,912	7,049	5,663	5,154	5,189
6 – 8 m	19,009	19,493	18,553	16,049	15,731
8 – 10 m	38,805	42,954	36,986	34,884	32,506
10 – 12 m	69,494	69,194	68,393	66,760	68,029
12 – 15 m	56,893	61,123	64,001	58,050	59,744
15 – 20 m	11,887	11,765	13,753	13,389	14,367
Over 20 m	3,026	4,070	3,530	3,529	3,422
<b>TOTAL</b>	<b>207,026</b>	<b>215,648</b>	<b>210,849</b>	<b>197,815</b>	<b>198,988</b>

Source: [7,8,9,10,11]

Looking at the number of vessels permanently moored in sea (Table 3), a growing trend of vessels' size can be observed. In 2006, out of the total number of vessels berthed in sea, 5.83% was 15 to 20 m long, and 1.18% was longer than 20 m. The following year, 7.99% of vessels were 15 to 20 m long, and 2.36% was longer than 20 m. Furthermore, out of the total number of transit vessels moored in sea (Table 4), vessels whose length was between 15 and 20 meters accounted for 5.74% in 2006, and while in 2010 it was 7.22%. The number of vessels longer than 20 meters accounted for 1.46%, in 2006, and 1.72% in 2010. Out of the total number of berths (Table 2), in 2006 10.60% berths were larger than 15 meters, while in 2010 12.97% berths were larger than 15 meters.



Graph 1: Number structure of vessels on permanent moorings and in transit, by flag 2010; Source: [7]

Berths in ports open to public traffic, mooring inside sport ports, industrial, fishing and former military ports, which are in compliance with the existing regulation and are not intended for nautical tourism, can also be used for the purposes of nautical tourism. Berths inside sports ports are intended solely for the Croatian flag vessels owned by the citizens who are members of sports associations which are the beneficiaries of concessions for such ports.

### 3 NAUTICAL TOURISM SUPPLY AND DEMAND

According to the “TOMAS-Boat 2007” research, boaters arrive to their starting port in the Republic of Croatia mostly by car (59%), by vessel in which to reside (23%) and by plane (14%). Most boaters’ journeys lasts around 14 overnights, out of which around 9 are spent in marinas, 2 in local ports and 1-2 on buoys or anchor, i.e., outside local ports and marinas. On average, 11 nights are spent on charters and 17 on individual vessels.

According to the data provided by the Croatian Ministry of the Sea, Transport and Infrastructure, in 2010 58,394 arrivals of foreign yachts and boats were registered, an increase of 2.01% compared to 2009. Out of this, 35,291 vessels (60.44%) arrived by land, 12,340 (21.13%) by sea, while 10,763 (1.43%) vessels arrived from wintering. Out of the total number of foreign vessels, 51.85% were less than 6 meters long. In 2010 there were 306,555 boaters on foreign yachts and boats, a 2.2% increase compared to 2009 (Table 5).

Table 5: Number of check-ins by foreign yachts and boats for sport and recreation and the number of boaters

PORT AUTHORITY	NUMBER OF CHECK-INS					NUMBER OF BOATERS				
	2006	2007	2008	2009	INDEX 09/08	2006	2007	2008	2009	INDEX 09/08
Pula	17,666	18,787	18,788	19,247	102.44	93,335	100,870	90,940	92,439	101.65
Rijeka	13,242	13,496	13,459	13,863	103.00	81,475	86,248	81,672	87,244	106.82
Senj	1,657	1,626	1,744	1,874	107.45	9,504	9,888	10,089	11,394	112.93
Zadar	7,166	7,503	7,829	8,289	105.88	27,254	28,921	31,633	36,114	114.17
Šibenik	6,089	6,417	6,365	6,682	104.98	29,376	32,517	28,916	29,441	101.82
Split	3,554	3,721	3,703	3,690	99.65	21,090	23,462	19,779	20,382	103.05
Ploče	87	122	142	148	104.23	849	849	1,124	972	86.48
Dubrovnik	3,165	3,192	3,158	3,474	110.01	24,424	27,712	20,455	21,970	107.41
<b>TOTAL</b>	<b>52,626</b>	<b>54,864</b>	<b>55,188</b>	<b>57,267</b>	<b>103.77</b>	<b>287,307</b>	<b>310,467</b>	<b>284,608</b>	<b>299,956</b>	<b>105.39</b>

Source: [12]

According to the data provided by the Croatian Ministry of the Sea, Transport and Infrastructure, in 2009 there were a total of 1,319 registered charter companies. The total number of companies with amended crews was 908. Out of the total 908 companies, 746 (82.15%) had 1 or 2 vessels, 101 (11.12 %) had 3 to 10 vessels, and 8 (0.88%) had more than 50 vessels (Table 6). The average number of vessels per every charter company with amended crews was 3.7 vessels. In 2010 there were 143 newly registered charter companies, while the total number of registered yachts and boats for rent was 4,099 (Table 7). The total number of charter guests in 2010 was 327,631, an increase of 3.26% compared to 2009 when there were 317,288 registered guests. The number of Scandinavian charter guests only (coming from Sweden, Denmark, Norway and Finland) increased by 28.15% in 2010 compared to 2009.

**Table 6: Number of vessels per charter company with amended crews in 2009.**

	NUMBER OF VESSELS								
	1 or 2	3 - 5	6 - 10	11 - 20	21 - 30	31 - 40	41 - 50	51 - 100	more than 100
Number of charter companies	746	59	42	28	14	5	6	6	2

Source: [12]

**Table 7: Number of charter companies and charter vessels from 2006 to 2010**

	YEAR				
	2006	2007	2008	2009	2010
Number of charter companies	719	928	1,115	1,319	1,462
Number of charter vessels	3,056	3,463	3,809	3,975	4,099

Source: [12]

#### 4 FUTURE DEVELOPMENT OF THE NAUTICAL TOURISM IN CROATIA

The Croatian Nautical Tourism Development Strategy for the period 2009-2019 suggests a moderate scenario of nautical tourism development. This scenario is based on the conclusions of the Croatian Nautical Tourism Development Study which proposed a future increase of the carrying capacity of berths to accommodate additional 15,000 vessels in the next 10 years (5,000 berths in ports of nautical tourism, 5,000 in ports open to public traffic, and 5,000 in areas on the mainland). Taking into account the characteristics of counties and their maximum capacities according to the county spatial planning, 5,000 berths would be made in existing ports, 5,000 evenly in new locations and 5,000 on mainland.

When planning the construction of berths in ports it is necessary to acknowledge the trend of ever larger yachts, which the existing infrastructure is unable to accept [1, p. 37]. The construction of the so-called "mega marinas" is planned in the vicinity of airports and major cities.

The Croatian Nautical Tourism Development Strategy for the period 2009-2019 identified the following fifteen sites as excellent locations for the construction of new berths: Rovinj, Pula-St. Katherine, Rijeka-Porto Baroš, Novalja, Pakoštane, Zadar, Šibenik - Mandalina, Dugi Rat, Split - Žnjan, Marina, Vis, Dubrovnik - Gruž, Slano, Orebić and Vela Luka.

In 2018 the total revenue from nautical tourism is expected to be worth around 15 billion dollars. In order to implement the strategy for the Croatian Nautical Tourism Development Strategy, Croatia established a coordinating body that will supervise its implementation. Moreover, the Action plan for effective and uniform implementation of the Strategy containing measures, activities, stakeholders and dates is already being implemented.

## 5 CONCLUSIONS

The Republic of Croatia with its 5835.3 km long indented coastline and more than 1000 islands, islets and reefs offers a natural starting point for the development of nautical tourism. Natural foundation of nautical tourism is the coastline. The most attractive part of the Croatian coast is the large number of hidden harbours, bays on non-urbanized or uninhabited islands, as well as areas under different categories of protection. Especially attractive are the national parks Brijuni, Kornati, Krka and Mljet, and the parks of nature Telašćica and Lastovo archipelago.

Nautical ports represent the starting point for boaters in further navigation on the Adriatic Sea. Therefore, during the planning and construction of new capacities and the development of existing ports of nautical tourism it is important to respect environmental standards in order to avoid disruption of ecological balance and negative impact on biodiversity. When choosing a site for construction of nautical tourism port, it is necessary to give priority to less valued areas (devastated areas such as quarries, abandoned military ports, industrial plants, etc.). Moreover, it is necessary to determine the carrying capacity of the area and limit the growth of reception facilities for a specified period. The Croatian Nautical Tourism Development Strategy for the period 2009-2019 suggests a moderate scenario in the development of new reception facilities for nautical vessels, while the counties' space planning predicts a faster scenario.

In 2010 there were 16,913 berths in 98 nautical tourism ports, while the total registered number of yachts and boats for rent was 4,099. The registered number of foreign yachts and boats arrivals was 58,394.

Looking at the number of vessels, a trend of ever larger vessels can be observed. In 2010, compared to 2006, the number of vessels on permanent berth in sea increased by 112.06% for vessels longer than 20 meters, by 45.05% for vessels between 15 and 20 meters, and by 17.64% for vessels between 12 to 15 meters (Table 3). In the same period the number of vessels from 10 to 12 meters increased by 1.96%, the number of boats under 6 meters increased by 7.16%, while the number of boats from 6 to 8 and those from 8 to 10 meters fell by -9.69% and -7.36% respectively. Moreover, in the same period the number of vessels in transit that are longer than 20 meters increased by 13.09%, those from 15 to 20 meters by 20.86%, and those from 12 to 15 meters by 5.01%. The number of vessels of other lengths decreased.

In parallel with the increase of the number of larger vessels came an increase in the number of berths (Table 2). In 2010 the number of berths longer than 15 meters increased by 30.69% compared to 2006, while the increase of the other berths was the following: 22.19% for boats under 6 meters, 0.05% for boats between 6 and 8 meters, 1.93% for boats between 8 and 10 meters, and 3.68% for boats between 10 and 15 meters.

When planning the construction of new berths or ports or the expansion of existing ones, it is important to take into consideration the trend of ever larger vessels. In order to meet the growing demand for nautical tourism services and offer quality services, it is important to offer also other services, such as the maintenance and equipping of vessels for boating, hospitality and education of staff and the attractiveness of content on land, thereby providing controlled, limited and focused sustainable development of nautical tourism. Guidance on future construction of new berths and ports, and the expansion of existing ones, apart from *legal and environmental criteria*, should also respect the *commodity flow criteria* (depending on the season, economic sector, current demand for berths and vessels), *spatial criteria* (distance from populated and urbanized areas, size of the area, expanding possibilities), *technical and technological criteria* (nautical tourism ports equipment, existing infrastructure) and *organizational criteria* (terms of introducing security and protective measures, current nautical tourism development strategy, IT support, trained and friendly staff).



## REFERENCES

1. Nautical Tourism Strategy of the Republic of Croatia for the period 2009-2019, Ministry of the Sea, Transport and Infrastructure, Ministry of Tourism, Zagreb, December 2008.
2. Law Tourism Services (National Gazette 68/07, and 88/10), Croatian Parliament, Zagreb.
3. Regulation on types and categories of nautical vessels (National Gazette 69/08, and 83/09), Ministry of Tourism, Zagreb, 5 June 2008.
4. Regulation on the classification and categorization of nautical tourism ports (NN 72/08), Ministry of Tourism, Zagreb, 12 June 2008.
5. Regulation on the criteria for determining the purpose of parts of the ports open to public traffic of county and local importance, methods of payment of berths, terms of use, and determination of the maximum amount of compensation and income distribution (National Gazette 94/07)
6. Statistical Yearbook of the Republic of Croatia, Croatian Bureau of Statistics, Year 42, December 2010, Zagreb, ISSN 1333-3305.
7. Nautical Tourism, Capacities and Operation of Nautical Ports, 2010, First release, Croatian Bureau of Statistics, 18.03.2011, Zagreb, ISSN 1330-0350
8. Nautical Tourism, Capacities and Operation of Nautical Ports, 2009, First release, Croatian Bureau of Statistics, 18.03.2010, Zagreb, ISSN 1334-0565
9. Nautical Tourism, Capacities and Operation of Nautical Ports, 2008, First release, Croatian Bureau of Statistics, 18.03.2009, Zagreb, ISSN 1334-0565
10. Nautical Tourism, Capacities and Operation of Nautical Ports, 2007, First release, Croatian Bureau of Statistics, 19.03.2008, Zagreb, ISSN 1334-056
11. Nautical tourism, Capacities and operation of nautical ports, 2006, First release, Croatian bureau of statistics, 22.03.2007, Zagreb, ISSN 1334-0565
12. Ministry of the Sea, Transport and Infrastructure.
13. Attitudes and consumption of sailors in Croatia, Institute for Tourism, press release, Zagreb, [http://www.iztzg.hr/UserFiles/Pdf/Tomas/2007\\_TOMAS-Nautika\\_2007.pdf](http://www.iztzg.hr/UserFiles/Pdf/Tomas/2007_TOMAS-Nautika_2007.pdf)(8.4.2011)